UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	Docket Nos. 50-266 & 50-301-SLR
NextEra Energy Point Beach, LLC	)	March 23, 2021
(Point Beach Nuclear Plant, Units 1 and 2, Subsequent License Renewal Application)	)	
	)	

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PETITION OF PHYSICIANS FOR SOCIAL RESPONSIBILITY WISCONSIN FOR LEAVE TO INTERVENE IN POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 SUBSEQUENT LICENSE RENEWAL PROCEEDING, AND REQUESTING AN ADJUDICATORY HEARING

Now comes the Petitioner, Physicians for Social Responsibility Wisconsin ("PSR WI"), on its behalf and also on behalf of its members, by and through counsel, and moves for leave to intervene and for the setting of an adjudicatory hearing in the matter of the Subsequent License Renewal Application for NextEra Energy Point Beach, LLC; Point Beach Nuclear Plant, Units 1 and 2 ("PBNP"), Docket Nos. 50-266 and 50-301. *See*, Notice #NRC-2020-0021, published at 86 FR 6684[1] (1/22/2021). In that proceeding, NextEra Energy Point Beach, LLC seeks to extend the Nuclear Regulatory Commission ("NRC") operating licenses for PBNP for 20 years beyond their present license termination dates of October 5, 2030, and March 8, 2033, for Units 1 and 2, respectively.

In support of their Request for Hearing and Petition to Intervene, Petitioner further states as follows:

[1]https://www.federalregister.gov/documents/2021/01/22/2021-01410/nextera-energy-point-beach-llc-point-beach-nuclear-plant-units-1-and-2

I. PETITIONER PSR, ITS MEMBERS AND STANDING

A. Petitioner PSR

1. Petitioner Physicians for Social Responsibility Wisconsin ("PSR WI"), is a nonprofit § 501(c)(3) organization located at 720 Hill Street, Suite 200, Madison, WI 53705, www.psr-wisconsin.org, info@psrwisconsin.org, 608.232.9945. PSR WI is a 36-year-old organization of health professionals and other concerned individuals who work to protect human life from the gravest threats to health and survival in the hope of preventing that which cannot be cured. PSR WI has 900 members. PSR WI works to end commercial nuclear power generation and engages in public education and legal and administrative advocacy in licensing proceedings to that end. PSR WI supports multiple measures to protect the health and safety of its members and the Wisconsin public from radiological injury. By declaration submitted along with this Petition, PSR WI wishes to represent all Member Declarants listed below.

B. Member Declarants

2. Roy Douglas Ozanne is a citizen of Wisconsin and member of PSR WI who lives at 12321 Sandy Bay Road, Two Rivers, WI, which is situated one straight-line mile from Point Beach Nuclear Plant.[2] He lives and works out of his home as a physician, and has patients and guests coming to his home. He also maintains a retreat space to which patients can come and stay. He is very concerned about the health and safety of the area environment for himself and the people he invites to his home. Dr. Ozanne is concerned that an extension to 80 years of operations at PBNP means that the power plant's components will age. He notes that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP

[2]See the Declaration of Dr. Ozanne annexed to this Petition.

will increase as plant operations continue. He is aware that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. He believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. Dr. Ozanne expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP. He is troubled that he or his family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property.

3. John T. Duffin is a member of PSR WI whose residence is located at 1202 Southfield Dr., Menasha, WI, 47 straight-line miles from PBNP. He lives and shops within a 50 mile radius of PBNP.[3] He visits and walks with his son and his wife who also live within the radius, he walks his son's dog in area neighborhoods and at local parks, and he walks with friends at state and county parks within the radius. Mr. Duffin bikes and kayaks and gathers with friends in Menasha. He gardens regularly in his yard. He has camped several times at Point Beach State Forest, about 6 miles from PBNP, and he and his family have enjoyed the beach there in the past. He recently has enjoyed bicycling with his partner along the Mariners Trail from Manitowoc to Two Rivers, about 12 to 20 miles from PBNP. Mr. Duffin has visited the Wisconsin Maritime Museum and also shops and eats in the Manitowoc-Two Rivers area. He fully embraces this part of northeastern Wisconsin. Mr. Duffin is concerned that an extension to 80 years of operations means that the power plant's components will age. He notes that the reactor vessels at PBNP are

[3]See Declaration of John T. Duffin, annexed to this Petition.

significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations continue. Mr. Duffin is aware that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. He believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. He expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and is troubled that he or his family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property.

4. Aleks Kosowicz is a member of PSR WI who lives at 1745 Roberts Lane, Abrams, WI, 49.54 straight-line miles from PBNP.[4] She conducts the majority of her activities within a closer radius than that. She is seeking employment in the Green Bay-DePere vicinity, but would accept a job as near to PBNP as Manitowoc. She conducts all of her business (including regular banking and grocery shopping at various shops) and recreating (kayaking and spending time in nature) around the Green Bay, Lake Michigan shore, and Fox River. She plans to volunteer with local animal shelters and wildlife sanctuaries. Because she cares about the safety of her family and all wildlife in the region, Ms. Kosowicz considers herself to be especially protective of the health and quality of the natural resources upon which she, her family, the surrounding communities, and, the abundant regional wildlife rely. Ms. Kosowicz is concerned that an extension to 80 years of operations means that the power plant's components will age. She notes

[4]See Declaration of Aleks Kosowicz annexed to this Petition.

that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations continue. Ms. Kosowicz is aware that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. She believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. She expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and is troubled that she or her family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property. Ms. Kosowicz is cognizant that there will likely be radioactive leakage and contamination from the routine handling and storage, whether in a spent fuel pool or dry storage casks or canisters, of spent nuclear fuel and other irradiated materials at PBNP during the extended operating period. She does not believe her interests will be adequately advanced and represented in this proceeding unless PSR WI is granted intervenor status to do so.

5. Marie Luna is a citizen of Wisconsin and member of PSR WI who resides at 2138 S. Walden in Appleton, WI, located 45 straight-line miles from PBNP.[5] Within 50 miles of PBNP, Ms. Luna travels related to her job, and spends time with friends and family in Two Rivers, which is about 11 miles from the plant. Ms. Luna is concerned that an extension to 80 years of operations means that the power plant's components will age. She notes that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will

[5]See Declaration of Marie Luna annexed to this Petition.

increase as plant operations continue. She is concerned that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. She believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. She expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP and is troubled that she or her family might be killed, injured or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property. She is cognizant that there is likely radioactive leakage and contamination from the routine handling and storage, whether in a spent fuel pool or dry storage casks or canisters, of spent nuclear fuel and other irradiated materials at PBNP during the extended operating period. Ms. Luna does not believe her interests will be adequately advanced and represented in this proceeding unless PSR WI is granted intervenor status to do so.

6. Thomas J. Cretney is a citizen of Wisconsin and member of PSR WI. He resides full-time at N2401 Vanderloop Rd, Kewaunee, WI which is located 18 straight-line miles from PBNP.[6] He is concerned that an extension to 80 years of operations means that the power plant's components will age. He notes that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations continue. Mr. Cretney is aware that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. He believes there might be tritium and radioactive isotopes from

[6]See Declaration of Thomas J. Cretney, annexed to this Petition.

the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. He expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and is troubled that he or his family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property. Mr. Cretney is concerned that an extension to 80 years of operations means that the power plant's components will age. He notes that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations continue. He is aware that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. He believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. He expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and is troubled that he or his family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property.

7. Frederick Richard Trost is a citizen of Wisconsin and a member of PSR WI. His residence is located at 2812 Windepoint Court in Sheboygan, WI, 36.7 straight-line miles from the PBNP.[7] With members of his family, he kayaks along the shoreline of beautiful Lake

[7]See Declaration of Frederick Richard Trost annexed to this Petition.

Michigan and enjoys the parks located by (and close to) the Lake. He takes photographs of the Lake at different times of year. Over the years he has fished for coho salmon in Lake Michigan, and has helped keep fishing boat captains in business. He swims in the Lake with his family and lays on the pristine beaches in and near Cleveland, WI, which is about 35 miles from PBNP. He shops in local stores that depend for their business on proximity to the Lake. When family members or friends from out-of-state visit, he accompanies them to Lake Michigan. Mr. Trost is concerned that PBNP "will present serious dangers to human life and to the environment as we know it close to the lake. I am concerned for the State of Wisconsin and tourism as the reactor vessels, already fragile, continue to have issues with the cooling system and spent fuel present themselves. I am concerned by extending the operating license for an additional twenty years, all of us who live here will he presented a catastrophe to life as we know and love it."

8. Montgomery Elmer is a citizen of Wisconsin and member of PSR WI. He resides at W2642 Brookhaven Drive in Appleton, WI, which is located 38.4 straight-line miles from PBNP.[8] He is a Family Physician of 35 years' duration in the Appleton area and the vast majority of his medical practice falls within the 50-mile radius of PBNP. For the past 13 years he has been the President of the Kimberly Area School District Board of Education. The school district boundaries lie within the 50-mile radius of PBNP. He frequently fishes in the creek and river tributaries (Manitowoc/Kewaunee/Branch) that flow into Lake Michigan, within a 50-mile radius of PBNP. Dr. Elmer is concerned that an extension to 80 years of operations means that the power plant's components will age. He notes that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations

[8]See the Declaration of Montgomery Elmer annexed to this Petition.

continue. He knows that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. He believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. Dr. Elmer expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and is troubled that he or his family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property from continued plant operations.

9. Lynn Utesch and Nancy Utesch are citizens of Wisconsin and PSR WI members who live at E5173 Fourth Road, Kewaunee, WI, which is 21 straight-line miles from PBNP.[9] The Utesches are cattle ranchers who raise grass-fed beef cattle on a 150 acre farm on a full-time basis. They rarely leave the area because of their obligations to their animals, so they shop locally and recreate at local parks and beaches, all within 50 miles of PBNP. The Utesches both are concerned that an extension to 80 years of operations means that PBNP's components will age. They are concerned that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations continue. They both know that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. They believe that there might be tritium and radioactive isotopes from the plant contaminating the plant site and groundwater beneath it, and that contamination has or may flow

[9]See the Declaration of Nancy Utesch and the Declaration of Lynn Utesch, both of which are annexed to this Petition.

into Lake Michigan. The Utesches expect the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and they are troubled that they might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to their real and personal property holdings.

10. Richard C. Swanson is a Wisconsin citizen and member of PSR WI who resides at 710 3rd Street, Algoma, WI, 27 straight-line miles from PBNP.[10] He lives one block from Lake Michigan and "loves it." He recreates and shops locally, well within 50 miles of PBNP. Mr. Swanson is concerned that an extension to 80 years of operations means that the power plant's components will age. He notes that the reactor vessels at PBNP are significantly embrittled and that the chance of serious mishaps from PBNP will increase as plant operations continue. He knows that the once-through cooling system at the plant is extremely destructive to aquatic life in Lake Michigan. He believes there might be tritium and radioactive isotopes from the plant that have contaminated the plant site, groundwater beneath it, and that contamination has or may flow into Lake Michigan. Mr. Swanson expects the quantity of irradiated fuel onsite to grow larger along with the chances of an accident involving the spent fuel pool at PBNP, such as a spent fuel pool fire or canister drop accident, or a serious breach of one or more of the dozens of spent fuel storage casks maintained at PBNP, and is troubled that he or his family might be killed, injured, or sickened by airborne or waterborne radioactive releases, and experience irreparable damage to real and personal property from continued plant operations.

[10]See Declaration of Richard C. Swanson annexed to this Petition.

C. Legal Basis for Standing

1. Judicial Concepts of Standing

11. Pursuant to 10 CFR § 2.309, a request for hearing or petition for leave to intervene must address (1) the nature of the petitioner's right under the Atomic Energy Act to be made a party to the proceeding, (2) the nature and extent of the petitioner's property, financial, or other interest in the proceeding, and (3) the possible effect of any order that may be entered in the proceeding on the petitioner's interest.

12. In determining whether a petitioner has sufficient interest to intervene in a proceeding to determine whether to license a commercial nuclear power plant, the Commission has traditionally applied judicial concepts of standing.[11] Contemporaneous judicial standards for standing require a petitioner to demonstrate that (1) she, he or it has suffered or will suffer a distinct and palpable harm that constitutes injury-in-fact within the zone of interests arguably protected by the governing statutes (*e.g.*, the Atomic Energy Act of 1954 ("AEA") and the National Environmental Policy Act of 1969 ("NEPA"); (2) the injury can be fairly traced to the challenged action; and (3) the injury is likely to be redressed by a favorable decision.[12]

13. An organization that wishes to intervene in a proceeding may do so either in its own right by demonstrating harm to its organizational interests, or in a representational capacity by demonstrating harm to its members.[13] An organization seeking representational standing must

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[11] *See Metropolitan Edison Co.* (Three Mile Island Nuclear station, Unit 1), CLI-83-25, 18 NRC 327, 332 (1983) (citing *Portland General Electric Co.* (Pebble Springs Nuclear Plant, Units 1 and 2), CLI-76-27, 4 NRC 610 (1976)).

[12] *See Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plants), LBP-99-25, 50 NRC 25, 29 (1999).

[13] *See Hydro Resources, Inc.* (2929 Coors Road, Suite 101, Albuquerque, NM 87120), LBP-98-9, 47 NRC 261, 271 (1998).

demonstrate how at least one of its members may be affected by the licensing action (such as by activities on or near the site), must identify that member by name and address, and must show (preferably by affidavit) that the organization is authorized to request a hearing on behalf of that member.[14]

2. Proximity Standing of PSR's Member Declarants

14. Standing to participate in this proceeding is demonstrated by the proximity standing set forth in the declarations of the PSR WI members annexed to this Petition. All Member Declarants, in turn, have authorized the organizational Petitioner, Physicians for Social Responsibility Wisconsin to represent their interests in this proceeding. And PSR WI has committed to representing the Member Declarants in the "Declaration of Physicians for Social Responsibility Wisconsin, filed contemporaneously to this Petition.

15. Because they all live, work and/or recreate within 50 miles of PBNP, each of the Member Declarants has demonstrated presumptive standing by virtue of their proximity to the plant.[15] In an operating license amendment proceeding, a petitioner can base his or her standing upon a combination of residence or visits near the plant and a showing that the proposed action entails an increased potential for offsite consequences.[16] Petitioners may be accorded standing if

[14] *See, e.g., Georgia Institute of Technology* (Georgia Tech Research Reactor, Atlanta, Georgia), CLI-95-12, 42 NRC 111, 115 (1995); *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), ALAB-549, 9 NRC 644, 646-48 (1979); *Houston Lighting and Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-535, 9 NRC 377, 390-97 (1979). Regarding the preference for an affidavit, see *Shieldalloy Metallurgical Corp.* (Cambridge, Ohio Facility), CLI-99-12, 49 NRC 347, 354 & n.4 (1999); *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit 1), LBP-96-1, 43 NRC 19, 23 (1996).

[15] *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 146, *aff'd*, CLI-01-17, 54 NRC 3 (2001).

[16] *Commonwealth Edison Co.* (Zion Nuclear Power Station, Units 1 & 2), CLI-99-4, 49 NRC 185, 191 (1999); *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-08-18, 68 NRC 533, 541 (2008).

they reside close enough to a planned project so that there is reasonable apprehension of injury.[17]

16. As each of the Member Declarants explains, they will suffer (or will be under threat of suffering) concrete and particularized injuries from the continued operations of PBNP Units 1 and 2 without adequate analysis of the environmental effects and/or the health and safety effects of those continued operations under the National Environmental Policy Act ("NEPA"), and absent consideration of the aging effects on certain safety-related structures, systems and components ("SSCs") at PBNP under the Atomic Energy Act ("AEA"). Petitioner PSR's experts, whose opinions appear *infra,* confirm the science behind these concerns. If PBNP Units 1 and 2 are not relicensed, the potential harms will not occur. Even if Units 1 and 2 are relicensed, the adverse environmental consequences caused by PBNP operations can be substantially reduced if they are identified, analyzed and, based on that analysis, mitigated. PBNP Units 1 and 2 may not continue operations without a license from the Commission, which by statute also has the power to order mitigation arrangements.[18]

17. The Member Declarants have expressed concerns that fall within the zone of interests protected by NEPA and its implementing regulations.[19] Their concerns also fall within the zone of interests protected by the AEA and its implementing regulations.[20] The Member Declarants

[17] *Hydro Resources, Inc., supra.*

[18] 42 U.S.C. § 2133(a).

[19] *See, e.g., Ouachita Watch League v. Jacobs*, 463 F.3d 1163, 1173 (11th Cir. 2006) ("[S]ince the injury alleged is environmental, it falls within the zone of interests protected by NEPA . . . ."); *Sabine River Auth. v. U.S. Dep't of Interior*, 951 F.2d 669, 675 (5th Cir. 1992) (plaintiffs' concerns about impacts on water quality and quantity fell within NEPA's zone of interests).

[20] *Sequoyah Fuels Corp. and General Atomics* (Gore, Oklahoma Site), 39 N.R.C. 54, 75 (1994) (membership organization granted standing by showing that "the health and safety interests of its members are within the AEA-protected zone of interests"); *Babcock and Wilcox* (Apollo, Pennsylvania Fuel Fabrication Facility), 37 N.R.C. 72, 80 (1993) (holding that specified "health, safety, and environmental concerns . . . clearly come within the zone of interests safeguarded by the AEA and NEPA").

therefore have standing to intervene in their own right: they have met the requirements for injury-in-fact, causation, and redressability, and their concerns fall within the zone of interests protected by NEPA, the AEA, and their implementing regulations. They will be affected by PBNP's proposed relicensing and failure to provide a legally adequate environmental analysis, they have provided their names and addresses, and have authorized PSR WI to intervene in this proceeding on their behalves. Thus, Petitioner PSR WI has standing to pursue this action.[21]

18. By granting the Member Declarants the relief they request in the form of requiring that an adequate environmental analysis be performed, they will obtain redress for their injuries. Even if NextEra Energy Point Beach, LLC chooses to revise its ER to provide a legally sufficient analysis, the Member Declarants will still have obtained redress: NEPA, in NRC's implementing regulations at 10 C.F.R. Parts 2 and 51, accords procedural rights to Member Declarants whose concrete interests may be harmed by the project. By requiring PBNP and the NRC staff to comply with these requirements, the Member Declarants' procedural rights will have been vindicated.[22]

19. Similarly, the NRC regulations promulgated pursuant to the AEA at 10 CFR § 54.29(a) requires that a renewed license may be issued by the Commission if "[a]ctions have been identified and have been or will be taken . . . that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the

[21] *Entergy Nuclear Vermont Yankee, L.L.C., and Entergy Nuclear Operations, Inc*. (Vermont Yankee Nuclear Power Station), 60 NRC 548, 553 (2004).

[22] *See Lujan v. Defenders of Wildlife*, 504 U.S. 555, 572 n.7 (1992) ("[P]rocedural rights are special: The person who has been accorded a procedural right to protect his concrete interests can assert that right without meeting all the normal standards for redressability and immediacy.") (internal quotations omitted); *see also Duke Energy Corp.* (McGuire, Units 1 and 2; Catawba, Units 1 and 2) CLI-02-17, 56 NRC 1, 10 (2002) (emphasizing NEPA's goal to "ensure that the agency does not act upon incomplete information, only to regret its decision after it is too late to correct.")

CLB [current licensing basis]," including "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 § 54.21(a)(1). . . ."[23]

The Member Declarants have incontestably proven their geographical proximity to PBNP and sufficient involvement in the relicensing issues, along with motivation, such that they should be accorded standing as individual petitioners. Then, PSR WI's willingness to represent its members in this proceeding should result in recognition by the Commission of PSR WI's organizational legal standing to proceed to assert and litigate contentions on their behalves.

II. CONTENTIONS

Pursuant to 10 C.F.R. § 2.309, Petitioners set forth below the specific contentions they seek to litigate. Each contention challenges the sufficiency of the application under NRC regulations, as specified therein, as well as PBNP's compliance with NEPA and the AEA. Respecting their NEPA contentions, PSR WI acknowledges that, as a private corporate entity, NextEra Energy Point Beach, LLC is not directly bound by NEPA. But as required by 10 C.F.R. § 2.309(f)(2),[24] PSR WI has stated its NEPA contentions against the "Applicant's Environmental Report, Subsequent Operating License Renewal, Point Beach Nuclear Plant Units 1 and 2 (2020)" (ML20329A248) ("Environmental Report" or "ER").

Because an applicant's ER generally serves as the basis for the Commission's eventual Draft Supplemental Environmental Impact Statement ("Draft SEIS" or "SEIS"), PSR WI also raises its NEPA claims now to preserve objections if the flaws of the ER also appear in the Draft

[23] 10 CFR § 54.29(a).

[24] 10 C.F.R. § 2.309(f)(2) ("On issues arising under the National Environmental Policy Act, the petitioner shall file contentions based on the applicant's environmental report.")

SEIS. If the Draft SEIS deviates substantially from PBNP's ER on the same issues, PSR WI reserves the option of submitting new or amended contentions addressing such departures, pursuant to 10 C.F.R. § 2.309(f)(2).

A. Scope of Proceeding and of Contentions

This license renewal proceeding is limited by 10 CFR Parts 51 and 54. A license renewal application review implicates two broad issue areas: safety/aging management issues, and public health/environmental effects. Petitioner's contentions raise issues in both areas.

The scope of the environmental review is defined by 10 C.F.R. Part 51, the NRC's "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437 (May 1996), and "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," NUREG-1437, Vols. 1 & 3, Rev. 1 (June 2013) ("GEIS"). Some environmental issues that might otherwise be germane in a license renewal proceeding have been resolved generically for all plants and are normally, therefore, beyond the scope of a license renewal hearing.[25] These "Category 1" issues are classified in 10 C.F.R. Part 51, Subpart A, Appendix B. Category 1 issues may be raised when a petitioner (1) demonstrates that there is new and significant information subsequent to the preparation of the GEIS regarding the environmental impacts of license renewal; (2) files a petition for a rulemaking with the NRC; or (3) seeks a waiver pursuant to 10 C.F.R. § 2.335.[26] There further are "Category 2" matters that can be alleged by intervenors. 10 C.F.R. Part 51, Subpart A, Appendix B, Category 2 issues are site-specific and must be addressed by the applicant in its environmental report and by the NRC

[25] *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), 54 NRC 3. 15 (2001); see 10 C.F.R. § 51.53(c)(3)(I).

[26] *Id.*, 54 NRC at 10-12; see also 10 C.F.R. § 51.53(c)(3)(iv) (new and significant information).

in its draft and final supplemental environmental impact statements for the facility.[27] Category 2 challenges relating to these issues are properly part of a license renewal proceeding.[28]

B. Materiality

Each of Petitioner's contentions below are "material" to the findings NRC must make,[29] *viz*, they are issues that would make a difference in the outcome of the proceeding.[30] "This means that there should be some significant link between the claimed deficiency and either the health and safety of the public or the environment."[31]

Each of PSR WI's contentions demonstrates sufficient information to show that a genuine dispute exists with the NextEra Energy Point Beach, LLC on a material issue of law or fact. The NRC interprets 10 C.F.R. § 2.309(f)(1) to "require the intervenor to read the pertinent portions of the license application, including the Safety Analysis Report and the Environmental Report, state the applicant's position and the petitioner's opposing view. Where the intervenor believes the application and supporting material do not address a relevant matter, it will be sufficient for the intervenor to explain why the application is deficient.[32]

Contention 1: The Environmental Report fails to consider a reasonable range of alternatives to the proposed action because of a failure to analyze thermal pollution mitigation as a means of reducing aquatic biota and migratory bird impingement, entrainment, and damage from thermal pollution, as required by NEPA and the NRC

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[27] *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-01-6, 53 NRC 138, 153 (2001).

[28] *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 67 (2008).

[29] 10 C.F.R. § 2.309(f)(1)(iv).

[30] Rules for Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Red. 33,168, 33,172 (Aug. 11, 1989).

[31] *Vermont Yankee*, 60 NRC 548, 557 (2004).

[32] 54 Fed. Reg. at 33,170.

The Environmental Report (§ 7.3) fails to comply with 10 C.F.R. §§ 51.45(c) and 51.53(c)(3)(iii) because it fails to consider an alternative under which the unmitigated once-through cooling system of Units 1 and 2 would be replaced with a closed-cycle cooling tower system to reduce the adverse environmental effects related to the once-through cooling system, including massive impingement and entrainment of aquatic organisms and occasional birds, and thermal pollution whereby the water temperature of Lake Michigan is elevated. The ER fails to include an accurate or complete analysis of "alternatives available for reducing or avoiding adverse environmental effects" and because it does not contain an adequate "consideration of alternatives for reducing adverse impacts . . . for all Category 2 license renewal issues."[33] The ER unlawfully fails to consider replacement of the once-through cooling system with cooling towers as a reasonable alternative that would "reduc[e] or avoid[ ] adverse environmental effects" relating to the Category 2 issues described below.[34] NRC regulations at 10 CFR § 51.45(c) require that the environmental report to "include an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects."

B. Scope

This contention is within the cope of this subsequent license renewal proceeding because it concerns environmental impacts. The scope of the required NEPA environmental review is

[33] 10 C.F.R. § 51.53(c)(3)(iii).

[34] 10 C.F.R. § 51.45(c).

established by 10 CFR Part 51 and the GEIS for license renewal cases.[35] This contention challenges the sufficiency of the environmental analysis in the Environmental Report within the parameters set by the GEIS. Matters of mitigation of thermal pollution, entrainment and impingement are encompassed within Appendix B to 10 CFR Part 51, Subpart A. That regulation treats the impacts of impingement and entrainment of aquatic organisms at plants with once-through cooling systems as a Category 2 site-specific issue where the effects might be deemed "SMALL, MODERATE, or LARGE. The impacts of impingement and entrainment are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems, depending on cooling system withdrawal rates and volumes and the aquatic resources at the site." And as to thermal impacts, Appendix B to 10 CFR Part 51, Subpart A also classifies the issue as be site-specific and under Category 2, concluding that thermal impacts on aquatic organisms at plants with once-through cooling systems may be "SMALL, MODERATE, or LARGE. Most of the effects associated with thermal discharges are localized and are not expected to affect overall stability of populations or resources. The magnitude of impacts, however, would depend on site-specific thermal plume characteristics and the nature of aquatic resources in the area."

C. Concise Statement of Facts

The basis for this contention is that the ER considered only two alternatives: (1) the preferred alternative (renew the operating licenses for Units 1 and 2 and keep operating) and (2) the no-action alternative (to not renew the operating licenses and, instead, implement

[35] *Entergy Nuclear Vermont Yankee, LLC* (Vermont Yankee), LBP-06-20, 64 N.R.C. 131, 148-49 (2006).

replacement power sources).[36] There was no consideration of the alternative of continued operations at PBNP with closed-cycle cooling systems as mitigation.

The current problem is that PBNP Units 1 and 2 are "super predators" in terms of their recurring effects of killing aquatic organisms and occasional birds. Nuclear power plants are the most thermodynamically inefficient way of producing electricity (Carnot efficiency). As such, they discharge an enormous amount of waste heat (hot water), and they consume a massive amount of cold water.[37]

In addition, PBNP has undergone two thermal uprates in the past two decades to accommodate the use of high burnup fuel. Mitigation in the form of mechanical draft or passive cooling tower systems would sharply reduce the thermal pollution discharges to Lake Michigan, but as importantly, the volume of water withdrawn from the Lake would shrink by about 95% and with that decrease, far fewer animals and plants would be sacrificed for the generation of electricity.

Withdrawing surface waters through cooling water intake structures ("CWISs") at power plants causes adverse environmental impacts by pulling large numbers of fish, larvae, eggs, and other small aquatic organisms into a facility's cooling system. Once pulled in, they may be killed by heat, stress, or chemical exposure (entrainment). Larger fish, crustaceans, and even marine mammals may be killed or injured when they are trapped against screens at the front of an intake structure by the force of water being drawn into the system (impingement). According to the U.S. Environmental Protection Agency ("U.S. EPA"), 2.1 billion fish, crabs, and shrimp are killed by

[36]ER at 7-1.

[37]Gundersen Declaration at ¶ 9.9.

impingement and entrainment annually.[38]

The environment may also be affected when the cooling water is discharged. Because the temperature of the effluent is higher than that of the receiving water, it may negatively affect plant growth, ecosystem composition, and fish reproduction and migration.[39]

The PBNP ER provides very limited historical data on the plant's aquatic and wildlife killing in Lake Michigan as a result of impingement and entrainment at the plant intakes. A 7.5-month long study in 1975 suggested that 2,082,525 fish larvae were entrained at PBNP during the study period, including 20% (416,505) alewife, 61% (1,270,340) rainbow smelt, 17% (354,029) sculpin, and 2% (41,651) longnose sucker. An estimated 4,661,410 fertilized alewife eggs were entrained.[40] In a one-year impingement study conducted at PBNP in 1975-76, over 313,000 fish from 31 species were collected in impingement samples generally obtained every fourth day of plant operation.[41] Total estimated impingement for the year was 1,056,724 fish.[42] Alewives and rainbow smelt constituted over 99 percent of all fish impinged during the study.[43] The estimated 161,389 rainbow smelt impinged at PBNP during the 1975 to 1976 study had an equivalent weight of 973 kg (2145 lb).[44]

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[38]U.S. EPA Office of Inspector General, "EPA Oversight Addresses Thermal Variance and Cooling Water Permit Deficiencies But Needs to Address Compliance With Public Notice Requirements," Report No. 13-P-0264 at 1 (May 23, 2013). https://www.epa.gov/sites/production/files/2015-09/documents/20130523-13-p-0264.pdf

[39]*Id.*

[40]NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 23." (Regarding Point Beach Nuclear Plant Units 1 and 2), ML052230490, at pp. 4-11 - 4-12.

[41]*Id.* at 4-15.

[42]*Id.*

[43]*Id.*

[44]*Id.* at 4-16.

In a 2005-2006 impingement study, 1,600,000 million fish and crayfish were collected, weighing approximately 6,134 kilograms.[45]

A 2017 entrainment study from April through September resulted in 32,477 organisms collected, five shellfish taxa and five ichthyoplankton taxa.[46]

Point Beach has also entrained or impinged waterfowl. In 1990 the intakes killed double-crested cormorants.[47] From 2001-2003, 33 birds were trapped, mainly gulls.[48]

Respecting thermal pollution caused by PBNP, the plant withdraws cooling water from Lake Michigan at a peak rate of about 1,080,000,000 gallons per day for both units.[49] Since 2002 there have been two thermal uprates at PBNP. In 2003, PBNP underwent a 1.4 percent power uprate, which increased the rated thermal output to 1540 MW(t) and increased the gross electrical power to 545 MW(e) (518 MW[e] net).[50] At that time PBNP switched to "high burnup" fuel, enriched to contain a nominal 5.0 weight percent of uranium-235.[51] The 2005 Supplemental Environmental Impact Statement (NUREG-1437) does not indicate that any study was conducted prior to that uprate to predict the thermal effects and lethal implications for aquatic life. The National Pollutant Discharge Elimination System ("NPDES," in Wisconsin called the "WPDES") at that time required monitoring and reporting of PBNP discharges to the Lake, but imposed no thermal water-quality standards for compliance.[52] The WPDES permit also required

[45]ER (2020) at 3-129.
[46]*Id.* at 3-128.
[47]NUREG-1437 at 2-30.
[48]*Id.* at 4-19.
[49]ER p. 4-25.
[50]*Id.* at p. 2-4.
[51]*Id.*
[52]*Id.* at 4-20.

a study of the cooling-water intake to assess any potential adverse impacts in future permits.[53]

Ahead of the next uprate, as required by the WPDES permit, NextEra in 2004 had EA Engineering compile a study, "Point Beach Nuclear Plant Evaluation of the Thermal Effects Due to a Planned Extended Power Uprate," which "modeled temperature increases for potential plant upgrades and determined that the plume predicted area, volume, and behavior will not be substantially different from previous conditions."[54] The extended power uprates ("EPUs") were estimated to result in a 2°C (3.6°F) increase in discharge temperature. Pre-uprate, the month of August, which typically showed the highest water temperatures, saw an average discharge temperature of 19.3°C (66.74°F). The maximum temperature increase over intake temperature as a result of the uprate at 1,000 feet offshore (within the security zone) was predicted to be 8.57°C (15.43°F) with an assumed along-shore current of 0.2 feet/second. This increase, when added to the average temperature at the intake for August (19.3°C (66.74°F)), resulted in an estimated average temperature of 27.9°C (82.2°F) at the approximate end of the security zone.[55] The average August discharge temperatures for years 2014–2018 for Units 1 or 2 (whichever was higher) were 82.2°F, 75.6°F, 84.8°F, 87.7°F, and 84.0°F, and the highest average daily discharge temperature for August 2019 was 88.8°F.[56]

PBNP's present WPDES permit limits waste heat rejected to Lake Michigan to a weekly average of 8,273 MBtu per hour. The permit requires reporting of intake and discharge temperatures to allow for the calculation of the heat rejection.[57] In a 2012 internal memo entitled

[53] *Id.* at 2-19, (citing WDNR 2004a).

[54] ER (2020) at 4-25, 10-4.

[55] ER at 3-212.

[56] *Id.*

[57] *Id.*

"Approval of the alternative effluent temperature limit for the Point Beach Nuclear Plant,"[58] the Wisconsin Department of Natural Resources noted that a 2009 study commissioned by PBNP showed that "the area of water elevated more than 1 °C increased by 28% to 1170 acres) extending approximately 1.8 miles downshore and a maximum of 1.5 miles offshore. The area of the 2°C contour increased 24% to 390 acres and the area of the 5°C contour increased 41 % to 44 acres or roughly a circle with a diameter of 1900 feet."[59] The agency determined:

> After reviewing the available temperature data and the temperature preferences of the representative important species, there appears *[sic]* to be portions of the mixing zone that will not be suitable for all life stages of these species. Although the discharge plume may cause some negative impacts to the fish community of the immediate area or to the localized ecology of the area, the Department has concluded that the thermal plume created at 8,273 MBTU/hr will cause minimal impacts to the fish and invertebrate communities on the representative important species list.[60]

The analysis performed by NextEra in the ER is incomplete and insufficient to support the determination to not consider a closed-cycle cooling tower alternative, for several reasons.

NextEra essentially considers the impact of PBNP's thermal discharge in isolation, and does not consider the cumulative impacts of its thermal discharge together with all other significant impacts on the species affected.[61] "[A] determination of the thermal discharge cannot be made without considering all other effects on the environment, including the effects of the intake *(i.e.,* entrainment and entrapment). . . ." *In re Pub. Serv. Co. of N.H.* (Seabrook Station, Units I & II), 1977 EPA App. LEXIS 16, *19-20; 1 E.A.D. 332 (Adm'r 1977).

Also, NextEra's analysis inappropriately assumes the aquatic "community" to include all

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[58]The August 29, 2012 memo is an attachment to PBNP's current WPDES permit, ER at p. 639/705 of .pdf, *et seq.*

[59]*Id.* at 640 of ER.

[60]*Id.* at 641 of ER.

[61]See ER at 4-25, WI DNR analysis at ER pp. 639/705 of .pdf.

of Lake Michigan, whereas a proper analysis should focus on specific, localized site conditions. *See, e.g., Appalachian Power Co. v. Train*, 545 F.2d 1351, 1372 (4th Cir. 1976) (upholding EPA's interpretation of § 316(a)[62] as "providing for consideration of specific site conditions in the setting of thermal limitations for individual power plants" and that even where a discharge might satisfy state temperature standards, "such discharge might nevertheless cause serious harm to a particular spawning ground, for example, located just below the plant's discharge point.").

Additionally, PBNP relied greatly on ancient (1975) data in conducting its analysis in the ER, and applied only a list of a few representative important species ("CRIS") in the retrospective on the plant's 2012 thermal uprate. There is insufficient analysis of the impacts of the thermal discharge between 1975 and 2020 (an omission PBNP attempts to account for by relying on data from other power plants on Lake Michigan). Even PBNP's spotty data from the past 45 years suggests substantial changes to the aquatic community.

Notwithstanding these distinct scientific weaknesses in its analysis, and the changed regulatory view of the need to impose closed-cycle cooling to stop power plant carnage, NextEra concluded in the ER that "[b]ecause there are no planned operational changes during the proposed SLR operating term that would increase the temperature of PBN's existing thermal discharge, impacts are anticipated to be SMALL and mitigation measures are not warranted."[63] NextEra's trivialization of the effects of its once-through, unmitigated thermal pollution system is evident where despite the 10 CFR 51.53(c)(3)(iii) mandate that the ER "*must* contain a consideration of alternatives for reducing adverse impacts, as required by 51.45(c) for all

[62]Clean Water Act § 316 is codified as 33 U.S.C. § 1326.

[63]ER at 4-26.

Category 2 license renewal issues," PBNP asserts there are "no significant adverse effects that would require consideration of additional alternatives. Therefore, NEPB concludes that the impacts associated with renewal of the PBN OLs would not require consideration of alternatives for reducing adverse impacts. . . ."[64] (Emphasis added).

Meanwhile, the passage of time has seen retrofits being forced on older nuclear power and other plants. Palisades Nuclear Plant, an 800-MW plant across Lake Michigan from PBNP, converted from a once-through cooling system to a closed-cycle wet cooling tower system after a significant period of operating utilizing the once-through system.[65] At least five other power plants have also been required to convert to a closed-cycle system.[66] One is the Indian Point complex in New York. *See Indian Point Nuclear Facility (NY):* "Pursuant to Section 316(b) of the CWA,[67] and 6 NYCRR Part 704.5, the Department has determined that the site-specific best technology available (BTA) to minimize adverse environmental impact of the Indian Point Units 2 and 3 cooling water intake structures is closed-cycle cooling."[68] On January 9, 2017, Entergy Corporation, the State of New York, and environmental groups agreed to close the Indian Point Units 2 and 3 nuclear reactors in 2020 and 2021, rather than install cooling towers for Entergy's proposed licensure venture.

Oyster Creek Generating Station (OCGS), located on Barnegat Bay in New Jersey and

[64]ER at 7-39.

[65]U.S. Environmental Protection Agency, "Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule" (Apr. 2002), at 4-1 (hereinafter "EPA 2002 TDD").

[66]EPA 2002 TDD, at 4-1 to 4-6; Cooling Tower Feasibility Assessment, at 28–29 & n. 138.

[67]33 U.S.C. § 1326(b).

[68]Fact Sheet, New York State Pollutant Discharge Elimination System (SPDES) Draft Permit Renewal with Modification (Indian Point Electric Generation Station, Buchanan, New York) 0004472 – Rev. January 2017, https://www3.epa.gov/region1/npdes/schillerstation/pdfs/AR-392.pdf

owned by Exelon Corporation, applied for and received a 20-year license extension from the NRC in 2009, but was denied the ability to discharge its waste heat into the Bay at the State permit level. *See*, *Oyster Creek Generating Station (NJ)*:[69] "Further, this draft renewal permit incorporates NJDEP's determination pursuant to Section 316(b) of the Clean Water Act regarding the best technology available for the cooling water intake structure. Specifically, the Department has determined that closed-cycle cooling (*i.e.* cooling towers) constitutes best technology available for the OCGS in accordance with best professional judgment."[70] Consequently, environmental groups, the State of New Jersey, and Exelon then negotiated an agreement that the plant would close by 2019 rather than operate until 2029, and Exelon would not install cooling towers for Oyster Creek. Exelon chose to give up the additional 10-years of operation of Oyster Creek and those profits rather than installing cooling towers.[71]

Perhaps the most damning evidence that cooling towers are *de rigeur* is in the NextEra ER itself. The three alternatives postulated by NextEra include: an Advanced Light Water Reactor ("ALWR") "with mechanical draft cooling towers" located at the PBN site; a cluster of small modular reactors ("SMRs") "with mechanical draft cooling towers" located at the PBN site; and a "Combination Alternative" involving natural gas combined cycle units "with mechanical draft cooling towers" located at the PBN site backing up an expanded photovoltaic installation there.[72]

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[69]Draft Surface Water Renewal Permit Action, Category: B-Industrial Wastewater NJPDES Permit No. NJ0005550, Oyster Creek Generating Station, Lacey Twp, Ocean County, http://www.state.nj.us/dep/dwq/pdf/draft_permit100107.pdf

[70]*Id.*

[71]Gundersen Declaration at ¶ 9.6; also, see https://www.worldnuclearreport.org/Oldest-US-Reactor-Oyster-Creek-Closed.html

[72]ER at 7-3 - 7-4.

Yet NextEra does not compare its preferred alternative of continued operations without closed-cycle cooling tower systems against an alternative where operations continue, but such a cooling system is built.

PBNP indulges a fiction that the annual destruction of 6,134 kg of fish biota - 12.75 short tons – is a "small impact" simply because there are no further temperature uprates planned for the 2030-2050 period. But the fish killed at Point Beach in 2011 were calculated to reduce the yield of Lake Michigan's fisheries by an estimated 10,625 pounds a year, or about 4.5 percent of the annual commercial fishing catch by weight.[73] But regardless of that, it is absurd to treat the recurring, known and completely predictable and voluminous future impacts of once-through cooling at PBNP as "small." The carnage will go on, unabated, producing hundreds more tons of senseless animal deaths during the extension period.

Cooling tower mitigation is also within the scope of the proceeding because NRC's NEPA regulations require a plant-specific assessment of cumulative impacts in the applicant's Environmental Report.[74] The NRC recognizes that "impacts from individually minor actions may be significant when considered collectively over time."[75] According to the 2013 GEIS;

> Impacts typically result from activities (*e.g.,* water withdrawal, effluent discharges . . .) . . . associated with . . . industrial and commercial development. . . . Perhaps the most important source of surface water impacts is the withdrawal of water for plant cooling systems (both once-through and closed-cycle). These impacts relate to water use conflicts with other users.[76]

The Union of Concerned Scientists estimates that recirculation cooling systems on

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[73] https://www.chicagotribune.com/news/ct-met-great-lakes-fish-kills-20110614-story.html

[74] 10 CFR Part 51, Subpt. A, App. B.

[75] ER at 4-49 (referencing 2013 GEIS § 4.13).

[76] § 4.13.4 of the 2013 GEIS.

nuclear plants withdraw about 5% of the water volume that once-through systems like Point Beach require.[77]

Point Beach is not the only mass water intake and discharge system on Lake Michigan. Palisades, D.C. Cook, coal burning power plants, and municipal water systems also cause impingement, entrainment and in the case of power plants, thermal pollution and resulting wildlife casualties.

It is obvious that NextEra *must* analyze mitigation in the ER. According to 10 C.F.R. § 51.53(c)(3)(iii), the environmental report must contain "consideration of *alternatives for reducing adverse impacts*, as required by § 51.45(c)," for all Category 2 license renewal issues in Appendix B to subpart A Part 51. And 10 CFR § 51.45(c) commands that "The environmental report must include an analysis that considers and balances . . . alternatives available for reducing or avoiding adverse environmental effects." (Emphasis added). Irrespective of whether entrainment, impingement and thermal pollution entail small, medium or large impacts, the mass killing of aquatic biota and birds is an "adverse environmental impact" that must be accounted for and analyzed under NEPA. Mitigating thermal pollution will draw enormously less water from Lake Michigan and will kill fewer creatures drawn into the PBNP intakes.

Indeed, the NRC's mitigation discussion and disclosure obligations are underscored by the obligation in 10 C.F.R. §§ 51.53(c)(1) and (2), which require the environmental report to "discuss in this report the environmental impacts of alternatives and any other matters described in § 51.45," bringing § 51.45(c)'s command that there be "alternatives available for reducing or avoiding adverse environmental effects" into play, again.

[77]https://www.ucsusa.org/resources/water-power-plant-cooling (table).

The NRC's NEPA regulations require that alternatives be presented in "comparative form" to "aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, 'appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.'"[78] Agencies must, to the fullest extent possible, "[s]tudy, develop, and describe appropriate alternatives to recommended courses of action in any proposal. . . "[79] There must be examination of every alternative within the nature and scope of the proposed action,[80] "sufficient to permit a reasoned choice."[81] NEPA requires a "discussion of alternatives" that "must '[r]igorously explore and objectively evaluate all reasonable alternatives.'"[82] "The existence of a viable, but unexamined alternative renders an environmental impact statement inadequate."[83]

Moreover, agencies must "study. . . significant alternatives suggested by other agencies or the public. . . ."[84] Even an alternative which would only partially satisfy the need and purpose of the proposed project must be considered by the agency if it is "reasonable,"[85] because it might convince the decision-maker to meet part of the goal with less impact.[86]

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[78]10 CFR § 51.45(b)(3).

[79]42 U.S.C. § 4322(2)(E); *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519-20 (9th Cir. 1992).

[80]*California v. Block,* 690 F.2d 753, 761 (9th Cir. 1982).

[81]*Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810, 815 (9th Cir. 1987).

[82]*Union Neighbors United, Inc. v. Jewell*, 831 F.3d 564, 569 (D.C. Cir. 2016) (quoting 40 C.F.R. § 1502.14).

[83]*Idaho Conservation League, supra*; *Natural Res. Defense Council v. U.S. Forest Serv.*, 421 F.3d 797, 813 (9th Cir. 2005) (internal quotation marks omitted); *see also City of Grapevine v. Dep't of Transp.*, 17 F.3d 1502, 1506 (D.C. Cir. 1994) (agency must consider "all 'feasible' or 'reasonable' alternatives[.]").

[84]*DuBois v. U.S. Dept. of Agric*., 102 F.3d 1273, 1286 (1st Cir. 1996), *cert. denied*, 117 S.Ct. 1567 (1997).

[85]*Natural Resources Defense Council v. Callaway,* 524 F.2d 79, 93 (2nd Cir. 1975).

[86]*North Buckhead Civic Ass'n v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990).

If the agency has not adequately studied the issue, the courts may "substitute their judgment of the environmental impact for the judgment of the agency."[87]

Clearly, a genuine dispute exists between PSR WI and NextEra on a material issue of law or fact. The harm NEPA seeks to prevent commenced at the point that NextERA concluded that there were no adverse environmental consequences from 50 years of once-through cooling at PBNP and that consequently there need be no consideration of mitigation.[88] "The injury of an increased risk of harm due to an agency's uninformed decision is precisely the type of injury [NEPA] was designed to prevent."[89]

A "hard look" for a superior alternative is a condition precedent to an agency licensing determination that an applicant's proposal is acceptable under NEPA.[90] Petitioner PSR WI has articulated an admissible contention that there must be analysis in the ER (and ultimately the NRC Environmental Impact Statement) of the alternative of continued operation of PBNP with closed-cycle cooling towers.

Contention 2: Point Beach's continued operation violates 10 CFR Part 50, Appendix A, Criterion 14 because the reactor coolant pressure boundary has not been tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture, and the aging management plan does not provide the requisite reasonable assurance.

In recent years, the NRC has systematically removed conservative calculational aspects of the embrittlement process to allow continued operation. The NRC has not incorporated the actual data from coupons/capsules in the remaining five worst embrittled atomic power reactors in the

[87] *Crounse Corp. v. Interstate Commerce Comm'n*, 781 F.2d 1176 (6th Cir. 1986).

[88] *Sierra Club v. Marsh*, 872 F.2d 497, 500 (1st Cir. 1989).

[89] *Comm. to Save the Rio Hondo v. Lucero,* 102 F.3d 445, 448-49 (10th Cir. 1996).

[90] *Public Service Co. of New Hampshire (Seabrook Station, Units 1 & 2)*, ALAB-471, 7 NRC 477, 513 (1978).

country, one of which is Point Beach Unit 2, for analysis which could be used to assess whether the Point Beach reactors should be allowed continued operation. The NRC has allowed Point Beach and its cohorts to use analytical techniques that ignore the data from sample coupons it could readily test. There is no scientific basis by which the Point Beach reactors should continue operating without a complete physical analysis of the coupons from its reactors and the five other reactors that are its embrittled cohorts. Point Beach's continued operation violates 10 CFR Part 50, Appendix A, Criterion 14 because the reactor coolant pressure boundary has not been tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

A. Within the Scope

This contention is within the scope of this proceeding and material to the findings the NRC must render. For a license renewal proceeding, 10 C.F.R. Part 54 establishes the scope of the proceeding for safety concerns.[91] NRC regulations promulgated pursuant to the AEA at 10 CFR § 54.29(a) requires that a renewed license may be issued by the Commission if "[a]ctions have been identified and have been or will be taken . . . that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB [current licensing basis]," including "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 § 54.21(a)(1). . . ."[92] The contention is "material" to the findings NRC must

[91] *PPL Susquehanna, LLC* (Susquehanna Steam Electric Station, Units 1 & 2), LBP-07-4, 65 NRC 281, 306 (2007).

[92] 10 CFR § 54.29(a).

make,[93] because it is an issue that would make a difference in the outcome of the proceeding.[94] Also, there is a "significant link between the claimed deficiency and either the health and safety of the public or the environment."[95] If pressurized thermal shock were to occur within one of the Point Beach reactors, as explained below, it could result in a Class 9 accident.

B. Concise Statement of Evidence

Petitioner PSR WI's expert witness for this contention is Arnold Gundersen, who has more than 50 years of experience in Nuclear Engineering.[96] He has a Bachelor's Degree in Nuclear Engineering (BSNE) from Rensselaer Polytechnic Institute (RPI) *cum laude* and a Master's Degree in Nuclear Engineering (MENE) from RPI via an Atomic Energy Commission Fellowship. He studied cooling tower operation and cooling tower plume theory for his Master's.

Mr. Gundersen progressed in his career from reactor operator and instructor to the position of Senior Vice President for a nuclear licensee prior to becoming a nuclear engineering consultant and expert witness. He has considerable experience testifying as an expert witness to the NRC ASLB and the Advisory Committee on Reactor Safeguards ("ACRS"), in federal court, before the State of Vermont Public Service Board, the State of Vermont Environmental Court, the Florida Public Service Commission, and the California Public Utility Commission ("CPUC"). He is an author of the first edition of the U.S. Department of Energy ("DOE") Decommissioning Handbook. His five decades of professional nuclear experience include

[93] 10 C.F.R. § 2.309(f)(1)(iv).

[94] Rules for Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Red. 33,168, 33,172 (Aug. 11, 1989).

[95] *Vermont Yankee*, 60 NRC 548, 557 (2004).

[96] Mr. Gundersen's *curriculum vitae* is attached to the Declaration of Arnold Gundersen ("Gundersen Declaration") filed with this Petition.

Cooling Tower Operation, Cooling Tower Plumes, Consumptive Water Loss, Nuclear Plant Operation, Nuclear Management, Nuclear Safety Assessments, Reliability Engineering, In-service Inspection, Criticality Analysis, Licensing, Engineering Management, Thermohydraulics, Radioactive Waste Processes, Decommissioning, Waste Disposal, Structural Engineering Assessments, Nuclear Fuel Rack Design and Manufacturing, Nuclear Equipment Design and Manufacturing, Prudency Defense, Employee Awareness Programs, Public Relations, Contract Administration, Technical Patents, Archival Storage and Document Control, Source Term Reconstruction, Dose Assessment, Whistleblower Protection, and NRC Regulations and Enforcement.

Even before Point Beach's design, scientists had discovered that neutron radiation from inside the nuclear core would gradually destroy the thick metal nuclear reactor that surrounds that core. This phenomenon, called "neutron embrittlement," can be problematic because if embrittlement becomes extensive, the dense metallic nuclear reactor can shatter like glass and cause a Class 9 radiological accident, the worst nuclear catastrophe category.[97]

Neutron embrittlement of metal cannot be halted. In the nuclear industry, in order to create a viable means of monitoring its progress in nuclear reactor vessels and components, engineers have placed numerous samples of the same exact metal the vessels are made of inside each reactor prior to operation. These samples are called coupons or capsules, and they are withdrawn periodically and measured in a laboratory to determine the progress of embrittlement.[98]

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[97]Gundersen Declaration at ¶¶ 7.4.1, 7.4.4.

[98]*Id.* at 7.4.5.

Engineers designed the Point Beach reactors to operate for 40 years, and the reactors contained enough sample coupons to last for 40 years of operation, but now that the PBNP reactors are licensed to operate for 60 years, there are not enough coupons in the reactor core to test for embrittlement, let alone for an additional 20 years out to 80 years of Point Beach operations.[99] If a nuclear reactor were to suddenly shut down during one of the dozens of atomic power mishaps that nuclear reactor design engineers and the NRC anticipate could happen, the safety system would immediately inject cool water into the reactor vessel in an attempt to cool the reactor core in hopes of preventing a meltdown.[100] However, in a seriously embrittled reactor like Point Beach, when that cool water is injected and comes in direct contact with the hot reactor vessel, it can cause "Pressurized Thermal Shock" ("PTS"). After this, the 8-inch thick steel reactor vessel may crack from PTS, causing it to break open and release massive radioactivity into the surrounding area and the environment.[101]

This rapid cooling and sudden pressurization sequence can cause a radioactive disaster.[102] There have been several historical precursor sequences showing that abrupt temperature and pressure changes do occur at operating nuclear power plants.[103]

One of the Point Beach units is officially regarded as the most embrittled reactor still operating in the United States. Of the six most embrittled nuclear reactors in the U.S., one is already closed, four more are slated to close by 2024, and only Point Beach plans to continue operations beyond 2024 – and that is until 2053.

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[99] *Id.* at 7.4.6.

[100] *Id.* at 7.5.1.

[101] *Id.* at 7.4.5.

[102] *Id.* at 7.5.2.

[103] *Id.* at 7.5.4. *See also* Gundersen Declaration ¶¶ 7.5.4.1 and 7.5.4.2.

The NRC's approach to increasing neutron embrittlement has been to develop new operator administrative controls. These administrative controls are requirements that the atomic reactor operators at Point Beach must implement during a reactor emergency to avoid cracking the 8" thick steel atomic power reactor vessel.[104] These administrative controls require the reactor operators to raise the reactor's temperature before increasing the pressure, and ***unless the operators implement these controls perfectly***, the reactor vessel will experience cracking.[105]

To measure embrittlement, when the Point Beach reactor vessels were manufactured, identical metallic coupons, also called capsules, were manufactured as well and were installed in the Point Beach reactors when the reactors were built.[106] Since Point Beach was designed and anticipated to operate for only 40 years, only 40 years' worth of coupon samples were installed in the reactors. Now there are not enough sample coupons to remove from the reactor and test for embrittlement during the 60-year period of operations, let alone for an additional 20 more years out to 80 years, as NextEra seeks to do.[107] PBNP is storing two capsules in the spent fuel storage pool at the reactor site, one from each unit.[108] They were removed from the reactors in 1994 and 1997, respectively and have apparently not been tested. Testing now, 25 years after removal, will provide no useful data. In addition, each reactor still contains a Capsule "N" inside the two reactor units, noted as being held on "standby."[109] PBNP has not announced when it will remove or test either one.

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[104] *Id.* at 7.6.1.

[105] *Id.* at 7.6.1.1.

[106] *Id.* at 7.7.1.

[107] *Id.* at 7.7.2.

[108] "Point Beach Nuclear Plant Units 1 and 2 Subsequent License Renewal Application" (Public Version), November 2020 (ML20329A247), p. 1208/1528 of .pdf.

[109] *Id.*

Instead of performing metallurgical tests on the coupons/capsules, the NRC has instead modified its calculations to allow aging, embrittled nuclear power reactors to continue to operate well past their lifespans and certainly into risky uncharted territory.[110]

Even though neutron embrittlement of the Point Beach reactors present a clear and present danger, the NRC and Point Beach have relied upon error-prone analytical calculations rather than use all the tools available to identify just how serious the embrittlement treatment has become as Point Beach ages. Mr. Gundersen's review of the publicly available files in the NRC's ADAMS database indicates that the NRC has granted waivers for each of the five most embrittled reactors still operating to avoid testing their actual embrittlement through the measurement of their actual metallurgical coupons. At Diablo Canyon Nuclear Plant, the NRC has allowed the unit to avoid testing any coupon samples for almost two decades, and at Palisades, Indian Point, and Point Beach, he could find no record of coupon samples being tested for at least ten years.[111] The NRC did not require that when the Yankee Rowe reactor was completely dismantled in 1992, the reactor vessel was not tested to determine how significant its embrittlement was.[112]

Mr. Gundersen concludes:

> As the US nuclear fleet ages, the NRC has systematically removed conservative calculational aspects of the embrittlement process to allow continued operation. The NRC has not incorporated the actual data from coupons in the remaining five worst atomic power reactors in the U.S. to be used for the embrittlement analysis applied to NextEra's Point Beach reactors to allow their continued operation. Instead of evaluating Point Beach's specific metallurgy, the NRC has allowed Point Beach and its cohorts to use analytical techniques that ignore the data from sample coupons it could readily test.

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[110]Gundersen Declaration ¶ 7.7.3.

[111]*Id.* at 7.8.1.

[112]*Id.*

> Additionally, there is no scientific basis by which the Point Beach reactors should continue operating unless there is a complete physical analysis of the coupons from its reactors and the five other reactors that are its embrittled cohorts.[113]
>
> Therefore, I conclude that Point Beach's continued operation violates 10 CFR Part 50 Appendix A, Criterion 14.[114]

Criterion 14 requires that "[t]he reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

Mr. Gundersen offers this further professional conclusion:

> During the last 50 years of operation, Point Beach has failed to develop an adequate coupon program to physically test the integrity of the RPV [reactor pressure vessel] for PB's operational life. As defined in Appendix A Criterion 14, "testing" obviously does not include analytical techniques prone to error. There is inadequate coupon data specific to PB to justify its continued operation beyond its 50th year, let alone until it reaches 80. PB has been violating GDC 14[115] by not testing coupons, and relying on analytical handwaving instead![116]
>
> The NRC already knows the PB reactor vessel to be the most embrittled vessel in the nation. PB was not "designed and fabricated… to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture." Thus the NRC's acknowledgment proves that the Point Beach reactors fail to meet Criterion 14.

C. Materiality to Findings

The NRC license renewal safety review focuses on potential detrimental effects of aging that ongoing regulatory oversight programs do not routinely address. If an aging-related issue is "adequately dealt with by regulatory processes" on an ongoing basis, it will not warrant review at the time of a license renewal application.[117] The evidence strongly suggests that embrittlement at

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[113] *Id.* at 7.8.2.

[114] *Id.* at 7.8.3.

[115] General Design Criterion 14, *supra*.

[116] *Id.* at 7.8.4.

[117] *PPL Susquehanna, LLC* (Susquehanna Steam Electric Station, Units 1 & 2), LBP-07-4, 65 NRC 281, 307-09 (2007).

Point Beach has not been "adequately dealt with by regulatory processes," hence it warrants review in this subsequent license extension proceeding.

The Commission has concluded that "the 'only issue' where the regulatory process may not maintain a plant's current licensing basis involves the potential "detrimental effects of aging on the functionality of certain systems, structures, and components in the period of extended operation."[118] The scope of a safety review for license renewal is thus limited to (1) managing the effects of aging of certain systems, structures, and components ("SSCs")[119] with the aim being to provide "reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB;[120] (2) review of time-limited aging evaluations; and (3) any matters for which the Commission itself has waived the application of these rules.[121] Three general categories of SSCs "fall within the 'initial focus'" of

[118] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC 449, 454 (2010).

[119] 10 CFR § 54.29(a)(1).

[120] 10 CFR § 54.3(a) defines "current licensing basis (CLB)" as "the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 52, 54, 55, 70, 72, 73, 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications. It also includes the plant-specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report (FSAR) as required by 10 CFR 50.71 and the licensee's commitments remaining in effect that were made in docketed licensing correspondence such as licensee responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.

[121] *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc*. (Pilgrim Nuclear Power Station), LBP-08-22, 68 NRC 590, 598-600 (2008); *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-01-6, 53 NRC 138, 152 (2001); *Entergy Nuclear Generation Co. And Entergy Nuclear Operations, Inc*. (Pilgrim Nuclear Power Station), LBP-06-24, 64 NRC 257, 276, 277 (2006).

license renewal review as outlined in 10 CFR § 54.4.[122] And 10 CFR § 54.21 provides standards for license renewal applicants to determine which of the components within the three general categories defined in § 54.4 require aging management review.[123] With respect to each structure, system, or component requiring aging management review, "a license renewal applicant must demonstrate that the 'effects of aging will be adequately managed so that the intended function(s) [as defined in § 54.4] will be maintained consistent with the CLB for the period of extended operation.'"[124] While some SSCs perform more than one function, the license renewal application is only required to provide reasonable assurance that SSCs "will perform such that the intended functions, as delineated in §54.4, are maintained consistent with the CLB."[125]

Additionally, SSCs subject to an aging management review perform an intended function in a passive fashion ("without moving parts or without a change in configuration or properties"[126]) and are not already subject to replacement based on a qualified life or specified time period.

NextEra must demonstrate that the "effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation."[127] The evidence shows that the capacity for the PBNP reactor vessels to become embrittled unmistakably exists, but that the reactor coolant pressure boundary has not been "tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating

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[122] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC 449, 456 (2010).

[123] *Id.*

[124] *Id.* (quoting 10 C.F.R. 54.21(a)(3)).

[125] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc., supra* at 71 NRC 456.

[126] *Id.*

[127] *Id.*

failure, and of gross rupture" for perhaps more than 20 years, and that both Point Beach reactors contain a coupon/capsule that might shed relevant light on whether the two units should be given consideration for licensure beyond 2030 and 2033.

Notably, 10 CFR § 54.4 considers plant systems, structures, and components within the scope of Part 54 to include SSCs that are "relied upon to remain functional during and following design-basis events . . . to ensure . . . [t]he integrity of the reactor coolant pressure boundary; ... [t]he capability to shut down the reactor and maintain it in a safe shutdown condition; or . . . [t]he capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable.[128] The embrittled Point Beach reactor vessels are thus SSCs requiring the utmost attention to ascertain "detrimental effects of aging on the functionality of certain systems, structures, and components in the period of extended operation."[129] Since NextEra cannot make such a showing, the subsequent license extension application should be denied.

Petitioner PSR WI has depicted an issue of fact with the license extension application, and this contention should be admitted for hearing.

Contention 3: The PBNP Environmental Report fails to adequately evaluate the full potential for renewable energy sources, such as solar electric power (photovoltaics) to offset the loss of energy production from PBNP, and to make the requested license renewal action from 2030 to 2053 unnecessary.

Violating 10 C.F.R. § 51.53(c)(3)(iii) and 10 CFR § 51.45, the PBNP Environmental Report treats all of the alternatives to license renewal as unreasonable except for new nuclear and

[128] 10 CFR § 54.4(a) (1)(i-iii).

[129] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc., supra* at 454.

the combination of natural gas combined cycle and 25MW of on-site solar, and does not provide a substantial analysis of the potential for significant alternatives, such as widespread solar power plus storage in the Region of Interest for the requested relicensing period of 2030 to 2053. The scope of the ER (and potentially the SEIS) is improperly narrow. The intrinsic need for PBNP to be available to provide power during the period of subsequent license extension is weak and eroding by the day, in light of continuing positive developments in the growth of solar power.

NextEra postulated only two alternatives: either renew the PBNP operating licenses for 20 more years, or close the plant (the no-action alternative). The no-action scenario, then, calls for identifying replacement power sources for the loss of PBNP generation.[130] According to NextEra, only three alternatives were deemed "reasonable" enough to be worthy of consideration:

Option 1: ALWR with mechanical draft cooling towers located at the PBN site.

Option 2: Cluster of small modular reactors (SMRs) with mechanical draft cooling towers located at the PBN site.

Option 3: A "Combination Alternative" involving a "configuration of natural gas combined cycle units with mechanical draft cooling towers located at the PBN site" and "expansion of the Point Beach solar facility using the identified alternative array location."[131]

NextEra rejects all three alternatives as unable to competitively replace PBNP. It is Petitioner's position, however, that the consideration by NextEra of an ALWR plant and creation of an SMR farm are chimeras that NextEra fully realizes are economic impossibilities. NextEra's

[130]ER at 7.1.

[131]ER at 7.2.1.

refusal to recognize the considerable genuine prospects for solar photovoltaic replacement power is astounding, given the firm's solar expansion investments in multiple states, including some nearby Midwestern locations.

The 2013 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" contemplates a discussion of alternatives in the ER that covers replacement power if PBNP were to have its licenses terminated in a decade. There are firm expectations:

> The following sections describe alternatives identified by the NRC as capable of meeting the purpose and need of the proposed action (license renewal) or replacing the power generated by a nuclear power plant. A reasonable alternative must be commercially viable on a utility scale and operational prior to the expiration of the reactor's operating license, or expected to become commercially viable on a utility scale and operational prior to the expiration of the reactor's operating license. As technologies improve, the NRC expects that some alternatives not currently viable may become viable at some time in the future. The NRC will make that determination during plant-specific license renewal reviews. The amount of replacement power generated must equal the baseload capacity previously supplied by the nuclear plant and reliably operate at or near the nuclear plant's demonstrated capacity factor.[132]

As PSR WI will show, Petitioner meets that standard in its presentation.

A. Within the Scope

The scope of the environmental review is defined by 10 C.F.R. Part 51, the NRC's "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437 (May 1996), and "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," NUREG-1437, Vols. 1 & 3, Rev. 1 (June 2013) ("GEIS"). As the above quotation suggests, this contention is well within the scope of this subsequent license renewal proceeding.

[132]GEIS, NUREG-1437 (2013) at 2.3.

This contention is "material" to the findings NRC must make[133] because its determination would make a difference in the outcome of the proceeding.[134] "This means that there should be some significant link between the claimed deficiency and either the health and safety of the public or the environment."[135]

B. Concise Statement of Facts

PSR WI provides expert reports from two witnesses in support of this contention, Dr. Alvin Compaan, a physicist with considerable solar power expertise, and Dr. Mark Cooper, an expert in utility economics. Dr. Compaan destroys NextEra's hollow discounting of solar photovoltaic, while Dr. Cooper wrecks the notion, not just of ALWR or SMR replacement power generation, but of any alleged economic justification for the continued operation of PBNP today through the early 2030s, let alone the early 2050s.

1. Dr. Alvin Compaan on the photovoltaic alternative

Dr. Alvin Compaan resides in the Toledo, Ohio metropolitan area.[136] He holds a Ph.D. in Physics from the University of Chicago and is a Professor Emeritus of physics from the University of Toledo. He currently is President of Lucintech Inc., a research and development company with numerous patents in photovoltaics technology and thin-film neutron detectors. Dr. Compaan has extensive academic and practical experience in photovoltaic solar power and its commercial applications both land-based and aerospace-based. He has been active in educating the public through TEDx and similar talks and through scientific presentations across the nation,

[133] 10 C.F.R. § 2.309(f)(1)(iv).

[134] Rules for Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Red. 33,168, 33,172 (Aug. 11, 1989).

[135] *Vermont Yankee*, 60 NRC 548, 557 (2004).

[136] Declaration of Alvin Compaan ("Compaan Declaration") ¶ 1.

State of Ohio, and to the Ohio legislature. Dr. Compaan is the inventor of 12 patents in the area of solar and nuclear detectors and has authored more than 270 publications in refereed professional journals and conference proceedings. Between 1987 and 2009 at the University of Toledo he was the principal advisor to 20 Ph.D. and M.S. students and 13 postdoctoral fellows. Dr. Compaan's *curriculum vitae* is attached as Exhibit 7 to his Declaration.

Dr. Compaan contends that the Next Era Point Beach Environmental Report fails to adequately evaluate the full potential for renewable energy sources, such as solar electric power or photovoltaics (hereinafter "solar power"), to offset the loss of energy production from NEPB, and to make the requested license renewal action from 2030 to 2053 unnecessary.

Calling PBNP's discussion of the solar power alternative "hollow, cursory, and often out-of-date,"[137] Dr. Compaan exposed in his Declaration how NextEra has grossly failed to adequately assess the solar option.

Dr. Compaan agrees with NextEra the array of solar panels needed to replace the power from Point Beach would of necessity occupy 65.7 square miles,[138] but articulates a realistic vision as to how that will occur pretty painlessly.

Using a National Renewable Energy Laboratory computational tool, Dr. Compaan calculated that there are thousands of available rooftops which are oriented properly and free of shading and other obstructions to serve as suitable locations for solar rooftop installations. He found that the State of Wisconsin has residential rooftops capable of providing suitable space for average generation (over 24 hours) of 1382 MW of solar electric (total annual energy generation

[137] Compaan Declaration ¶ 4.

[138] *Id.* at ¶ 17.

of 12,111,240 MWh).[139] He identifies commercial rooftop space suitable for solar panels that could deliver average generation of 1760 MW (total annual energy generation of 15,415,280 MWh).[140] Dr. Compaan shows that the NREL/SLOPE tool shows that residential and commercial solar – and at that, either residential rooftops alone or commercial rooftops alone -- could host solar panels sufficient to cover all of the yearly electricity energy output of the PBNP's 1200 MW (full year of 8760 hours and total electric energy of 10,512,000 MWh.).[141]

Dr. Compaan also found that the federal farmland Conservation Reserve Program has nearly 100,000 enrolled acres, which if solarized completely would result in more than 18,000 MW of solar generation power three (3) times the annual energy output of PBNP.[142] Dr. Compaan points out that realistically, solar will be deployed in a mix of locations, from conventional solar farms to high voltage power line transmission easements, awnings, parking lot canopies, landfills, brownfields, and on highway rights-of-way, as well as rooftop installations and installations on Conservation Reserve land.[143]

His testimony further shows that solar is low cost and available, that the supply of modules is growing rapidly and the cost of solar power has been falling dramatically so that today solar power is the lowest cost electricity in many regions of the U.S. and internationally, even when compared to the cost of established nuclear power.

He found that solar is suited to Wisconsin and particularly within PBNP's distribution territory because solar availability in Wisconsin is comparable to that of northern California.

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[139] *Id.* at 21.

[140] *Id.*

[141] *Id.*

[142] *Id.* at ¶ 22.

[143] *Id.* at ¶ 24.

Respecting the intermittency of solar, Dr. Compaan wrote about battery storage, since the technology of large-scale batteries for electricity energy storage has been improving rapidly and the costs have been dropping quickly. He pointed out in his report the brand-new Florida Power & Light solar-charged battery storage project, believed to be the world's biggest. FPL is a subsidiary of NextEra Energy; the plant will be 409MW /900MWh in Manatee County, Florida.[144]

Dr. Compaan found that with "recent advances in battery storage technology, increasing manufacturing scale, and reductions in costs, battery energy storage is a very viable option to combine with solar to provide a durable and reliable solution to the limited capacity factor of solar."[145]

Dr. Compaan explained that the solar + storage approach is scalable and adaptable because the delivery of solar power closely follows the time-of-day demand curve, which can mitigate some of the need for baseboard power. He observes that even "baseboard" nuclear plants are not available 100% of the time, and that the utility grid must be able to fill in for the periods when refueling and other outages occur and nuclear power is not available, sometimes for many weeks.[146] Moreover, he states that nuclear plants are unable to follow the demand curve of usage which typically peaks in the daytime and is very low at night.[147] Dr. Compaan illustrated that the inclusion of large scale wind and solar power into the California grid tends to offset the need for large baseboard plants to provide "peak" power at the highest-demand times of day.[148]

[144] *Id.* at ¶ 29.

[145] *Id.* at ¶ 30.

[146] *Id.* at ¶¶ 25-26.

[147] *Id.* at 31.

[148] *Id.* at 33 (discussing Compaan Exh. 6).

Dr. Compaan opined that "as the amount of solar and wind increase, this minimum demand could go all the way to zero so that no baseboard power would be required in the middle of the day, for some days. . . ."[149] He points out that there "is too much thermal energy stored in a 600 MW energy generation facility to dial back the steam generation so quickly. So it is quite possible that by 2030 a 1200 MW supply of baseboard power to replace PB Nuclear may be entirely superfluous."[150]

Dr. Compaan showed that solar power has minimal environmental impacts even when compared with existing nuclear plants. His survey of the scientific literature showed that the best estimate of greenhouse gas emissions from already-constructed nuclear power plants is 66 grams of CO2 equivalent per kWh, mostly from mining, milling, enrichment, waste management and disposal, and decommissioning. While solar power causes some emissions during manufacture, mining, milling and purification, there are no emissions during power generation.[151] Dr. Compaan found that crystalline silicon wafer-based solar modules had greenhouse gas emissions of 50g of CO2-equivalent and thin-film cadmium telluride modules had only 20 g of CO2-equivalent emissions per kWh, and that because since 2008, the average manufactured module efficiencies have increased by about 20%, the emissions per kWh are estimated for solar as ranging from 16 to 40 grams of CO2-equivalent, well below that of nuclear power.[152]

Dr. Compaan decisively lays out the case for the ongoing photovoltaic revolution:

> [O]ver the last decade technological advancements, manufacturing growth, deployment experience, and rapidly dropping prices have all established solar

[149] *Id.*

[150] *Id.*

[151] *Id.* at ¶ 35.

[152] *Id.*

> photovoltaics and battery storage as the most attractive technologies for grid power in Wisconsin. Not only does solar plus battery storage have compelling economic advantages today, solar plus battery storage has the lowest environmental footprint of any technology. It can power today's modern grid with the flexible and nimble response times that are demanded from a modern grid where voltage and frequency stability are of utmost importance. For these reasons and all the other environmental issues presented in the preceding discussion, we contend that the 20-year subsequent operating license renewals for the Point Beach Nuclear Plant units 1 and 2 should be denied.[153]

2. Dr. Mark Cooper on 'Baseboard Myopia'

Dr. Mark Cooper is a Senior Fellow for Economic Analysis at the Institute for Energy and the Environment at Vermont Law School. He holds a Ph.D. from Yale University. He is also Director of Research at the Consumer Federation of America, where he served for two decades as Director of Energy. He has testified over 400 times on energy and telecommunications issues at federal and state regulatory and legislative bodies in over forty jurisdictions in the U.S. and Canada. His *curriculum vitae* is attached to his Declaration as MNC-1.[154]

Dr. Cooper asserts that "Nuclear power is far too costly to include in a 21st century electricity system based on efficiency, distributed and renewable resources that deliver lower cost and much less pollution while effectively decarbonizing the sector."[155] According to him, "Wisconsin is underperforming in efficiency and renewables. Under the purchased power agreement [between PBNP and We Power], I estimate that compared to 21st century alternatives, ratepayers will bear unnecessary charges of about $5 billion."[156] The reason, he says, is:

> Once the direction of a least-cost route to a decarbonized economy is set by the superiority of renewables, it becomes impossible for nuclear power to participate in the

[153] *Id.* at ¶ 37.

[154] The Declaration of Mark Cooper, Ph.D. ("Cooper Declaration") has been filed with this Petition.

[155] Cooper Declaration at 3.

[156] *Id.*

> ultimate portfolio. The idea of pursuing an "all-of-the-above" scenario runs afoul of the fundamental differences between the 20th-century baseboard fossil fuel approach and 21st-century renewable energy approach. The two technologies simply do not mix well because nuclear is not flexible. The vigorous attack on renewables launched by advocates of nuclear power in an effort to secure favorable treatment of aging reactors is testimony to the incompatibility between the two...[157]

The large and inflexible performance of nuclear reactors, "old or new," Dr. Cooper says, "makes them a burden, not a benefit in the 21st century system."[158] Noting the "basic economic evidence of the prospective superiority of the alternatives," the professor commented that "the great threat of maintaining the output of nuclear reactors is the obstacle they present to the development of the alternative. The longer they continue their massive, inflexible output with uneconomic subsidies, such as the Point Beach Purchased Power Agreement and/or unjustified preference in dispatch, the more difficult it is for the alternatives to take root and achieve their potential."[159]

Dr. Cooper accuses NextEra of being afflicted with "baseboard myopia" en route to determining that "*lead time necessary to ensure the operation of a 21st century system is more than adequate between now and 2030 (for Point Beach Unit 1) and 2033 (for Point Beach Unit 2),* not to mention the two decades of operation during the license extension."[160] (Emphasis added).

The expert lays out significant long-term economic trends that are eviscerating nuclear power as an option: "[T]he costs of solar and batteries are projected to decline about 5 percent per year in the 30 years from 2000 to 2030. The cost of wind is estimated to decline by over 2 percent per year for the 50-years between 1980 and 2030. In contrast, the cost of nuclear power

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[157] *Id.*

[158] *Id.*

[159] *Id.* at 4-5.

[160] *Id*. at 5.

has increased by almost 3 percent per year over that same, 50-year period."[161] On this foundation, he breaks more bad economic news for the nuclear industry, that "the technologies of grid management, information, computer capacity, and advanced control technologies have made it possible to manage and integrate demand, matching it more closely with supply with much greater precision. This has directly lowered the costs of the system, but it has also yielded a transformation dividend, a reduction in the size of the system needed to meet demand."[162] Further, "the link between electricity consumption and economic growth has been broken."[163] There is now an inverse relationship between GDP growth and electrical consumption, where electricity consumption per unit of GDP growth has been declining recently.[164]

Noting the suggestion of using Small Modular Reactors as a replacement for baseboard power from PBNP, Dr. Cooper says "Promises that a new generation of 'small modular' nuclear technologies will do better are doubtful at best. They will be much more expensive than the alternatives already available and take decades to deploy. Their costs will likely create pressures to demand priority in dispatch, which frustrates flexibility. They leave serious doubts about security and pollution." Dr. Cooper sees a "nightmare" scenario with SMRs.[165] According to him,

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[161] *Id.* at 6.

[162] *Id.*

[163] *Id.* at 7.

[164] *Id.* at 7.

[165] *Id.* at 22-23: "Hyped as the dream solution, [SMRs] turn into a nightmare. Small modular reactors that have been on the drawing board for at least a decade exhibit all of the characteristics of failure. Like the "nuclear renaissance" before it, the initial estimates of cost have doubled before they go into construction and cost overruns really only begin when construction does. While they can find companies to back them and governments to support them, and academics to explain the theory of why they should work, the one thing they cannot do is deliver low cost power.

While they claim to be safer than large units, they achieve that goal not by solving safety problems, but by being excused from safety rules (like exclusion zones). While they are low in carbon emissions during operation, they suffer from the problem that, even if the production of small units will be possible in the future, they will arrive long after the battle against climate change is lost. While they

" Nuclear power should be held to strict economic standards, without any subsidies. If it cannot compete on cost, it cannot be part of the 21st century energy sector."

Dr. Cooper's review of relevant literature supports the notion that difficulties in "the integration of distributed supply and actively managed demand are quite small" has become mainstream thinking and is reflected in U.S. DOE analysis. DOE's *Wind Vision* analysis argues that "wind generation variability has a minimal and manageable impact on grid reliability and related costs." DOE believes that operational challenges arising from much higher levels of wind power construction can be easily overcome by expanding the use of tried techniques such as increased system flexibility, greater electric system coordination, faster dispatch schedules, improved forecasting, demand response, greater power plant cycling, and in some cases, storage options.[166] He thinks that the prospect of achieving reliability that equals or exceeds current levels with the alternative approach is increasingly seen as quite good.[167]

Dr. Cooper sees the confrontation between large baseboard providers such as PBNP and distributed energy sources as "inevitable" frontal assaults by nuclear advocates on alternative resources and the institutions that support them. He warns that responsible policymakers should reject the "all of the above" argument "because the severely restricted market created by the forced presence of nuclear power will strangle the ability of non-hydro renewables to expand, which is likely to drive the market clearing price down, as resources compete for a smaller

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are small, they still need "must run" status and large numbers of units shipped in order to lower their cost. Small modular reactors are likely to be between three and five times as costly as the already available technologies to build a low cost, low carbon, low pollution electricity sector."

[166] *Id*. at 14.

[167] *Id.*

market."[168]

But Dr. Cooper has the harshest criticism for the Purchased Power Agreement keeping Point Beach afloat:

> [T]he purchased power agreement is totally uneconomic. In 2020, the price is $20/MWh higher than the bundle of alternatives analyzed above. The overcharge mounts steadily to almost $100/MWh through 2030. The average excess is $55/MWh. The cumulative excess cost imposed on ratepayers is almost $5 billion for the period ending in 2030, which works out to over $3,000 per electricity customer, or $300 per year.
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> With $5 billion and the remaining time between the early-2030s expirations of Point Beach Units 1 and 2, the net expected power generation from the plant during that period could be completely obviated by construction of renewables and implementation of efficiency. Given the current cost of alternatives, the output of Point Beach would cost ratepayers over twice as much as a least cost, low carbon, low pollution approach. Thus, the purchased power agreement for Point Beach imposes enormous excess costs on Point Beach ratepayers and is unconscionable. By 2030 and 2033, but for the PPA, efficiency and renewable energy sources could have expanded and displaced this myopic baseboard power plant. *By 2030, Point Beach Units 1 and 2 will be completely redundant and obsolescent.*[169]

In the face of harsh economic realities in the form of a collapsing baseboard market and the onslaught of ever-cheaper photovoltaic solar, the Licensing Board should admit this contention for adjudication. According to 10 C.F.R. § 51.53(c)(3)(iii), the environmental report must contain "consideration of *alternatives for reducing adverse impacts*, as required by § 51.45(c)." (Emphasis added). And 10 CFR § 51.45(c) commands that "The environmental report must include an analysis that considers and balances . . . alternatives available for reducing or avoiding adverse environmental effects." Also, 10 C.F.R. §§ 51.53(c)(1) and (2) require the environmental report to "discuss in this report the environmental impacts of alternatives and any other matters described in § 51.45," bringing § 51.45(c)'s command that there be "alternatives available for

[168] *Id.* at 21.

[169] *Id*. at 24 (Emphasis added).

reducing or avoiding adverse environmental effects" into play, again.

The NRC's NEPA regulations require that alternatives be presented in "comparative form" to "aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, 'appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.'"[170] Agencies must, to the fullest extent possible, "[s]tudy, develop, and describe appropriate alternatives to recommended courses of action in any proposal. . . "[171] There must be examination of every alternative within the nature and scope of the proposed action,[172] "sufficient to permit a reasoned choice."[173] NEPA requires a "discussion of alternatives" that "must '[r]igorously explore and objectively evaluate all reasonable alternatives.'"[174] "The existence of a viable, but unexamined alternative renders an environmental impact statement inadequate."[175]

Moreover, agencies must "study. . . significant alternatives suggested by other agencies or the public. . . ."[176] Even an alternative which would only partially satisfy the need and purpose of the proposed project must be considered by the agency if it is "reasonable,"[177] because it might

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[170] 10 CFR § 51.45(b)(3).

[171] 42 U.S.C. § 4322(2)(E); *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519-20 (9th Cir. 1992).

[172] *California v. Block,* 690 F.2d 753, 761 (9th Cir. 1982).

[173] *Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810, 815 (9th Cir. 1987).

[174] *Union Neighbors United, Inc. v. Jewell*, 831 F.3d 564, 569 (D.C. Cir. 2016) (quoting 40 C.F.R. § 1502.14).

[175] *Idaho Conservation League, supra*; *Natural Res. Defense Council v. U.S. Forest Serv.*, 421 F.3d 797, 813 (9th Cir. 2005) (internal quotation marks omitted); *see also City of Grapevine v. Dep't of Transp.*, 17 F.3d 1502, 1506 (D.C. Cir. 1994) (agency must consider "all 'feasible' or 'reasonable' alternatives[.]").

[176] *DuBois v. U.S. Dept. of Agric*., 102 F.3d 1273, 1286 (1st Cir. 1996), *cert. denied*, 117 S.Ct. 1567 (1997).

[177] *Natural Resources Defense Council v. Callaway,* 524 F.2d 79, 93 (2nd Cir. 1975).

convince the decision-maker to meet part of the goal with less impact.[178]

It is incumbent on the NRC to not indulge in a self-imposed ignorance, the turning of a blind eye or actual censure of expert opinion and material fact to define otherwise reasonable alternatives out of existence. "NEPA's requirement for forecasting environmental consequences far into the future implies the need for predictions based on existing technology and those developments which can be extrapolated from it."[179] Similarly, NextEra is not free to favor bad technical information over legitimate technical information.[180]

The reasonable alternatives for license renewal proceedings must be feasible technically and available commercially.[181] Solar photovoltaic fulfills all of these criteria. "[W]hen a reasonable alternative has been identified, it must be objectively considered by the evaluating agency so as not to fall victim to 'the sort of tendentious decisionmaking that NEPA seeks to avoid.'"[182]

Clearly, a genuine dispute exists between PSR WI and NextEra on multiple issues of law and fact and this contention must be admitted for adjudication.

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[178] *North Buckhead Civic Ass'n v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990).

[179] *Natural Resources Defense Council, Inc. v. Nuclear Regulatory Commission (Vermont Yankee I)*, 547 F.2d 633, 637, 6 ELR 20615 (D.C. Cir. 1976), *rev'd on other grounds sub nom. Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 8 ELR 20288 (1978).

[180] *Seattle Audubon Society v. Espy*, 998 F.2d 699, 703-04 (9th Cir. 1993) (overturning decision which "rests on stale scientific evidence, incomplete discussion of environmental effects . . . and false assumptions").

[181] *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2 and 3), LBP-08-13, 68 NRC 43, 205 (2008).

[182] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-01-34, 54 NRC 293, 302 (2001), citing *I-291 Why? Association v. Burns*, 372 F. Supp. 223, 253 (D. Conn. 1974), *aff'd* 517 F.2d 1077 (2d Cir. 1975).

<u>Contention 4:</u> PBNP has an elevated risk of a turbine missile accident owing to the poor alignment of its major buildings and structures.

Historically, Point Beach and many other early reactors have a turbine hall that is dangerously aligned relative to the reactor buildings and control rooms. This alignment was inexpensive and was later determined to be unsafe and is no longer an acceptable design anywhere in the world.[183] The PBNP design is unsafe, because a turbine failure will send 600 lb. pieces of shrapnel hurtling at 600 mph into the containment, safety-related components, and the control room.[184]

Construction of reactors built after Point Beach changed the turbine hall's orientation to be radially outward from the containment to protect the control room and its operators, the safety-related components, and the containment from the threat of turbine shrapnel.[185] This realignment of the turbine hall to the radially outward design meant that shrapnel would fly into the parking lot rather than the safety-related equipment, control room, and containment building in the event of a turbine failure. [186]

Turbine failures are likely events. Fermi 2 in Michigan experienced turbine failure, as have other nuclear plants and airplane jet engines.[187]

On Christmas Day, December 25, 1993, at Fermi Nuclear Power Plant, Unit 2, the main turbine automatically tripped due to an erroneous mechanical overspeed signal caused by high vibrations. The reactor, which was operating at 93 percent power, received an automatic scram

[183]Gundersen Declaration ¶ 7.3.3.

[184]*Id.* at ¶ 7.3.4.

[185]*Id.* at ¶ 7.3.5.

[186]*Id.* at ¶ 7.3.7.

[187]*Id.* at ¶ 7.3.8.

signal triggered by the turbine trip. The high vibration was caused by catastrophic failure of the turbine blades.[188] Ejected blade parts ripped through the turbine casing and severed condenser tubes and other piping. The rupture of piping supplying hydrogen gas to the generator for cooling caused a large fire. The plant's fire brigade took 37 minutes to muster, dress, and enter the turbine building to fight the fire.[189] Their efforts were hindered by numerous communication problems, including malfunctions of personnel motion detectors (*e.g.*, "man down" alarms[190]). About 500,000 gallons of water from broken general service water piping and turbine building closed cooling water piping flooded the radwaste building basement to a depth of approximately six feet.

Workers were slow to isolate the systems with broken piping to terminate the flooding, due to the lack of procedures for a turbine building internal flood.[191] The severed condenser tubes permitted water from Lake Michigan to flow into the condenser hotwell, from where it was pumped to the condensate storage tank and thence the standby feedwater system pumped water from the condensate storage tank to the reactor vessel. The lake water caused conductivity and chloride levels of the reactor vessel water to significantly exceed specifications.[192]

Nuclear engineer Gunderson has reviewed publicly available photos of the PBNP turbine hall and sees no indication that shielding from turbine missiles has been implemented.[193] A

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[188]Augmented Inspection Team, FERMI 2 TURBINE GENERATOR FAILURE, December 25, 1993, INSPECTION REPORT NUMBER 50-341/93029(DRS) (2/4/1994) (ML20069J693), pp. 6-8, 10-11, 16-17/72 of .pdf.

[189]*Id.*, p. 42/72 of .pdf.

[190]*Id.*, p. 28/72 of .pdf.

[191]*Id.*

[192]*Id.* at p. 34/72 of .pdf.

[193]Gundersen Declaration ¶ 7.3.9.

search through the "Point Beach Nuclear Plant Units 1 and 2 Subsequent License Renewal Application" (Public Version), November 2020[194] turns up dozens of results respecting aging management to guard against missiles from fragmented components, but none of them appear to involve steam turbine shafts or blades. PBNP appears to recognize the possibility of pump shafts breaking up, but not the large turbines: "Missiles can be generated from internal events such as failure of rotating equipment or external events. Inherent nonsafety-related features that protect safety-related equipment from internal and external missiles are within the scope of SLR per 10 CFR 54.4(a)(2)."[195]

Mr. Gundersen observes that "While PB cannot rotate its entire turbine hall to assure that a turbine failure does not result in safety-related consequences, there is a solution. To mitigate the impact of a turbine failure, PB could install an inexpensive 'Energy Absorbing Turbine Missile Shield, US Patent #4397608A. I conclude that to reduce the risk of damage to safety-related systems, structures, and components, PB should be required to install an energy-absorbing turbine missile shield around its turbine.[196]

The NRC license renewal safety review focuses on potential detrimental effects of aging that ongoing regulatory oversight programs do not routinely address. If an aging-related issue is "adequately dealt with by regulatory processes" on an ongoing basis, it will not warrant review at the time of a license renewal application.[197] The evidence strongly suggests that turbine missiles

[194]ADAMS ML20329A247.

[195]*Id.* at p. 2.1-14 (p. 68/1528 of .pdf).

[196]Gundersen Declaration ¶

[197]*PPL Susquehanna, LLC* (Susquehanna Steam Electric Station, Units 1 & 2), LBP-07-4, 65 NRC 281, 307-09 (2007).

at Point Beach have not been "adequately dealt with by regulatory processes," hence it warrants review in this subsequent license extension proceeding.

The Commission has concluded that "the 'only issue' where the regulatory process may not maintain a plant's current licensing basis involves the potential "detrimental effects of aging on the functionality of certain systems, structures, and components in the period of extended operation."[198] The scope of a safety review for license renewal is thus limited to (1) managing the effects of aging of certain systems, structures, and components ("SSCs")[199] with the aim being to provide "reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB;[200] (2) review of time-limited aging evaluations; and (3) any matters for which the Commission itself has waived the application of these rules.[201] Three general categories of SSCs "fall within the 'initial focus'" of

[198] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC 449, 454 (2010).

[199] 10 CFR § 54.29(a)(1).

[200] 10 CFR § 54.3(a) defines "current licensing basis (CLB)" as "the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 52, 54, 55, 70, 72, 73, 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications. It also includes the plant-specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report (FSAR) as required by 10 CFR 50.71 and the licensee's commitments remaining in effect that were made in docketed licensing correspondence such as licensee responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.

[201] *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc*. (Pilgrim Nuclear Power Station), LBP-08-22, 68 NRC 590, 598-600 (2008); *Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-01-6, 53 NRC 138, 152 (2001); *Entergy Nuclear Generation Co. And Entergy Nuclear Operations, Inc*. (Pilgrim Nuclear Power Station), LBP-06-24, 64 NRC 257, 276, 277 (2006).

license renewal review as outlined in 10 CFR § 54.4.[202] And 10 CFR § 54.21 provides standards for license renewal applicants to determine which of the components within the three general categories defined in § 54.4 require aging management review.[203] With respect to each structure, system, or component requiring aging management review, "a license renewal applicant must demonstrate that the 'effects of aging will be adequately managed so that the intended function(s) [as defined in § 54.4] will be maintained consistent with the CLB for the period of extended operation.'"[204] While some SSCs perform more than one function, the license renewal application is only required to provide reasonable assurance that SSCs "will perform such that the intended functions, as delineated in §54.4, are maintained consistent with the CLB."[205]

> Plant systems, structures, and components within the scope of 10 CFR Part 54 are–
>
> (1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions--
> (I) The integrity of the reactor coolant pressure boundary;
> (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
> (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable.[206]

NextEra must demonstrate that the "effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation."[207] Cracking and suddenly crumbling turbine blade shrapnel can easily impair or

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[202] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC 449, 456 (2010).

[203] *Id.*

[204] *Id.* (quoting 10 C.F.R. 54.21(a)(3)).

[205] *Nuclear Generation Co. and Entergy Nuclear Operations, Inc., supra* at 71 NRC 456.

[206] 10 CFR § 54.4(a)(1).

[207] *Id.*

destroy SSCs from performing in a crisis. Section § 54.4 considers plant systems, structures, and components within the scope of Part 54 to include SSCs that have "[t]he capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable."[208] Since NextEra cannot make a showing that it has mitigated the possibilities of major damage from a turbine missile event, the current licensing basis may not be sustained. It is no longer permissible to align turbine halls and critical reactor operations equipment and features as was done in the late 1960's when PBNP was constructed. Petitioner PSR WI has demonstrated an issue of fact with the license extension application, and this contention should be admitted for hearing.

WHEREFORE, PSR WI prays the Commission accord it organizational standing to proceed on the abpve-stated contentions, and to admit those contentions for adjudication.

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[208] 10 CFR § 54.4(a) (1)(i-iii).