UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	Docket No. 50-440
	)	
Energy Harbor Nuclear Corp.; Energy Harbor Nuclear Generation LLC	)	NRC-2023-0136
	)	November 28, 2023
(Perry Nuclear Power Plant, Unit No. 1)	)	

PETITION OF OHIO NUCLEAR-FREE NETWORK AND BEYOND NUCLEAR FOR LEAVE TO INTERVENE IN PERRY NUCLEAR POWER PLANT LICENSE EXTENSION PROCEEDING, AND REQUEST FOR A HEARING

Now come the Petitioners, Ohio Nuclear-Free Network ("ONFN") and Beyond Nuclear ("BN") (collectively, "Petitioners"), on behalf of their respective members, proceeding by and through counsel, and seek leave to intervene and requesting an adjudicatory hearing in the matter of a license renewal pending before the U.S. Nuclear Regulatory Commission ("NRC"). That proceeding involves Facility Operating License No. NPF–58 to authorize Energy Harbor Nuclear Corp. ("Energy Harbor," the applicant), doing business as Energy Harbor Nuclear Generation LLC, to operate Perry Nuclear Power Plant ("PNPP" or "Perry"), Unit 1. The renewed license would authorize operation of PNPP for an additional 20 years beyond the present terminal date of November 7, 2026. This matter is docketed at the NRC as Docket No. 50-440 and was publicly noticed as NRC-2023-0136, published at 88 FR 67373 (9/29/2023).

In support of their Petition to Intervene, Petitioners further state as follows:

I. PETITIONERS-INTERVENORS AND MEMBERS

A. Petitioner Ohio Nuclear-Free Network

Petitioner Ohio Nuclear-Free Network ("ONFN") is an unincorporated association of individuals whose legal address is 316 N. Michigan Street, Ste. 520, Toledo, OH 43604,

www.onfn.org. ONFN has existed for five years, and is made up of about 60 members from within and without Ohio who are concerned about nuclear weapons, radioactive waste and the radioactive contamination of air, water, and soil. ONFN works to transition away from unsustainable nuclear power and fossil fuels to renewables and energy efficiency. ONFN also exists to expose the relationships among and between the commercial nuclear industry and U.S. militarism.

ONFN has proffered a declaration (Appendix Exhibit A) by which it proposes to represent two members, Connie Kline and David Hughes, whose particulars are provided below.

1. Connie Kline

ONFN member Connie Kline lives at 38531 Dodds Landing Dr., Willoughby Hills, OH 44094, which is located about 17 miles from PNPP. Ms. Kline lives, works and recreates within a radius of 50 miles of PNPP. Her declaration is found at Appendix Exhibit B.

She opposes the 20 year license extension because PNPP is aging and deteriorating and asserts that many maintenance and repair obligations at PNPP were deferred or excused by the NRC in years preceding 2021, when PNPP's owner decided to close the plant, but then subsequently canceled that decision. She further notes that there is historic evidence of tritium leakage into groundwater beneath PNPP and into Lake Erie, which poses long-term problems of public and environmental health. She is concerned about increasing erosion problems and seismic instability within the area of the plant. She says that the power from PNPP is redundant and unnecessary for the 20 year extension period. Ms. Kline also maintains that PNPP has no effective means of remediating problems of spent fuel storage because of a lack of a dry transfer system/hot cell. To her, the fact that the PNPP reactor uses enriched fuel that might be high burnup fuel poses additional problems of spent fuel storage and transfer. She expects the quantity

of irradiated fuel stored onsite to grow larger along with the chances of an accident involving the spent fuel pool at PNPP, 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 PNPP.

Ms. Kline is concerned that if an accident were to occur at PNPP, she and her family might be killed, injured or sickened by the radioactive releases, and that she might suffer irreparable damage to real and personal property located at her residence. She believes that if the PNPP operating license is extended without resolving her safety and environmental concerns, Perry may operate unsafely and pose an unacceptable risk to the environment and the public health and safety of many inhabitants within a 50-mile radius of PNPP.

Ms. Kline requests to have ONFN represent her interests by seeking intervention in the license extension proceeding, and she designates ONFN as her representative for that purpose.

2. <u>David Hughes</u>

David Hughes also is an ONFN member. He lives at 7394 Bank St., Madison, OH 44057, which is located about 4 miles from PNPP. He lives, works and recreates within a radius of 50 miles of PNPP. His declaration is found at Appendix Exhibit C.

Mr. Hughes opposes the 20 year license extension because PNPP is aging and deteriorating, and asserts that many maintenance and repair obligations at PNPP were deferred or excused by the NRC in years preceding 2021, when PNPP's owner decided to close the plant, but then subsequently canceled that decision. He further notes that there is historic evidence of tritium leakage into groundwater beneath PNPP and into Lake Erie, which poses long-term problems of public and environmental health. He is concerned about increasing erosion problems and seismic instability within the area of the plant. He says that the power from PNPP is redundant and unnecessary for the 20 year extension period. Mr. Hughes also maintains that

PNPP has no effective means of remediating problems of spent fuel storage because of a lack of a dry transfer system/hot cell. To him, the fact that the PNPP reactor uses enriched fuel that might be high-burnup fuel poses additional problems of spent fuel storage and transfer. He expects the quantity of irradiated fuel stored onsite to grow larger along with the chances of an accident involving the spent fuel pool at PNPP, 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 PNPP.

Mr. Hughes is concerned that if an accident were to occur at PNPP, he and his family might be killed, injured or sickened by the radioactive releases, and that he might suffer irreparable damage to real and personal property located at his residence. He believes that if the PNPP operating license is extended without resolving his safety and environmental concerns, Perry may operate unsafely and pose an unacceptable risk to the environment and the public health and safety of many inhabitants within a 50-mile radius of PNPP.

Mr. Hughes requests to have ONFN represent his interests by seeking intervention in the license extension proceeding, and he designates ONFN as his representative for that purpose.

B. Beyond Nuclear

Beyond Nuclear (BN) is a not-for-profit public policy, research, education organization based in Takoma Park, Maryland that advocates the immediate expansion of renewable energy sources to replace commercial nuclear power generation. Beyond Nuclear has over 12,000 members of whom a number reside, work and recreate near the Perry Nuclear Power Plant. BN has herewith provided a declaration (Appendix Exhibit D) indicating its willingness to represent one its members, Ronald O'Connell, in this proceeding. Beyond Nuclear's address is 7304 Carroll Ave., #182, Takoma Park, MD 20912, phone (301) 270-2209, www.beyondnuclear.org.

1. Ronald O'Connell

Ronald O'Connell lives at 774 SR 534 South, Geneva, Ohio 44041, which is located 11.09 miles from Perry Nuclear Power Plant ("PNPP"). Mr. O'Connell actively farms at that address and has resided there for 29 years. He lives, works and recreates within a radius of 50 miles of PNPP. His declaration appears at Appendix Exhibit E.

Mr. O'Connell opposes the 20 year license extension because PNPP is aging and deteriorating, and asserts that many maintenance and repair obligations at PNPP were deferred or excused by the NRC in years preceding 2021, when PNPP's owner decided to close the plant, but then subsequently canceled that decision. He further notes that there is historic evidence of tritium leakage into groundwater beneath PNPP and into Lake Erie, which poses long-term problems of public and environmental health. He is concerned about increasing erosion problems and seismic instability within the area of the plant. He says that the power from PNPP is redundant and unnecessary for the 20 year extension period. Mr. O'Connell also maintains that PNPP has no effective means of remediating problems of spent fuel storage because of a lack of a dry transfer system/hot cell. To him, the fact that the PNPP reactor uses enriched fuel that might be high-burnup fuel poses additional problems of spent fuel storage and transfer. He expects the quantity of irradiated fuel stored onsite to grow larger along with the chances of an accident involving the spent fuel pool at PNPP, 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 PNPP.

Mr. O'Connell is concerned that if an accident were to occur at PNPP, he and his family might be killed, injured or sickened by the radioactive releases, and that he might suffer

irreparable damage to real and personal property located at his residence. He believes that if the PNPP operating license is extended without resolving his safety and environmental concerns, Perry may operate unsafely and pose an unacceptable risk to the environment and the public health and safety of many inhabitants within a 50-mile radius of PNPP.

Mr. O'Connell requests to have ONFN represent his interests by seeking intervention in the license extension proceeding, and he designates ONFN as his representative for that purpose.

II. LEGAL BASIS FOR STANDING TO INTERVENE

A. Judicial Concepts of Standing

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.

In determining whether a petitioner has sufficient interest to intervene in a proceeding to determine whether to license a commercial nuclear power plant, the Nuclear Regulatory Commission has traditionally applied judicial concepts of standing.[1] 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

[1] *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)).

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.[2]

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.[3] This includes unincorporated associations such as ONFN.[4]

An organization seeking representational standing must 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.[5]

B. Proximity Standing of ONFN and BN Member Declarants

Standing to participate in this proceeding is demonstrated by the proximity standing set forth in the declarations of the ONFN and BN members accompanying this Petition. All member declarants, in turn, have authorized the organizational Petitioners, ONFN and BN to represent

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

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

[4] *Warth v. Seldin*, 422 U.S. 490, 511, 95 S.Ct. 2197, 45 L.Ed.2d 343 (1975) ("There is no question that an association may have standing in its own right to seek judicial relief from injury to itself and to vindicate whatever rights and immunities the association itself may enjoy. Moreover, in attempting to secure relief from injury to itself the association may assert the rights of its members, at least so long as the challenged infractions adversely affect its members' associational ties. *E.g., NAACP* v. *Alabama, supra*, at 458-460; *Anti-Fascist Committee* v. *McGrath*, 341 U.S. 123, 183-187 (1951) (Jackson, J., concurring). . . . Even in the absence of injury to itself, an association may have standing solely as the representative of its members. *E.g., National Motor Freight Assn*. v. *United States*, 372 U.S. 246 (1963)."

Also, see Sperry Products v. Ass'n of Am. Railroads, 132 F.2d 408, 410–11 (2d Cir. 1942) (noting that unincorporated associations can be treated as singular entities for "procedural incidents" such as "service of process" and "venue," but that "for most purposes," including "jurisdiction over [] subject matter," the law "looks at such associations as mere aggregations of individuals").

[5] *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).

their interests in this proceeding, and they have committed to representing the member declarants via organization declarations appearing in Appendix A hereto, the aggregated declarations, filed contemporaneously to this Petition.

Because they all live, work and/or recreate within 50 miles of PNPP, each of the member declarants have demonstrated presumptive standing by virtue of their proximity to the plant.[6] In an operating license 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.[7] Petitioners may be accorded standing if they reside close enough to a planned project so that there is reasonable apprehension of injury.[8]

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 PNPP Unit 1 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 proper consideration of the aging effects on certain safety-related structures, systems and components ("SSCs") at PNPP under the Atomic Energy Act ("AEA"). If PNPP is not relicensed, the potential harms will not occur. Even if PNPP is relicensed, the adverse environmental consequences caused by PNPP operations can be substantially reduced if they are identified, analyzed and, based on that analysis, mitigated. PNPP may not continue operations

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[6] *Amergen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), LBP-06-7, 63 NRC 188, 195 (2006). *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).
[7] *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).
[8] *Hydro Resources, Inc., supra.*

without a license from the Commission, which by statute also has the power to order mitigation arrangements.[9]

The member declarants have expressed concerns that fall within the zone of interests protected by NEPA and its implementing regulations. Their concerns also fall within the zone of interests protected by the AEA and its implementing regulations.[10] The member declarants therefore have standing to intervene in their own right, having 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.[11] They will be affected by PNPP's proposed relicensing and failure to provide a legally adequate environmental analysis. Granting the member declarants the relief they request in the form of requiring that an adequate environmental analysis be performed will provide redress for their injuries. 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 PNPP and the NRC staff to comply with these requirements, the member declarants' procedural rights will have been vindicated.[12]

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[9] 42 U.S.C. § 2133(a).

[10] *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).

[11] *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").

[12] *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.")

Likewise, NRC regulations at 10 CFR § 54.29(a) require 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). . . ."[13]

The member declarants have incontestably proven their geographical proximity to PNPP and sufficient involvement in the relicensing issues, along with motivation, such that they should be accorded standing as individual petitioners. Then, ONFN's and BN's willingness to represent their members should result in recognition by the Commission of ONFN's and BN's representational standing to proceed on behalf of their respective members.

III. 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 PNPP's compliance with NEPA and the AEA. Respecting their NEPA contentions, ONFN and BN acknowledge that, as a private corporate entity, Energy Harbor Nuclear Corp., the applicant, doing business as Energy Harbor Nuclear Generation LLC,is not directly bound by NEPA. But the applicant is bound by10 C.F.R. § 51.45(a) to submit an environmental report that addresses various topical areas which parrot the requirements of NEPA.[14] And as required by 10 C.F.R. § 2.309(f)(2),[15] ONFN and BN have stated their NEPA contentions against Appendix E of the Perry Nuclear Power Plant License

[13] 10 CFR § 54.29(a).
[14] *See generally* 10 C.F.R. §§ 51.45(b), (d) and (e).
[15] 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.")

Renewal Application (ML23184A081) ("LRA"), which is entitled "Applicant's Environmental Report, License Renewal Stage, Perry Nuclear Power Plant Unit 1 (2023)" ("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"), Petitioners raise their NEPA claims now to preserve objections if the flaws of the ER also appear in the Draft SEIS. If the Draft SEIS deviates substantially from PNPP's ER on the same issues, Petitioners reserve 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. 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.

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

B. Materiality

Each of Petitioners' contentions below are "material" to the findings NRC must make, viz, they are issues that would make a difference in the outcome of the proceeding. "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."

Each of ONFN's and BN's contentions demonstrates sufficient information to show that a genuine dispute exists with Energy Harbor 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.

Contention 1: The Severe Accident Mitigation Analysis Is Inadequate

1. Proposed Contention

The Environmental Report (ER) is inadequate because it does not properly reflect contemporary geological investigative techniques as well as geological understanding of the Perry Nuclear Power Plant site since the design and construction of the plant some 40 years ago.

Petitioners' expert geologist has detailed possibilities of severe accidents to structures and stability of the PNPP site, all based upon latter-day science. There is a severe earthquake potential at PNPP because of the tectonic nature of recent quake activity; shoreline erosion is ongoing; there is an increasing possibility of landslide collapse of the bluff on which PNPP is located. The applicant's study of postulated severe accidents rejects the need for mitigation measures. Petitioners state that Energy Harbor has ignored severe geological defects and deficiencies revealed by scientific developments since PNPP was built and that consequently, the applicant is in violation of 10 C.F.R. § 51.53(c)(3)(ii)(L). Further SAMA analysis by the applicant, Energy Harbor, is obligatory.

2. Basis For The Contention

Improved understanding of the geological characteristics and hazards underlying the PNPP site has prompted Petitioners' geological witness to counsel abandonment of the site. The opinion of Julie Weatherington-Rice, Ph.D. is that "[I]t is hubris on the part of the NRC and DOE to continue to permit the operation of this plant at this location. . . . The plant should be decommissioned and all radioactive materials should be moved off site to a more structurally stable location." Petitioners' position is that there is serious science warning of possibly catastrophic problems. Their expert repeatedly states that the geological defects and deficiencies may not be remediable. Energy Harbor, however, has rejected all SAMA candidates.

3. The Contention Is Within The Scope Of The Proceeding

This license extension proceeding falls within the ambit of the Atomic Energy Act (AEA), 42 U.S.C. §§ 2011-2297; and the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321-4347.

Where, as here, the NRC staff has not previously evaluated Severe Accident Mitigation Alternatives ("SAMAs") for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment, the NRC's environmental regulations at 10 CFR § 51.53(c)(3)(ii)(L) require that license renewal applicants consider alternatives to mitigate severe accidents. The purpose of this consideration is to ensure that plant changes (*i.e*,

hardware, procedures, and training) with the potential for improving severe accident safety performance are identified and evaluated.

Severe accidents are a Category 2 issue in Subpart B to Appendix A of Part 51, which states "the probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives." Contentions implicating Category 2 issues ordinarily are deemed to be within the scope of license renewal proceedings. *See In the Matter of Florida Power & Light Company* (Turkey Point Nuclear Generating Plant, Units 3 and 4), 54 NRC 3, 11-13.

Because SAMAs have not previously been considered for PNPP;[16] this contention is within the scope of this license extension proceeding.

4. The Issues Raised In The Contention Are Material To The Findings The NRC Must Make To Support The Action That Is Involved In The Proceeding

The environmental report is required to discuss the impact of the proposed action on the environment as well as any adverse environmental effects which cannot be avoided should the proposal be implemented. 10 CFR § 51.45(b)(1) and (2).Council on Environmental Quality regulations require an agency, in considering whether the effects of the proposed action are significant, to "analyze the potentially affected environment and degree of the effects of the action," taking into account the significance of the project's effects in the local area. 40 CFR § 1501.3(b)(1). "In considering the degree of the effects, agencies should consider . . [e]ffects on public health and safety." 40 CFR § 1501.3(b)(2)(iii).

[16] LRA p. 4-44.

NRC's intervention regulation, 10 CFR 2.309(f)(iv), requires the petitioner to "demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding." In discussing the materiality requirement, the Atomic Safety and Licensing Board considering the license renewal for Millstone Nuclear Power Station stated "In order to be admissible, the regulations require that all contentions assert an issue of law or fact that is material to the outcome of a licensing proceeding; that is, the subject matter of the contention must impact the grant or denial of a pending license application. Where a contention alleges a deficiency or error in the application, the deficiency or error must have some independent health and safety significance." *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3) Docket Nos. 50-336-LR, 50-423-LR ASLBP No. 04-824-01-LR July 28, 2004, p. 7. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 179-80 (1998), *aff'd in part*, CLI-98-13, 48 NRC 26 (1998).

The deficiency highlighted in this contention has considerable independent health and safety significance. By underestimating the cost of a severe earthquake-caused accident in its SAMA analysis, Energy Harbor incorrectly discounts possible mitigation alternatives. This could have enormous implications for public health and safety because a potentially cost effective mitigation alternative might not be considered that could prevent or reduce the impacts of that accident. Petitioners allege the ER's SAMA analysis is deficient and the deficiency could significantly impact health and safety.

5. Concise Statement Of Facts and Opinions, With Source References

Petitioners' expert witness is Julie Weatherington-Rice, PhD, CPG, CPSS, of Columbus, Ohio, a longtime professional geologist whose expert qualifications and experience are detailed in her declaration and expert report, in Appendix Exhibit F which accompanies this Petition.

Dr. Weatherington-Rice assessed the historical geological backgrounding that was performed in preparation for construction of the Perry Nuclear Power Plant complex in the 1970s and 1980s. Petitioners incorporate her entire report herein by reference, but provide many of Dr. Weatherington-Rice's conclusions and some of the underlying evidence below.

Latter-Day Understanding of Soil Structure at PNPP Should Prompt Review of Pool and Building Stability

When design work was performed for PNPP more than 40 years ago, the site was subject to geotechnical testing and evaluation which deliberately measured only primary matrix porosity and permeability. "In fact, back then, if subsurface testing cores encountered secondary fracturing, those portions of the cores were discarded and not subjected to testing."[17] Those testing methods failed to provide the supporting data to explain the physical parameters of the site. "Therefore, the understanding of the site hydrogeology and engineering design of the site was based on only partial and faulty information." The issue of secondary fracturing in glacial materials application to construction in Ohio was not addressed until 2000.[18] This latter-day science "calls into question the original design calculations for saturated Hydraulic Conductivity, Consolidation, Shear Strength and site softening over time for sites like that found at the Perry Plant. That means that the facility is already undergoing structural changes that were not anticipated when it was originally built."[19]

"There is approximately 60 feet of unconsolidated materials under the plant. These are Pleistocene in age and consist of finer-grained low lime glacial tills, varved lake deposits and beach ridge sandy deposits. This is important information because it tells us the type of materials that the wet pools are constructed into. Unless they are more than 60 feet deep, they are in unconsolidated materials. Any leaks from the wet and dry storage containment areas will be moving through these materials either down to the underlying bedrock or as base flow into Lake Erie."[20] These geotechnical site limitations were fully understood when the Perry site was designed. Many of the summary publications that would have identified the issues of secondary

[17] Exh. F. p. 13.
[18] See Ohio Journal of Science, https://kb.osu.edu/server/api/core/bitstreams/403c8a86-0573-531f-ae98-7aef8764d95a/content
[19] Exh. F p. 13.
[20] *Id.*

porosity impacts at the site were published after the site investigations and analyses were completed.[21]

"Static groundwater levels in the unconsolidated materials are only 5-15 feet below the surface so there is a very good possibility that the wet storage pools, if dug to any depth at all, are sitting in saturated conditions at least part of the year. . . . While they are under drained, water will be passing by the outside walls as well as being contained inside the pools. That would place water both outside and inside the concrete, perhaps speeding up the weathering and decomposition of the concrete pools."[22]

The original designs "badly misinterpreted the movement of ground water through the soils, glacial materials vadose zone and the saturated unconsolidated materials. Their assumption of matrix movement for contaminants bears little resemblance to what actually is happening at the site. Water and contaminants move predominantly if not almost exclusively through the secondary fracturing systems at the site. Only the beach sands are permeable enough to drain through the matrix. This transport system can have significant impacts on the structures at the site where the water movement affects buried and hidden structures. Given that the buildings are already completed, it is now impossible to check the foundation excavations or impacts to the structures where they are built into or on top of the ground surface."[23]

Landslide Potential Is Increasing

It is unclear at this point how much consideration was taken about the potential for landslides into Lake Erie at the site but since the geotechnical analyses for the engineering design were incorrect, it is doubtful that any considerations developed in 1982 would have actually mirrored real life conditions at the site.

All of the soils mapped as CoF should be considered prime landslide areas. That mapping unit extends under the plant on the north edge and included the location of the cooling tower to the north. Since these soils have an F slope (25-50%), it is not clear how they were ever leveled off to be used for building sites. If they were filled with soils, then all the concerns voiced in Allred, 2000 apply. If they were bench cut and graded, then Allred, 2000 also applies. If they were filled with aggregate, then there are concerns about surface water moving through the aggregate into any primary and secondary permeability conditions that can exacerbate the potential for landslides by wetting the landslide scarp. While slides can be reactivated by cutting the toe of the slope *(i.e.* wave action at the beach), they can also be reactivated by loading the top (*i.e*. building a cooling tower on top of them) or saturating them with surface or groundwater.[24]

Shoreline Erosion Is Continuing[25]

[21] *Id.*
[22] *Id.* at 15.
[23] *Id.* at 15-16.
[24] Exh. F p. 23.
[25] *Id.* pp. 23-24.

It is not clear how much consideration, if any, was made for the active process of shoreline erosion at the Perry plant. Over the years, whole sections of the shore line including communities have ended up falling into the Lake. The early documents record the shoreline eroding at the rate of 5 feet a year. They also state that the north edge of the facility was 300 feet south of the shoreline. At that rate, the shoreline will have eroded 215 feet since 1980 and will erode another 100 feet in the next 20 years, placing the northern edge of the Perry plant at the northern edge of the Lake Erie shoreline bluffs. Given that the high level radioactive wastes at the site are supposed to be harmful for "hundreds of thousands of years", it would strongly behoove the Perry plant to take this geologic hazard into serious consideration and to armor the bluffs at the Lake, fully understanding that landslides can develop behind the armoring, thereby dumping the structural armoring into the Lake and exposing new faces of the bluffs, closer to the plant, to shoreline erosion. Without such safety precautions, it is possible that the shore line will reach the plant in the next 20 years.[26]

Prospective Seismic Activity May Have Been Underestimated[27]

Seismic activity is probably the most important hazard that the Perry plant faces. A review of the 1982, 1986 and 2003 reports indicate that the initial and follow-up evaluation for the potential of earthquake impacts to the Perry plant is unrealistic. The 1982 report quotes Eardley (1962), claiming the site is located in the "central stable region tectonic province" and that there should be no concern about earthquakes. In the 1986 update after the 5.0 quake in Lake County, the new evaluations spent much time discussing the quakes in Anna, Ohio, in the Maysville, Kentucky area, at the North Anna reactor in Virginia and one in upper New York State, again assuring everyone that the 1986 quake was an anomaly. That assurance was again provided in the 2003 report. There was significant discussion about faulting found in the Devonian shale that was attributed to glacial ice deformation.

In point of fact, the Devonian faulting is not the root of the significant earthquake potential surrounding the Perry plant. Neither are the Lake County quakes being triggered by deep injection wells. Having said that, USGS and ODNR have now collected information on earthquakes and contaminant migration at four sites in Ohio where injection wells play a very important role. These include the Class I hazardous waste well in Ashtabula County, active drilling and Class II injection wells in Mahoning County (Youngstown), Class II injection wells in Athens County (Torch) and Class II injection wells in Washington County (Marietta) as well as a few other random areas across the state where unconventional oil and gas wells are being drilled and/or Class II injection wells are being used. The Calhio well in Lake County is suspected but not confirmed as being a source of earthquakes and should be watched carefully.

[26] *Id.* pp. 23-24.
[27] *Id*. pp, 24-26.

Therefore, it is premature to assume the Class II injection wells in Lake County could never create significant earthquakes or even that they could not do so in the next 20 years.

When the current earthquake map is reviewed, it is clear that the Perry plant is sitting in the middle of swarms of recent earthquakes. While the 1986 5.0 quake appears to be the largest one to date, dozens and dozens have happened since then, including a 4.2 in 2023. A review of the ODNR interactive map shows this pattern. There are also several historical quakes of significance in the County, including a 4.4 event in 1943.

What is most important is the depth of these events. They tend to be clustered in a 2.31 to a 6.0 Kms zone beneath the surface. This range puts them squarely in the Precambrian. This is critically important to understand because they are not only natural, they are tectonic and therefore can neither be stopped (which could be possible with man-made quakes) nor can their occurrence be predicted with precise accuracy. All we can know for sure is that they are happening; they appear to continue to be happening and that it is not possible to predict when, where or how strong the next quakes will be.[28]

At this point in time, all that is known is that the quakes are natural, in the Precambrian and appear to be tectonic in nature, also that they are continuing, increasing in number and strength and should be planned for. Given that they are natural, stronger quakes should be expected.

The Urgent and Most Salient Conclusions[29]

> There is no way to assure a stable site for another 20 years since it is impossible to determine that the site is stable now. The current design and construction fails in so many ways and cannot be counted on.

> It is unrealistic to expect that the wet and dry high level radioactive waste storage facilities at the site will continue to be effective for many more years, let alone assuming the storage facilities are working now. Given that the site is already more than 40 years old since original inception, it is expected that there are already some levels of structural compromises at the site. . . . Since there appears to be no serious investigations of existing conditions, the current level of compromise cannot be determined. It is also not clear if the facility could be renovated in its current configuration. Another 20 years of aging without serious rehab to the facilities will only degrade the structures further.

> The soils and underlying unconsolidated materials were only analyzed geotechnically and older methods were used. There appear to be no efforts to re-evaluate the site using currently available information developed here in Ohio. Without a modern reanalysis of the site, it is impossible to determine where failures to the structure are already occurring. Since much of the potential failure sites are buried below ground, it is not possible to determine the structural integrity of the site just by visual observation. Given what we have learned about building on

[28] *Id.* at 24-25.
[29] *Id.* at 28-31.

Ohio's fractured environment, it must be assumed that almost 40 years in, some failures are occurring and that they will only increase in time. There is no way to guarantee structural integrity for the next 20 years given the physical limitations of the site. There really is no way to fix many of the problems that will or have already developed.

> Only geotechnical hydraulic primary porosity was considered for the soils and underlying unconsolidated materials. Three generations of Ohio soil scientists, geologists and agricultural engineers, the work of more than 100 scientists and engineers, has been collected in two special issues of the Ohio Journal of Science, (June-September 2000 and April 2006). Those two issues should be read and evaluated by those responsible for the site. The references and examples discussed in this paper should be studied for site applications. The site should be re-evaluated under our more modern understanding of conditions at the site. This review should be undertaken with an eye to considering closure of the facility. It's not safe. It may take the next 60 years to decommission the plant and there are no guarantees that it will be structurally stable for the next 60 years.

> A monitoring program for methane and radon gas incursions and seeps and springs on the bluffs along Lake Erie should begin immediately if not already in place. I found no information in the environmental reports documenting such ongoing programs. The monitoring for methane and radon buildups in confined spaces is required for worker safety and to prevent the enclosed space from exploding because of methane buildup.

> The site is subject to lake shore erosion and landslides. The bluff should be hardened to prevent further failure. Outlets for seeps and springs emanating as base flow from the bluffs must be included in the design or hydrostatic pressure will build up over time and cause the bluff protection to fail from behind. An estimate of shoreline failure at an average of 5 feet per year was given in the pre-built reports. The facility was built with the north edge approximately 300 feet south of the Lake bluffs. Assuming a beginning date of 1980, the shoreline is expected to recede 330 feet by 2046. That puts the recessional area within the built environment of the facility.

> The seismic activity is real, natural and ongoing. It is Precambrian in origin and appears to be connected to plate tectonic activity. Another series of quakes began in August of this year near Madison and are continuing. At any point in time quakes higher than the plant design can occur. The earthquakes are the game changer. Given this information, it is hubris on the part of the NRC and DOE to continue to permit the operation of this plant at this location. Most of the environmental reports that propose to understand and predict the earthquake events in the area predate the current activity. They also predate the more modern understanding of their root causes. These are not simple random quakes that just "happen", these are movements triggered by mid-continental plate shifts. Mid-continental plate shifts are the hardest to predict and they can be catastrophic when they occur.

> The plant should be decommissioned and all radioactive materials should be moved off site to a more structurally stable location. While a number of the problems at the site might be

mitigated, some of them, like the old well inventories cannot be because the site is already built. But the earthquakes are the game changer.

6. There Are Material Issues of Law and/or Fact

Dr. Weatherington-Rice has provided a geological perspective that introduces doubt into the assumptions of stability and continued, unimpeded operation of PNPP. Juxtaposed to her detailed report and its conclusions is this determination made by Energy Harbor on questions of severe accident mitigation:

> The analysis considered a total of 157 SAMAs identified from industry studies and plant-specific examination as potential candidates for severe accident mitigation. The qualitative Phase I screening eliminated 155 SAMA candidates from further consideration. The two SAMA candidates were retained for quantitative cost benefit assessment.
>
> The benefit from the remaining two candidates (SAMA 11 and SAMA 17) was quantified. When compared to the implementation cost, the benefit from implementation was found not to be cost beneficial and both SAMAs were screened out. As a result of this evaluation, all potential SAMAs were screened out (Attachment G).[30]

There are disputed facts and legal conclusions inferable from those facts. Petitioners believe that their geological review should prompt extensive re-examination of SAMA candidate scenarios. Where a petitioner alleges that the SAMA was done, but that the analysis was significantly flawed due to the use of inaccurate factual assumptions, it may be used to support a contention. *Entergy Nuclear Operations, Inc*. (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 102 (2008).

This contention, that updated science poses a serious need for in-depth review of the previous SAMA assumptions and determinations, should be admitted for adjudication.

Contention 2: Flawed Description of No-Action Alternative

1. Proposed Contention

[30] ER p. 4-46.

Only two project options are considered by Energy Harbor in the Environmental Report: (1) to renew the PNPP operating license for an additional 20-year period, and (2) the no-action alternative. Energy Harbor's consideration of the no-action alternative is fact-averse, and provides conclusions unsupported by data concerning environmental harms predicted to arise from the purchased power alternative. The applicant presents an exaggerated perception of the centrality of Energy Harbor as a power producer in the multistate regional grid. An accurate recitation of purchased power alternatives likely to be available during the 2026-2046 period exposes Perry Nuclear Power Plant's generating capacity as currently and prospectively redundant and not needed. Energy Harbor's depiction of the no-action alternative should be rejected as conclusory and nonfactual.

2. Basis For The Contention

NRC regulations require Energy Harbot's environmental report to consider alternatives to the proposed project. 10 CFR § 51.45(b)(3). According to Energy Harbor, **"**The only other alternative under consideration is the no-action alternative, which would be the decision not to renew the PNPP OL."[31] Energy Harbor rejections the no-action alternative, stating:

> Given the uncertainties associated with purchasing baseload power at the scale of PNPP's generation capacity on a long-term basis and the environmental impacts for developing new generation and transmission capacity, as well the operational impacts of fossil fuel generation, purchased power was not considered a reasonable discrete alternative.[32]

ER p. 7-4.

Energy Harbor's purpose and need statement for the proposed project of 20-year operating license renewal clearly is devoted to preservation of anachronistic baseload power:

> The purpose and need for the proposed action (issuance of a renewed license) is to provide an option that allows for baseload power generation capability beyond the term of the current nuclear power plant operating license to meet future system generating needs. Such needs may be determined by other energy-planning decision-makers, such as State, utility, and, where authorized, Federal agencies (other than the NRC). Unless there are findings in the safety review required by the Atomic Energy Act or the NEPA [National Environmental Policy Act] environmental review that would lead the NRC to reject a license renewal application, the NRC does not have a role in the energy planning decisions of whether a particular nuclear power plant should continue to operate.[33]

[31] ER p. 7-1.
[32] ER p. 7-4.
[33] ER p. 1-1.

Energy Harbor's depiction of the no-action alternative provides no statistical or factual analysis of the availability of electricity overcapacity within Ohio, nor of the available export electricity in multiple states surrounding Ohio. Energy Harbor omits to mention the historical fact that after PNPP's owners expressed a formal, public intention to permanently shut down Perry in 2019, arrangements to make up for PNPP's lost capacity were promptly and competently made by regional power grid administrators. The applicant alleges, without providing supporting data or other evidence, that the environmental negatives of power generated to replace energy from PNPP. Energy Harbor provides a falsely exaggerated portrayal of Perry's and the company's importance as a power producer within the multistate regional grid.

Energy Harbor alleges "uncertainties" in the purchased power market, but provides zero projections, pricing information, and assessment of incoming new generation resources. The applicant nonetheless concluded:

> Given the uncertainties associated with purchasing baseload power at the scale of PNPP's generation capacity on a long-term basis and the environmental impacts for developing new generation and transmission capacity, as well the operational impacts of fossil fuel generation, purchased power was not considered a reasonable discrete alternative.[34]

Petitioners' competing, evidence-based recitation of purchased power alternatives likely to be available during the 2026-2046 period reveals that PNPP's generating capacity is presently and prospectively will be too expensive, redundant and unnecessary, and that the claimed "uncertainties" accompanying the purchased power alternative are, to the contrary, much more "certain" than any economic advantage to be gained by keeping PNPP running for another generation..

3. The Contention Is Within The Scope Of The Proceeding

[34] ER p. 7-4.

This license extension proceeding falls within the ambit of the Atomic Energy Act (AEA), 42 U.S.C. §§ 2011-2297; and the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321-4347. The requirement of consideration of alternatives to continued PNPP operation is recognized under NEPA and NRC regulations and is a proper subject for a NEPA-based contention.

The NRC requires an applicant's environmental report to consider alternatives to the proposed project. 10 CFR § 51.45(b)(3) requires as follows:

> The discussion of alternatives shall be sufficiently complete 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." To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form. . . .

Indeed, the NRC requires the PNPP environmental report to

4. The Issues Raised In The Contention Are Material To The Findings The NRC Must Make To Support The Action That Is Involved In The Proceeding

Under NEPA, Energy Harbor's environmental review must "rigorously explore and objectively evaluate all reasonable alternatives." 40 C.F.R. § 1502.14(a). NEPA requires a "searching inquiry into alternatives." *Simmons v. U.S. Army Corps of Eng'rs*, 120 F.3d 664, 666 (7th Cir.1997).

The regulations also require a discussion of a no-action alternative. 40 C.F.R. § 1502.14(d). NEPA expects a "substantial treatment of each alternative" to be considered in an EIS. 40 C.F.R. § 1502.14(b); see also, *Southeast Alaska Conservation Council v. FHWA*, 649 F.3d 1050 (9th Cir. 2011). The purpose of the no-action alternative is to "compare the potential impacts of the proposed major federal action to the known impacts of maintaining the *status*

quo." *Custer Cnty. Action Ass'n v. Garvey,* 256 F.3d 1024, 1040 (10th Cir. 2001). In other words, the no-action alternative cannot just be blithely dismissed with unsupported statements.

5. Concise Statement Of Facts and Opinions, With Source References

On July 22, 2021, FirstEnergy Corporation, predecessor to Energy Harbor, paid a $230,000,000 penalty and signed a deferred prosecution agreement in U.S. District Court for Southern Ohio.[35] The company admitted that it conspired with public officials and other individuals and entities to pay millions of dollars to public officials in exchange for specific official action for FirstEnergy Corp.'s benefit.[36] It agreed that it paid millions of dollars to an elected state public official through the official's alleged 501(c)(4) in return for the official pursuing nuclear legislation for FirstEnergy Corp.'s benefit.[37] It further acknowledged that it used 501(c)(4) entities, including one it controlled, to further the scheme because it allowed certain FirstEnergy Corp. executives and co-conspirators to conceal from the public the nature, source and control of payments.[38] It further acknowledged that it paid $4.3 million dollars to a second public official. In return, the individual acted in their official capacity to further FirstEnergy Corp.'s interests related to passage of nuclear legislation and other company priorities.[39]

FirstEnergy renamed itself Energy Harbor when it emerged from bankruptcy in 2020.

After underwriting a $61,000,000 bribery scandal involving dozens of state legislators who passed H.B. 6, creating a billion-dollar subsidy for FirstEnergy's two nuclear power plants, Energy Harbor's credibility regarding the seriousness of its alternatives analysis may properly be

[35] https://www.justice.gov/usao-sdoh/pr/firstenergy-charged-federally-agrees-terms-deferred-prosecution-settlement
[36] *Id*.
[37] *Id.*
[38] *Id.*
[39] *Id.*

questioned. In 2019, legislative hearings were convened on the proposed H.B. 6 after the 2018 announcement by FirstEnergy that it was shuttering Davis-Besse Nuclear Plant and PNPP as early as May, 2020. At one Ohio Senate committee hearing, Asim Haque, Executive Director for Strategic Policy and External Affairs at PJM Interconnection and formerly Chairman of the Ohio Public Utilities Commission testified:

> PJM's analysis found that FirstEnergy Solutions' deactivation of those generating units is not expected to adversely impact the reliability of the PJM transmission system due to three remedial measures that PJM would take: one, PJM would accelerate the completion of existing baseline upgrades in its Regional Transmission Expansion Plan (RTEP); two, PJM would complete new RTEP Upgrades; and three, PJM would implement system redispatch measures. The overall cost of these upgrades to Ohio consumers is approximately $24 million.[40]

At that time in 2019, according to Ned Ford, Petitioners' utility economics expert, the cost of operating the Perry and Davis-Besse nuclear plants was $42 per MWh, at a time when the PJM market was experiencing costs between $33.00 and $35.00 per MWh.[41] Since 2019, according to Mr. Ford, the wholesale price of electricity has dropped while inflation has caused the price of power generation to rise.[42] Noting that Ohio is a longtime net importer of electricity, Mr. Ford points out that "FirstEnergy has openly sought to represent its capacity as a more essential part of its resources than is the case in the PJM region. . . . Attempting to assert that FirstEnergy/Energy Harbor is in control of or responsible for the provision of generation power to the customers in the company's distribution service area is a false representation of the dynamics of the competitive market in the State of Ohio, the PJM interconnection region and most of the United States. The company has an obligation to report its planning to PJM and the

[40] Testimony of Asim J. Haque before Energy and Public Utilities Commission of Ohio Senate, June 5, 2019 https://www.documentcloud.org/documents/6131549-HB6AsimHaqueTestimony.html.
[41] See Exhibit C, Comments of Ned Ford, p.2, in the Appendix filed contemporaneously with this Petition.
[42] *Id.*

evidence we have is that in 2019 PJM testified that the two Ohio nuclear plants were not needed to ensure reliable and affordable supply to Ohio or surrounding PJM states."[43]

Mr. Ford further points out that in asserting the lack of viability of the no-action alternative that Energy Harbor has apparently decided not to offer voluntary energy efficiency programs to its customers: "[T]he FirstEnergy companies could offset some of the capacity that Perry represents very quickly, and while it might be unreasonable to assume efficiency could replace the entire plant in just a few years, it is also unreasonable to discount the role of efficiency entirely."[44]

Mr. Ford uses a graph in his report[45] to depict excess generating capacity in Ohio that could partially replace lost Perry power production.

It is in the states surrounding Ohio that Petitioners' expert found even more *certain, existing* generating capacity. Coal and natural gas combined cycle generation are the most productive power sources in Michigan. There is significant excess generating capacity from either, and either source could completely replace the power provided by Perry.[46] Similarly, there is significant excess power generating capability in Indiana which could replace power lost by terminating PNPP.[47] Pennsylvania has exported 25% of the electricity generated within its borders for more than 30 years and could easily replace all power lost from closing PNPP.[48]

6. There Are Material Issues of Law and/or Fact

[43] *Id.* at 3.
[44] *Id.*
[45] *Id*. at 4.
[46] *Id.* at 5.
[47] *Id.*
[48] *Id.*

The Petitioners have articulated issues of fact and law that are adverse to the ER. Energy Harbor's discussion of the no-action alternative lacks a factual basis. There is no comparative data supporting the supposed environmental and/or economic advantages of keeping Perry running. The applicant in conclusory fashion merely alleges unspecified "uncertainties" having to do with the purchased power wholesale market and generally alludes to the carbon releases that otherwise viable purchased power generators would cause. Kentucky and West Virginia, both of which produce most of their power from coal, also have excess capacity, and West Virginia in particular has solid physical interconnections with the Ohio electrical grid.[49]

There are material issues of fact over the no-action alternative primarily because Energy Harbor did not rely on a factual presentation, but instead on self-serving conclusions about a rather outsized power generation role ostensibly dominated by Perry. The poorly-conceived purpose and need statement enables the equally uninformed discussion of the no-action alternative, and the resulting shallow discussion defeats the purpose of publicly disclosing the pros and cons of alternatives to the project.

Under NEPA, an agency choosing to "trumpet" an action's benefits has a duty to disclose its costs. *Sierra Club v. Sigler*, 695 F.2d 957, 979 (5th Cir. 1983). "[I]t is essential that the EIS not be based on misleading economic assumptions." *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446, 448 (4th Cir.1996) (inflated estimate of recreation benefits versus adverse environmental effects). Moreover, NRC environmental regulations explicitly require Energy Harbor's environmental report to contain a discussion of costs and benefits of the no-action alternative even at the license renewal stage:

> Environmental reports prepared at the license renewal stage under § 51.53(c) need not discuss the economic or technical benefits and costs of either the proposed action or alternatives *except if these benefits and costs are either essential for a determination*

[49] *Id.*

regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation.[50]

In addition, Energy Harbor's self-serving purpose and need statement essentially undercuts its conclusory discussion of the purchased power alternative. The avowed purpose and need is to "provide an option that allows for baseload power generation capability beyond the term of the current nuclear power plant operating license to meet future system generating needs." But those needs "may be determined by other energy-planning decision-makers, such as State, utility, and, where authorized, Federal agencies (other than the NRC)." And Energy Harbor clearly states that absent AEA or NEPA justifications "that would lead the NRC to reject a license renewal application, the NRC does not have a role in the energy planning decisions of whether a particular nuclear power plant should continue to operate."[51]

PNPP is a baseload power plant, but as Petitioners' expert as well as Energy Harbor's purpose and need statement indicate, the need for PNPP is not for the NRC to decide. The purpose and need statement is tautological; Energy Harbor relies on the baseload nature of the plant and vague conclusions about its environmental cleanliness as a means of avoiding head-to-head economics arguments. And so the no-action alternative is ineffectual and legally inadequate.

The agency may not accept out of hand the applicant's statement of purpose and need, *ELPC v. NRC*, 470 F.3d 676,683 (7th Cir. 2006), and then use that statement of purpose and need to summarily reject the no-action alternative. NEPA does not permit an agency to ". . . contrive a purpose so slender as to define competing 'reasonable alternatives' out of consideration (and even out of existence). . . . If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency

[50] 10 CFR § 51.45(c) (emphasis added)..
[51] ER p. 1-1.

satisfy [NEPA].” *Simmons v. United States Army Corps of Eng'rs,* 120 F.3d 664, 665 (7th Cir. 1997). Blindly adopting the applicant's goals is "a losing proposition" because it does not allow for the full consideration of alternatives required by NEPA. *Id.* at 669. NEPA requires an agency to "exercise a degree of skepticism in dealing with self-serving statements from a prime beneficiary of the project" and to look at the general goal of the project rather than only those alternatives by which a particular applicant can reach its own specific goals. *Id.*

The “evaluation of ‘alternatives’ mandated by NEPA is to be an evaluation of alternative means to accomplish the general goal of an action; it is not an evaluation of the alternative means by which a particular applicant can reach his goals.” *Van Abbema v. Fornell*, 807 F.2d 633, 638 (7th Cir. 1986); *Sierra Club v. Marsh*, 714 F.Supp. 539, 577 (D.Me. 1989) (“project’s principal goals must override the stated preferences of the applicant for purposes of NEPA's ‘reasonable alternatives’ analysis”); *DuBois v. U.S. Dept. of Agric*., 102 F.3d 1273, 1287 (1st Cir. 1996), *cert. denied*, 117 S.Ct. 1567 (1997) (existence of a reasonable, but unexamined, alternative renders the EIS inadequate).

The D.C. Circuit warned, in *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190 (D.C. Cir. 1991) that “[A]n agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative from among the environmentally benign ones in the agency’s power would accomplish the goals of the agency’s action, and the EIS would become a foreordained formality. . . .”

An effective purpose and need statement is especially key to whether the no-action alternative has been fairly presented. After all, the information submitted as part of the applicant’s environmental report “should not be confined to information supporting the proposed action but should also include adverse information.” 10 CFR § 51.45(e). Petitioners urge the

Commission to admit this contention for litigation, if for no other reason than to let Energy Harbor prove that it should not be further prosecuted for causing the gravest damage to the credibility of the Ohio legislature in over 220 years.

Contention 3: PNPP's Tritium Problem

1. Proposed Contention

The License Renewal Application is inadequate because it fails to include considerable information on the release of tritium and other radionuclides from PNPP. The LRA and its Environmental Report omit to analyze cumulative radiological impacts and resulting potential health risks of operating Perry Nuclear Power Plant while leaking and otherwise emitting unpredictable amounts of tritium, for an additional 20 years. The LRA and ER underestimate the hazards of tritium released into the physical environment and omit to provide analysis of the hazards from 20 more years of discharge of water that contains radioactive particulates and tritium into groundwater in the vicinity of PNPP and also, into Lake Erie.

While the LRA gives a partial history of tritium releases into water and air, but that history is incomplete. There is mention of pipe leaks or other breakage that has led to some radiation releases, but there is no analysis of similar pipe leaks or breakage that may occur in the future and the related radiation release increase that could result in aging nuclear reactors.

The LRA and ER do not contain analysis of the potentially additive or synergistic effects of tritium and other radionuclides that leak or are emitted with tritium in Lake Erie water, where there are toxic industrial chemicals such as PCBs, as well as pesticides and herbicides. There is no recognition nor scientific discussion of the additive or synergistic relationships that might exist between tritium and other leaked radionuclides and the biocide chemicals used to kill mollusks and other aquatic beings around the water intake and discharge into Lake Erie. The LRA and ER further omit to take cognizance of or to analyze the potential health impacts to workers and the communities surrounding Perry Nuclear Power Plant for an additional 20 years of operation, including cumulative impacts.

2. Basis For The Contention

Over the years, there have been numerous releases at nuclear power reactor sites involving unknown, uncontrolled, and unmonitored leakages or spills of liquids containing radioactive material into groundwater and nearby surface waters. The majority of the inadvertent liquid release events involve tritium, which is a radioactive isotope of hydrogen. However, other radioactive isotopes, such as cesium and strontium, have also been inadvertently released into

groundwater. The types of events include leakage from spent fuel pools, buried piping, and failed pressure relief valves on an effluent discharge line.[52]

This is especially true of tritium and other radionuclide releases at PNPP, where there have been numerous tritium and other radioactive releases for a decade into groundwater, into Lake Erie which is immediately downslope from the Perry plant, and into the air. While there is periodic monitoring for tritium and other radionuclide releases, it is not frequent enough, given the aging of the power plant infrastructure and predictable deterioration of pipes and various fluid containers and reservoirs onsite.

The problem of tritium releases at power plants like Perry can be severe enough that the NRC anticipates the impact to groundwater quality from the release of radionuclides to range from small to moderate, depending on the magnitude of the leak, the radionuclides involved, hydrogeologic factors, the distance of receptors, and the response time of plant personnel in identifying and stopping the leak in a timely fashion.[53]

NEPA requires the evaluation of projects which are likely to be accompanied by significant environmental events to be based, in part, on potential or actual public health effects, and also for the assessment of direct and indirect project impacts to be cumulative. NEPA requires "an agency to evaluate 'cumulative impacts' along with the direct and indirect impacts of a proposed action." *TOMAC, Taxpayers of Michigan Against Casinos v. Norton*, 433 F.3d 852, 864 (D.C. Cir. 2006) (citing *Grand Canyon Tr. v. FAA*, 290 F.3d 339, 345 (D.C. Cir. 2002)). A cumulative impact is "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7.

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[52] ER p. 4-14.
[53] ER p. 4-15.

NRC regulations explicitly require the environmental report to include "an analysis of the cumulative impacts of the proposed action when added to the impacts of such excluded site preparation activities on the human environment." 10 CFR § 51.45(c). And 10 CFR § 51.14(b)51 incorporates into NRC regulations the Council on Environmental Quality mandate that environmental impact statements include "impacts, which may be cumulative" within their scope. 40 CFR § 1508.25(c).

3. The Contention Is Within The Scope Of The Proceeding

This license extension proceeding falls within the ambit of the Atomic Energy Act (AEA), 42 U.S.C. §§ 2011-2297; and the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321-4347.

In its Environmental Report, Energy Harbor concedes that:

> *The issue [of inadvertent radionuclide release] is relevant to license renewal because all commercial nuclear power plants routinely release radioactive gaseous and liquid materials into the environment.* These radioactive releases are designed to be planned, monitored, documented, and released into the environment at designated discharge points. But over the years, there have been numerous events at nuclear power reactor sites that involved unknown, uncontrolled, and unmonitored releases of liquids containing radioactive material into the groundwater.
>
> The majority of the inadvertent liquid release events involved tritium, which is a radioactive isotope of hydrogen. However, other radioactive isotopes, such as cesium and strontium, have also been inadvertently released into groundwater. The types of events include leakage from spent fuel pools, buried piping, and failed pressure relief valves on an effluent discharge line.[54]

Council on Environmental Quality regulations require an agency, in determining the significance of a proposed action, to "analyze the potentially affected environment and degree of the effects of the action," taking into account the significance of the project's effects in the local area. 40 CFR § 1501.3(b)(1). "In considering the degree of the effects, agencies should consider . . [e]ffects on public health and safety." 40 CFR § 1501.3(b)(2)(iii).

[54] ER pp. 4-14 to 4-15 (Emphasis added)..

4. The Issues Raised In The Contention Are Material To The Findings The NRC Must Make To Support The Action That Is Involved In The Proceeding

As noted in the 2022 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants,"[55] "At nuclear power plant sites, groundwater quality has been affected by inadvertent releases of radionuclides, predominately *[sic]* tritium, from plant systems."[56] Moreover, "[t]he issue of tritium (and other radionuclide) releases to groundwater rose to prominence as groundwater contamination was observed at an increasing number of plants, including the exceedance of drinking water standards in onsite groundwater at some plants."[57] And "[t]he NRC has repeatedly determined that inadvertent releases at nuclear power plant sites either remain on power plant property or involve such low offsite levels of tritium that they do not affect public health and safety. The NRC has continued to review incidents of inadvertent releases to ensure that nuclear power plant operators take appropriate action."[58]

NRC regulations at 10 CFR § 54.29(a) require 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). . . ."[59]

Leakage of tritium and other radionuclides is intimately associated with managing the aging and deterioration of structures and components at nuclear power plants, and the issues

[55] NUREG-1437. Vol. 1, Rev. 2 (Draft 2022) (ML22165A006).
[56] *Id.* p. 3-40.
[57] *Id.* p. 3-48.
[58] *Id.* p. 3-49.
[59] 10 CFR § 54.29(a).

raised by this contention go to the ultimate "reasonable assurance" question that must be answered by the applicant.

5. Concise Statement Of Facts and Opinions, With Source References

Tritium as an Understated Health Threat

The lightest of all radionuclides, tritium, or H3, has largely escaped public and scientific scrutiny. This is surprising given that tritium is usually the single largest radioactive substance emitted as a part of normal nuclear power plant operations.[60] Contrary to some popular notions that tritium is a relatively benign radiation source, the vast majority of published studies indicate that exposures, especially those related to internal exposures, can have significant biological consequences including damage to DNA, impaired physiology and development, reduced fertility and longevity, and can lead to elevated risks of diseases including cancer.[61] Tritium is a very underrated environmental toxin that deserves much greater scrutiny.

In his book, Exploring Tritium Dangers, Dr. Arjun Makhijani states that "tritium crosses the placenta with facility," and that by ionizing water in the cytoplasm, it "set[s] in motion processes that can profoundly disrupt mitochondrial DNA and hence the system that converts food to usable form, ATP, that the body uses for all functions."[62] By "affecting ova during the time of their formation *in utero* and during the time of the maturation during pregnancy," he continues, tritium can "exemplify the ways in which other internal emitters can have non-cancer impacts, including during the early period of pregnancy, when internal radiation can result in miscarriages and malformations."[63]

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[60] Mousseau, Timothy and Todd, Sarah A., Biological Consequences of Exposure to Radioactive Hydrogen (Tritium): A Comprehensive Survey of the Literature (April 11, 2023), Abstract. Available at SSRN: https://ssrn.com/abstract=4416674 or http://dx.doi.org/10.2139/ssrn.4416674

[61] *Id.*

[62] Makhijani, Arjun, Exploring Tritium Dangers, p. 5 (Opus Self-Publishing Services 2022), https://ieer.org/wp/wp-content/uploads/2023/02/Exploring-Tritum-Dangers.pdf

[63] *Id.* at p. 5.

Dr. Makhijani, who is president of the longtime Institute for Energy and Environmental Research in Takoma Park, Maryland and holds a Ph.D. from Berkeley in nuclear fusion, further asserts that tritium is "about 150,000 times as radioactive, in terms of disintegrations per unit time, as plutonium-239." One teaspoon of tritiated water would contaminate about 100 billion gallons of water to the U.S. drinking water limit, enough to supply about 1 million homes with water for a year.[64]

The presence of tritium as a byproduct of generating electricity at nuclear power plants is growing as those plants age. In 2014, the NRC admitted that "[T]ritium levels as high as 3.2 million pCi/L have been reported to the NRC in the ground water at some nuclear power plants."[65]

Terrestrial Tritium Leakages at Perry Nuclear Power Plant

Tritium can be distributed into the physical environment from nuclear power plants as a gas or blended in groundwater. Terrestrial habitats near nuclear power plants can be subject to radiological releases under normal plant operations. These habitats are exposed to small amounts of radionuclides that result from the deposition of particulates released from nuclear power plant vents during normal operations. Releases typically include noble gasses (which are not deposited), tritium, isotopes of iodine, and cesium, and they may also include carbon-14, strontium, cobalt, and chromium.[66] Terrestrial habitats near nuclear power plants that have cooling towers are subject to the deposition of cooling tower drift particulates (including salt); the deposition of water droplets on vegetation from drift; structural damage from freezing vapor

[64] *Id.* at p. 5.
[65] https://www.federalregister.gov/documents/2014/02/04/2014-02307/environmental-radiation-protection-standards-for-nuclear-power-operations
[66] "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437. Vol. 1, Rev. 2, p. 3-51 (Draft 2022) (ML22165A006).

plumes; and increased humidity. Small amounts of particulates from cooling towers are dispersed over a wide area.[67]

"Perry's 12 groundwater monitoring wells and quadrant piezometers (N-3-83, E-2-83, S-2-89, and W-7-83) are sampled twice a year, in the spring and fall and analyzed for gamma isotopes and tritium."[68] But Energy Harbor contradicts this regime elsewhere in the Environmental Report: "Two of the twelve groundwater monitoring wells (MW-2C and MW-3C) are sampled on a biennial basis. The remaining 10 groundwater monitoring wells are sampled semiannually."[69] Any positive result lower than 500 picoCuries per liter (pCi/L) is attributed to background activity and not plant operations. The offsite dose calculation manual (ODCM) reporting level for tritium in an environmental water sample is 20,000 pCi/L (EPA drinking water limit).

In 2021, tritium was not detected above background in any of the sampled wells or piezometers. (EH 2022c).[70] Over the last decade, however, there have been several tritium spills and leaks of considerable concern. So far people and the environment have been lucky as regards tritium and other radionuclide releases. To date, tritium in excess of the drinking water standard has been observed in groundwater at 38 nuclear power plant sites as a result of leaks or spills, with 7 plants continuing to have tritium in groundwater above the drinking water standard as of October 2021 (NRC 2021j).[71]

On January 20, 2014, analyses of a sample taken from Perry Nuclear Power Plant's Auxiliary Building Groundwater confirmed the presence of tritium at a concentration of

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[67] *Id.*
[68] Perry ER p. 3-87 (2023).
[69] Perry ER p. 3-92 (2023).
[70] Perry ER p. 3-87 (2023).
[71] "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437. Vol. 1, Rev. 2, p. 3-49 (Draft 2022) (ML22165A006).

46,200 picocuries per liter (pCi/L).[72] The discovery was made following a notification of a feedwater leak from a feedwater venturi. The concentration was above the 20,000 pCi/L threshold for voluntarily reporting for a non-drinking water pathway, as indicated in NEI 07-07.[73] Monitoring showed that tritium in the groundwater had not migrated off the plant property and that there was no public exposure pathway in groundwater.[74] Investigation of the cause revealed a leak in feed water piping which was not contained and subsequently migrated from the leak site through a building rattle space and into the ground area under the auxiliary building.[75] Fortunately, tritium water contamination was not found in the outfall to Lake Erie during this event.[76]

On July 9, 2015, analyses of a sample taken during semi-annual sampling of in-plant piezometers showed the presence of tritium at a concentration of 4960 picocuries per liter (pCi/L). Confirmatory and expanded sampling done on July 10 and 11, 2015, confirmed the first sample and detected a tritium concentration of 15,900 pCi/L at a second location.[77] No plant-related gamma emitters were detected on any samples. These concentrations were above the 2000 pCi/L site threshold for voluntarily reporting groundwater contamination.[78]

On January 31, 2020, a leak developed from the reactor coolant system into the Nuclear Closed Cooling (NCC) system. Daily sampling from January throughout 2020 revealed residual

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[72] Letter, "Perry Nuclear Power Plant - Discovery of Tritium in Groundwater, 30-Day Report in Accordance with the Industry Ground Water Protection Initiative," p. 3 (2/21/2014), https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML14063A063
[73] *Id.*
[74] *Id.*
[75] Inspection Report (April 2014), https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML14308A292
[76] *Id.*
[77] Perry - Submittal of 30-Day Report in Accordance with the Industry Ground Water Protection Initiative, p. 4 (8/5/2015), https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML15223A440
[78] *Id.*

tritium activity in the NCC system in January, March, April, May, June, July, and December.[79] Cobalt-60 was detected in the February batch environmental counts and March composite with the range of 1.04E-07Ci to 1.82E-06Ci.[80] Gross alpha activity was detected in the November monthly composite. (EH 2021b).[81]

Then, in an underdrain manhole, MH-23, tritium was detected at 5,310 pCi/L in March 2020.[82] Upon discovery of the elevated tritium activity in MH-23, a monitoring and sampling plan tritium flowing into underdrain MH-9 via a drain line from the auxiliary boiler deaerator that had become contaminated with tritium by a steam leak. Tritium was observed in MH-9 in March 2020 up to 13,200 pCi/L. Once the steam leak causing the contamination was addressed, tritium concentrations in both MH-9 and MH-23 returned to less than the lower limit of detection (LLD).[83] Quarterly composite samples were collected and analyzed for tritium and gamma emitters; tritium was detected during the third and fourth quarters. (EH 2021b).[84] Tritium continued to show up in manhole MH-23 in March, April, June, and November 2021.[85]

On December 14, 2021, a tritium release was detected by the NCC Process Radiation Monitor. A failed thermal neck on a Reactor Water Clean Up pump caused the release. The pump was repaired and returned to service.[86]

Tritium was detected in manhole MH-20 on December 16, 2021, at 1,750 pCi/L with no detectable gamma activity.[87] A backup sample was obtained on December 17, 2021, with

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[79] Perry ER p. 3-93 (2023).
[80] *Id.*
[81] *Id.*
[82] *Id.*
[83] *Id.*
[84] *Id.*
[85] *Id.*
[86] *Id.*
[87] *Id.*

2,050 pCi/L of tritium, which exceeded the voluntary reporting requirement of 2,000 pCi/L.[88] A sampling plan and action plan to identify the source turned up in indoor piezometer PZ-3, which ranged from 10,100 to 14,800 pCi/L for samples collected in December 2021 and January 2022.[89] Three potential sources were identified during the investigation, but a single source was not determined. Tritium activity has returned to background levels since the December 2021 discovery. Tritium levels continue to be monitored and tracked with analytical results for samples collected from manhole MH-20. (EH 2022c).

On June 22, 2023, the tritium activity level from Piezometer Tube 21 was determined to be 40,300 pCi/L, and subsequent tests have confirmed continued elevated tritium levels.[90] There was no migration of tritium from this groundwater event off the plant property outside of an approved plant effluent pathway. The exceedance was measured on an internal plant piezometer located in Auxiliary Building Unit 1. The purpose of such measurement equipment is early detection of mitigation of groundwater contamination as part of PNPP's groundwater protection program. The groundwater in the area moves toward the site's underdrain system and will be discharged via a permitted pathway[91] (which is code for discharge into Lake Erie). As of October 2023, the source of this significant tritium leakage is unresolved; there seems to be no active leak in the underdrain system nor migration of the tritium outside of the underdrain system.[92]

Radionuclide Leakage Offshore of PNPP

[88] *Id.*
[89] ER p. 3-94.
[90] "Perry Nuclear Power Plant, 30-Day Voluntary Report in Accordance with Industry Groundwater Protection Initiative," (7/19/2023), https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23200A079
[91] *Id.*
[92] Perry Nuclear Power Plant - Integrated Inspection Report 05000440/2023003, https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML23284A173

Nuclear power plants also affect aquatic organisms through radiological and non radiological chemical releases. Chemical effects on aquatic biota can occur from exposure to biocides and other contaminants. Blowdown from closed-cycle cooling systems can contain concentrated levels of constituents present in the makeup water, residual biocides, process contaminants, and other chemicals added for controlling corrosion or deposits (DOE 1997a).[93] Radionuclides are released to aquatic systems at or below permitted levels at nuclear power plants (10 CFR Part 20, Appendix B). Radionuclides can be environmentally significant because they have a strong tendency to adsorb onto particles (*e.g.*, suspended and settled solids), can accumulate in biological organisms, or can be concentrated through trophic transfers (MDNR 2019).[94] Radionuclides, such as tritium, and other constituents in cooling water systems, such as biocides, can enter aquatic systems and be taken up by aquatic plants and animals.[95]

Levels of radionuclides, including tritium, immediately offshore of PNPP have declined during the 2013-2023 period. In 2013, gross beta activity was detected in forty-five (45) of the fifty-six (56) samples collected. The indicator average gross beta activity was 2.2 pCi/L and the control average gross beta activity was 2.3 pCi/L.[96] In 2023, gross beta activity offshore was detected in 31 of the 60 samples collected and the indicator annual average gross beta activity was 1.4 pCi/L and the control average gross beta activity was 1.2 pCi/L.[97]

This downward trend over the last decade is reflected on the graph appearing on the next page:[98]

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[93] "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437. Vol. 1, Rev. 2, p. 3-58 (Draft 2022) (ML22165A006).
[94] *Id.*
[95] *Id.*
[96] Perry Nuclear Power Plant, "Annual Environmental and Effluent Release Report," p. 43/127 of .pdf, (April 30, 2014), https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML14122A325
[97] https://www.nrc.gov/docs/ML2310/ML23108A044.pdf (page 18/82)
[98] *Id.*

Gross beta activity was detected in 31 of the 60 samples collected. The indicator annual average gross beta activity was 1.4 pCi/L and the control average gross beta activity was 1.2 pCi/L. Refer to Figure 6 for the annual average gross beta activity for both indicator and control locations. No gamma activity was detected in any of the 60 samples collected. The 20 quarterly composite samples had 10 samples where tritium activity was detected. Any positive result less than 500 pCi/L is considered as background activity and not due to plant operations. The highest tritium activity was 230.5 pCi/L.

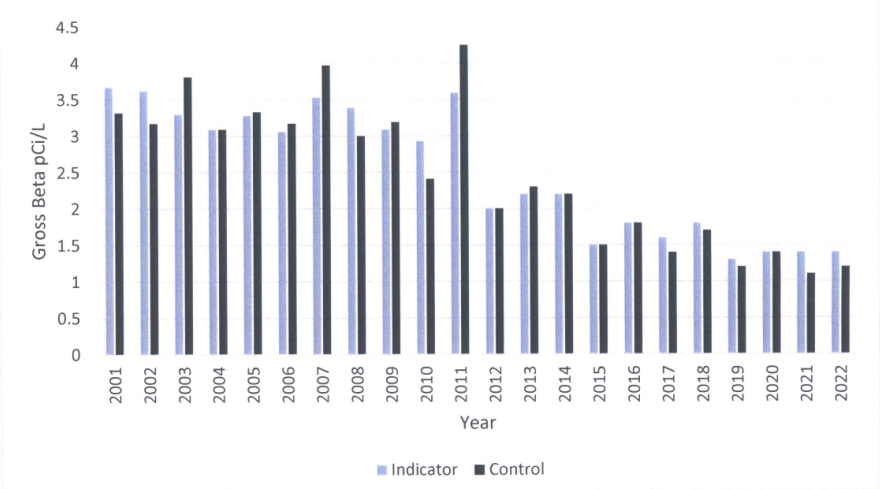

Figure 6: Annual Average Gross Beta Activity in Water

8.2 Sediment

Sampling shoreline sediments provides an indication of the accumulation of particulate radionuclides which may lead to an external radiation source to fishermen and swimmers from shoreline exposure. Sediment was sampled from two locations.

A total of four sediment samples were collected in May, June, and October of 2022 and were analyzed by gamma spectroscopy. The only radionuclide detected was naturally occurring potassium-40.

8.3 Fish

Fish are analyzed primarily to quantify the radionuclide intake by humans and secondarily to serve as indicators of radioactivity in the aquatic ecosystem. Fish are collected from two locations annually during the fishing season as required by the ODCM. Important sport or commercial species are targeted, and only the fillets are sent to the laboratory for analysis.

While this long-term decline is good news, it may only signify that tritium and radionuclide leakage is happening beneath the plant in areas where groundwater is not moving toward or draining into Lake Erie. It might be evidence of the continued degradation of tritium and other radionuclides byproduct to above-ground nuclear testing, which ended more than 30 years ago. That bomb-made tritium will eventually decay away completely (presuming the test ban holds), leaving power plants and cosmic rays as the major sources, along with minor contributions from the tritium in photoluminescent signs and the like.[99] Also, tritium's radioactivity is difficult to detect, so its supposed prevalence in a given body of water may be understated. "Because the electron tritium spits out is not a penetrating or high-energy particle, it is hard for radiation monitoring devices to even detect. That makes measuring the radiation dose from tritium difficult.[100] Regardless of capability of measurement, it remains true, as Dr. Makhijani stated, that tritium can contaminate in very small volumes – even in dilution-is-the-solution Lake Erie. As one reads the foregoing history of tritium leaks and spills, it is difficult to feel reassured that the problem is under control at PNPP. Ten of twelve monitoring wells are tested two times per year, and the remaining two are tested every other year. As to leakage beneath the plant and into groundwater inside the facility fence, that can go on for months, or years, before being discovered.

Additionally, the cooling tower water vapor is a pathway for tritium and radionuclide dispersion because H3 easily bonds with oxygen to create tritiated water. Further, tritium might attach itself to particulate vented from the cooling tower, or elsewhere onsite. Gaseous releases of tritium within the plant can travel unpredictable distances.

6. Petitioners Have Demonstrated Issues of Law and Fact

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[99] Scientific American, "Is Radioactive Hydrogen in Drinking Water a Cancer Threat?" (2014), https://www.scientificamerican.com/article/is-radioactive-hydrogen-in-drinking-water-a-cancer-threat/

[100] *Id.*

NEPA Requires Analysis of Tritium Accumulations in Lake Erie from 2026-2046

Petitioners maintain that the Environmental Report fails to account for cumulative impacts of tritium leakage and deposition into Lake Erie for the 20 year extension period sought by the applicant. Further, they point out that there is no showing of understanding in the Environmental Report of how tritium and other radionuclides might be interacting with contaminants emanating from PNPP and contaminants of concern in the Lake Erie Basin.

Pages 4-38 through 4-40 of the LRA address cumulative surface water impacts and do not address at all either the additive effects of 20 more years of tritium accumulation in Lake Erie, nor any synergistic analysis of continuous tritium exposure to offshore aquatic plants which are bathing in non-PNPP contaminants of concern. Twenty additional years of contamination with tritium likely will be significant. The degree of tritium and associated radionuclide contamination in Lake Erie will be hard to predict as the power plant ages. The LRA contains nearly 300 hits for the word "cumulative" – not in the context of "cumulative effects," but rather of "cumulative fatigue damage," a priority in aging management efforts for piping, liquid contaminants, vents, valves and other components through the 20 year extension period.

The supposed downward trend of tritium's presence offshore of Perry may, in other words, not continue, but reverse. The cumulative impacts of migrating radionuclides in water and gas form over the coming 20 years should be identified, investigated and explained in the Supplement Environmental Impact statement for the license extension.

NEPA requires "an agency to evaluate 'cumulative impacts' along with the direct and indirect impacts of a proposed action." *TOMAC, Taxpayers of Michigan Against Casinos v. Norton*, 433 F.3d 852, 864 (D.C. Cir. 2006) (citing *Grand Canyon Tr. v. FAA*, 290 F.3d 339, 345 (D.C. Cir. 2002)). A cumulative impact is "the incremental impact of the action when added to

other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7. "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." *Id.* § 1508.7. A NEPA cumulative impact analysis must include discussion of "other actions—past, present, and proposed, and reasonably foreseeable—that have had or are expected to have impacts in the same area," "the impacts or expected impacts from these other actions," and "the overall impact that can be expected if the individual impacts are allowed to accumulate." *Grand Canyon Tr.*, 290 F.3d at 345.

NEPA Requires Investigation of Synergistic Chemistry Cumulative Effects Analysis

Lake Erie is the source of drinking water for most communities within a 5 mile radius of PNPP,[101] despite its being far from pristine. There are longstanding contaminants of concern dispersed throughout the Lake Erie Basin, as measured in chemical sampling of the flesh of Erie's abundant game fish. The recurring principal toxins are mercury, PCBs, DDT, chlordane, and dieldrin.[102] The widespread human consumption advisories for fish for decades in the Lake Erie Basin have prompted USEPA and Environment Canada to try to clean up and eliminate mercury and PCBs (Daher, 1999).[103] PCB contamination in fish is the cause of many human health impairments in Ohio, followed by mercury.[104]

Notably with respect to mercury,PNPP's existing NPDES permit includes a variance-based limit of 7.0 ng/L for mercury. Based on available monitoring data and new application information, PNPP has determined that the facility cannot meet the 30-day average permit limit

[101] ER p. 3-90.
[102] Myers *et al*., "Water Quality in the Lake Erie-Lake Saint Clair Drainages (Michigan, Ohio, Indiana, New York, and Pennsylvania, 1996–98, https://pubs.usgs.gov/circ/circ1203/major_findings2.htm
[103] *Id.*
[104] *Id.* p. ES-1.

of 1.3 ng/L.[105] PNPP "has also demonstrated to the satisfaction of the Ohio EPA that there is no readily apparent means of complying with the WQBEL without constructing prohibitively expensive end-of-pipe controls for mercury."[106] These facts have implications for the 20 year period of the license extension and evaluation of cumulative effects.

Although pages 4-38 through 4-40 of the LRA address cumulative surface water impacts, there is no mention there or elsewhere in the Environmental Report of either the additive effects of 20 more years of tritium accumulation in Lake Erie, nor any analysis of the synergistic effects of tritium and other radionuclides when blended in an aquatic environment containing the listed contaminants of concern. It is undisputed that radionuclides such as tritium and other constituents in cooling water systems such as biocides can enter aquatic systems and be taken up by aquatic plants and animals.[107]

The U.S. Supreme Court has interpreted NEPA to require consideration of "cumulative or synergistic environmental impact." *Kleppe* v. *Sierra Club,* 427 U.S. 390, 410 (1976). Although *Kleppe* was focused on programmatic review, the Court recognized the importance of considering the collective environmental effects of agency actions to inform the decision-making process. *Id.* ("Only through comprehensive consideration of pending proposals can the agency evaluate different courses of action.").

The cumulative impact analysis of Lake Erie contaminants must embrace this historical, present and proposed and reasonably foreseeable actions "that have had or are expected to have impacts in the same area," "the impacts or expected impacts from these other actions," and "the overall impact that can be expected if the individual impacts are allowed to accumulate." *Grand*

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[105] https://epa.ohio.gov/static/Portals/35/permits/doc/3IB00016.fs.pdf
[106] *Id.*
[107] PNPP "Annual Environmental and Effluent Release Report," p. 43/127 of .pdf, (April 30, 2014), https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML14122A325

Canyon Tr., 290 F.3d at 345. The prognosis for increased tritium and radionuclide leakage and spilling into Lake Erie as the Perry Nuclear Power Plant enters its fifth and sixth decades cannot be ignored. An adequate Supplemental Environmental Impact Statement under the circumstances must contain investigation of any synergisms that are likely to occur between the radioactive and nonradioactive chemicals in the Lake.

WHEREFORE, Ohio Nuclear-Free Network and Beyond Nuclear pray the Nuclear Regulatory Commission accord each of them organizational standing to proceed on behalf of their respective members and represented parties for the aforestated contentions, and to admit those contentions for adjudication.

Respectfully submitted,

/s/ Terry J. Lodge
Terry J. Lodge, Esq. (Ohio S.Ct. No. 0029271)
316 N. Michigan St., Ste. 520
Toledo, OH 43604-5627
(419) 205-7084
tjlodge50@yahoo.com
Counsel for Petitioners Ohio Nuclear-Free Network and Beyond Nuclear

CERTIFICATE OF SERVICE

Pursuant to 10 CFR § 2.305, I hereby certify that copies of the foregoing "Petition for Leave to Intervene and Request for Hearing" were served upon the Electronic Information Exchange (NRC Filing System) in the captioned proceeding this 28th day of November, 2023.

Respectfully submitted,

/s/ Terry J. Lodge
Terry J. Lodge, Esq. (Ohio S.Ct. No. 0029271)
Counsel for Petitioners Ohio Nuclear-Free Network and Beyond Nuclear