

ORAL ARGUMENT NOT SCHEDULED

**UNITED STATES COURT OF APPEALS FOR THE
DISTRICT OF COLUMBIA CIRCUIT**

BEYOND NUCLEAR, INC. and THE SIERRA CLUB, INC.
Petitioners,

v.

UNITED STATES NUCLEAR REGULATORY COMMISSION
and the UNITED STATES OF AMERICA,
Respondents,

NUCLEAR ENERGY INSTITUTE, et al.,
Intervenors.

No. 24-1318

On Petition for Review of an Order of the
United States Nuclear Regulatory Commission

PETITIONERS' FINAL OPENING BRIEF

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June 13, 2025

UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

BEYOND NUCLEAR, INC. and)	
the SIERRA CLUB, INC.)	
)	
Petitioners,)	
)	
v.)	
)	
UNITED STATES NUCLEAR)	
REGULATORY COMMISSION and the)	Case No. 24-1318
UNITED STATES OF AMERICA,)	
)	
Respondents,)	
)	
NUCLEAR ENERGY INSTITUTE, et al,)	
)	
Intervenors.)	

RULE 26.1 DISCLOSURE STATEMENT

Beyond Nuclear, Inc., and Sierra Club, Inc., are nonprofit organizations engaged in environmental advocacy, including issues related to nuclear safety and environmental protection. Pursuant to D.C. Circuit Rule 26.1, Beyond Nuclear, Inc., certifies that it is a nonprofit corporation that does not issue stock, has no parent companies, and in which no publicly held corporations have any form of ownership interest. Similarly, Sierra Club, Inc., certifies that it is a nonprofit corporation that does not issue stock, has no parent companies, and in which no publicly held corporations have any form of ownership interest.

Respectfully submitted,

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to D.C. Circuit Rules 15(c)(3) and 28(a)(1), counsel for Petitioners Beyond Nuclear, Inc. (“Beyond Nuclear”) and the Sierra Club, Inc. (“Sierra Club”) certifies as follows:

1. Parties, Intervenors, and Amici Curiae.

Parties. The Petitioners are Beyond Nuclear and the Sierra Club. Respondents are the United States Nuclear Regulatory Commission (“NRC”) and the United States of America. Intervenor-Respondents are the Nuclear Energy Institute; Florida Power & Light Company; and NextEra Point Beach, LLC.

2. Ruling Under Review.

Petitioners seek review of the following regulation issued by the NRC: Final rule and guidance: Reviewing Nuclear Power Plant Operating Licenses -- Environmental Review, 89 Fed. Reg. 64,166 (Aug. 6, 2024).

3. Related Cases.

To Petitioners' knowledge, there are no related cases.

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GLOSSARY

Pursuant to Circuit Rule 28(a)(3), the following is a glossary of acronyms and abbreviations used in this brief:

APA	Administrative Procedure Act
CEQ	President’s Council on Environmental Quality
CEQ Guidance	Notice of Interim Guidance; request for comments, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
Final Rule	Final Rule on Review
GEIS	Generic Environmental Impact Statement
Intergovernmental Panel	Intergovernmental Panel on Climate Change
JA	Joint Appendix
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
NRC-DOE Degradation Assessment	Expanded Material Degradation Assessment
Petitioners	Beyond Nuclear, Inc. and the Sierra Club, Inc.
1996 GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants (1996)
2013 GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants (2013)
2024 GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants (2024)
2017 Lessons Learned Report	Generic Aging Lessons Learned Report for Subsequent License Renewal (2017)
2018 Climate Assessment	Fourth National Climate Assessment
2023 Draft Lessons Learned Report	Draft Generic Aging Lessons Learned Report for Subsequent License Renewal (2023)
2023 Synthesis Report	Climate Change 2023: Synthesis Report, Summary for Policymakers

JURISDICTIONAL STATEMENT

Pursuant to 42 U.S.C. § 2239(b), 28 U.S.C. § 2342(4), and 5 U.S.C. § 702, this Court has jurisdiction over the petition filed by Beyond Nuclear, Inc. and the Sierra Club, Inc. (“Petitioners”) for review of a rulemaking by the U.S. Nuclear Regulatory Commission (“NRC”) for environmental review of nuclear reactor license renewal applications: Final rule and guidance: Reviewing Nuclear Power Plant Operating Licenses – Environmental Review, 89 Fed. Reg. 64,166 (Aug. 6, 2024) (“Final Rule”) (JA034). On October 7, 2024, Petitioners timely filed their petition for review under 28 U.S.C. § 2344.

STATUTES AND REGULATIONS

Relevant statutes and regulations are included in an addendum.

ISSUES PRESENTED FOR REVIEW

1. Does the Final Rule violate the National Environmental Policy Act (“NEPA”), 42 U.S.C. §§ 4331-4370, and the Administrative Procedure Act (“APA”), 5 U.S.C. § 706, by relying on and adopting environmental impact findings in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437, August 2024) (“2024 GEIS”) (JA068) as binding regulations in all NRC license renewal and subsequent license renewal decisions, without assessing how reasonably foreseeable deterioration of safety components may influence the likelihood and

consequences of nuclear reactor accidents during subsequent operating license renewal terms?

2. Does the Final Rule violate NEPA and the APA by relying on and adopting environmental impact findings in the 2024 GEIS as binding regulations in all NRC license renewal and subsequent license renewal decisions, without assessing how reasonably foreseeable climate change effects may influence the likelihood and consequences of nuclear reactor accidents during initial and subsequent license renewal terms?
3. Does the Final Rule violate NEPA and the APA by relying on and adopting environmental impact findings in the 2024 GEIS as binding regulations in all NRC license renewal and subsequent license renewal decisions for nuclear reactors that are unreasonable, inadequately supported, and therefore arbitrary and capricious and not in accordance with law?
4. Does the Final Rule violate NEPA and the APA by adopting, as binding regulations for all NRC license renewal and subsequent license renewal decisions for nuclear reactors, a determination that mitigation measures need not be addressed in any site-specific supplemental environmental impact analysis for an individual reactor?

STATEMENT OF THE CASE

This appeal raises significant omissions and deficiencies in NRC's NEPA-required environmental analysis for prospective initial and subsequent license renewal decisions. Over three decades, NRC has renewed the forty-year operating licenses for most operating commercial reactors in the United States for an initial twenty-year license renewal term, allowing them to operate for sixty years. Now, NRC proposes to renew many of those operating licenses for a second or "subsequent" license renewal term, thereby doubling their original operating terms to eighty years. NRC may also renew a handful of original forty-year operating licenses that have yet to be renewed.

As NRC has recognized, the risk of radiological accidents during renewed operating license terms is a primary concern in re-licensing nuclear reactors. Generic Environmental Impact Statement for License Renewal of Nuclear Plants at 5-10 (NUREG-1437, Rev. 0, 1996) ("1996 GEIS") (JA365). In particular, the NRC focuses on two risk factors: the "effects of aging," *i.e.*, the deterioration of safety components under the harsh conditions to which they are exposed during reactor operation; and the "changing environment" surrounding nuclear reactors. *Id.*

Recently, NRC has recognized the existence of knowledge gaps and uncertainties regarding the long-term reliability of aging safety equipment to protect against accident risks during operation after sixty years. The agency has

also acknowledged that the increased intensity and frequency of climate change-caused weather events will affect the environment surrounding nuclear reactors during their initial and subsequent license renewal terms. Yet, in issuing the Final Rule and 2024 GEIS, NRC categorically refused to assess how these risks impact nuclear reactor safety during license renewal. Instead, it relied on outdated assumptions and sweeping, unsupported assurances that its existing safety regulations are sufficient.

By dismissing the relevance of these critical risks to its environmental analysis for license renewal, and by refusing to evaluate alternatives for avoiding or mitigating accident impacts in individual license renewal proceedings, NRC violated both NEPA and the APA.

STATUTORY AND REGULATORY FRAMEWORK

NRC's regulation and licensing of reactors is primarily governed by two statutes: the Atomic Energy Act, 42 U.S.C. § 2011 *et seq.*, and NEPA. While these statutes' concerns overlap, *Citizens for Safe Power v. NRC*, 524 F.2d 1291, 1299 (D.C. Cir. 1975), they impose independent obligations. *Limerick Ecology Action v. NRC*, 869 F.2d 719, 729-31 (3rd Cir. 1989). Nothing in the Atomic Energy Act precludes or limits NEPA. *Id.*, 869 F.2d at 729.

I. ATOMIC ENERGY ACT

The Atomic Energy Act allows NRC to issue nuclear reactor operating licenses for an initial term of 40 years, with provision for renewal. 42 U.S.C. §§ 2133(a), (c). NRC may not license a reactor if its operation would be “inimical” to public health and safety. 42 U.S.C. § 2133(d). NRC may set standards it deems necessary for adequate protection of public health and safety. 42 U.S.C. § 2201(b).

II. NATIONAL ENVIRONMENTAL POLICY ACT

NEPA “declares a broad national commitment to protecting and promoting environmental quality.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348 (1989) (citing 42 U.S.C. § 4331). NEPA’s “sweeping policy goals” are “realized through a set of ‘action-forcing’ procedures that require agencies to take a ‘hard look’ at environmental consequences” and “provide for the broad dissemination of environmental information.” *Id.* at 350 (quoting *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976)). Thus, NEPA requires agencies to prepare an environmental impact statement (“EIS”) for every “major [f]ederal action” significantly affecting the environment. *Id.* at 348-49 (citing 42 U.S.C. § 4332). “Major federal actions” include NRC’s issuance or re-issuance of reactor licenses. *New York v. Nuclear Regulatory Comm’n*, 681 F.3d 471, 476 (D.C. Cir. 2012)

(citing *New York v. U.S. Nuclear Regulatory Com'n*, 589 F.3d 551, 553 (2d Cir. 2009)).

NEPA requires consideration of “reasonably foreseeable environmental effects of [a] proposed agency action.” 42 U.S.C. §4332(C)(i) (2023). *See also New York*, 681 F.3d at 476 (quoting 40 C.F.R. §§ 1508.8, 1508.18; *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 763 (2004) (“major federal actions” include “actions with ‘[i]ndirect effects, which are caused by the action and are later in time or farther removed in distance, but are reasonably foreseeable”)). Reasonably foreseeable environmental impacts include the effects of climate change. *N.J. Conservation Found. v. FERC*, 111 F.4th 42, 54 (D.C. Cir. 2024). An agency may avoid discussing an environmental risk only if the probability of an environmental effect is “so low as to be ‘remote and speculative,’ or if the combination of probability and harm is sufficiently minimal.” *New York*, 681 F.3d at 478-79 (quoting *City of New York v. Dep’t of Transp.*, 715 F.2d 732, 738 (2d Cir. 1983)). *See also Standing Rock Sioux Tribe v. U.S. Army Corps. of Engineers*, 985 F.3d 1032, 1050 (D.C. Cir. 2021) (quoting *Sierra Club v. FERC*, 827 F.3d 36, 47 (D.C. Cir. 2016) (even where an environmental risk “may be low,” NEPA requires consideration if “the risk is sufficient ‘that a person of ordinary prudence would take it into account in reaching a decision.’”)).

The “heart” of the EIS is “the requirement that an agency rigorously explore and objectively evaluate the projected environmental impacts of all reasonable alternatives for completing the proposed action.” *Van Ee v. EPA*, 202 F.3d 296, 309 (D.C. Cir. 2000).

III. NRC REGULATORY SCHEME FOR ISSUANCE AND RENEWAL OF REACTOR LICENSES

A. Initial Reactor Licensing and Oversight

NRC may not issue a reactor operating license unless it finds the reactor will operate in compliance with NRC “rules and regulations” and unless “[t]here is reasonable assurance . . . that the activities authorized by the operating license can be conducted without endangering the health and safety of the public” 10 C.F.R. §§ 50.57(a)(2), (3).

After initial licensing, NRC oversees the safety of reactor operation and imposes new safety requirements as necessary or advisable. The “various Commission requirements applicable to a specific plant that are in effect at the time of the license renewal application” constitute the “current licensing basis.” *Fla. Power & Light Co.*, 54 N.R.C. 3, 9 (2001). NRC regulations define the current licensing basis as the “set of NRC requirements applicable to a specific plant and a licensee’s written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all

modifications and additions to such commitments over the life of the license) that are docketed and in effect.” 10 C.F.R. § 54.3.

B. License Renewal and Subsequent License Renewal

In the 1990s, NRC began to renew many initial reactor operating licenses for twenty years, yielding total operating terms of sixty years. Recognizing that aging of reactor safety components could pose “unique” and “new” safety and environmental risks that were not anticipated at the time of original licensing and that “age-related degradation will be critical to safety during the term of the renewed license,” NRC issued safety regulations for the renewal of operating licenses past their first 40 years of operation. Final Rule, Nuclear Plant License Renewal, 56 Fed. Reg. 64,934, 64,946 (Dec. 13, 1991).

Within the past decade, NRC has also begun to review applications for a second or “subsequent” license renewal term, which would yield total operating terms of eighty years.¹ NRC has not modified its license renewal safety regulations

¹ Six subsequent license renewal applications are now pending before NRC. See NRC website, Status of License Renewal Applications, <https://www.nrc.gov/reactors/operating/licensing/renewal/subsequent-license-renewal.html#plantapps>. The NRC Staff has approved five other subsequent license renewal applications, although the adjudicatory process has not concluded with respect to three of the proceedings: Turkey Point (*Fla. Power & Light Co.*, 99 N.R.C. 39 (2024) (admin. appeal pending); North Anna (*Va. Elec. and Power Co.*, 100 N.R.C. 52 (2024) (admin. appeal pending); and Peach Bottom (*Exelon Generation Co., LLC*, 95 N.R.C. 44, 45 (2022) (opportunity for hearing on site-specific supplemental License Renewal GEIS pending).

in 10 C.F.R. Part 54 to add any new requirements for subsequent license renewal. Final Rule, 89 Fed. Reg. at 64,166 (JA034).

C. License Renewal Review Processes

NRC conducts “separate” safety and environmental reviews for both initial license renewal and subsequent license renewal. Final Rule, 89 Fed. Reg. at 64,166 (JA034). NRC’s safety review is governed by 10 C.F.R. Part 54 and its environmental review is governed by 10 C.F.R. Part 51.

1. Safety review

In deciding whether to renew a nuclear reactor license, NRC does not duplicate the broad review conducted in initial licensing or its ongoing safety oversight. Instead, NRC focuses its safety review on the effects of aging on reactor equipment. *See* 10 C.F.R. Part 54. License renewal applicants must demonstrate that “the effects of aging will be adequately managed so that the intended functions will be consistent with the [current licensing basis] for the period of extended operation.” 10 C.F.R. § 54.21(a)(3).²

² The equipment covered by this requirement is limited to “passive” safety components such as pipes, conduits and cables. 10 C.F.R. § 54.21(a)(1); Final Rule, Nuclear Power Plant License Renewal; Revisions, 60 Fed. Reg. 22,461, 22,463 (May 8, 1995). For “active” components such as valves and switches, the NRC considers that ongoing oversight of the current licensing basis is sufficient to detect aging problems. *Id.*, 60 Fed. Reg. at 22,464.

2. Environmental review

a. Review under Part 51 regulations and Council on Environmental Quality guidance

The “aging-based safety review” conducted under 10 C.F.R. Part 54 “does not in any sense restrict NEPA or drastically narrow the scope of NEPA” and is “analytically separate.” *Fla. Power & Light*, 54 N.R.C. at 13. While the Part 54 Atomic Energy Act-based review focuses on “the potential detrimental effects of aging” with respect to “radiological health and safety,” the Part 51 NEPA review “examines environmental effects of all kinds.” *Id.*

In conducting its NEPA reviews, NRC also considers the guidance and regulations of the President’s Council on Environmental Quality (“CEQ”). Established in 1971 by an Executive Order, the CEQ provides non-binding guidance to federal agencies on NEPA compliance. *Marin Audubon Society v. FAA*, 121 F.4th 902, 910 (D.C. Cir. 2024). While NRC has long treated CEQ guidance and regulations as non-binding, *Pac. Gas and Elec. Co.*, 74 N.R.C. 427, 443-44 (2011), it deems them “useful guides for determining what actions are reasonable under NEPA.” *Powertech (USA) Inc.*, 92 N.R.C. 295, 299 (2022).

b. Generic environmental impact findings made binding in all license renewal proceedings

Since 1996, to a significant extent, NRC has relied on generic or universally-applicable environmental impact findings in the License Renewal GEIS for its license renewal reviews. The License Renewal GEIS “is intended to streamline NRC’s license renewal environmental review by documenting a systematic approach that NRC uses to evaluate the environmental impacts of renewing operating licenses of commercial nuclear power plants.” Final Rule, 89 Fed. Reg. at 64,167 (JA035). Environmental impacts addressed in the License Renewal GEIS include radiological impacts such as reactor accident risks and spent fuel storage and disposal impacts, as well as non-radiological impacts such as impacts on water and air quality and socioeconomic impacts. *See* 89 Fed. Reg. at 64,190-97 (JA035).³

Generic environmental impact determinations of the License Renewal GEIS, classified as “Category 1,” are set forth in 10 C.F.R. Part 51, Subpart A, Appendix

³ The first license renewal rule and GEIS were issued in 1996: Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467 (June 5, 1996) (JA369) and 1996 GEIS (JA364). The rule and GEIS were revised in 2013: Final Rule, Revisions to Environmental Review of Nuclear Power Plant Operating Licenses, 78 Fed. Reg. 37,282 (June 20, 2013) (JA426) and Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437, Rev. 1, 2013) (“2013 GEIS”) (JA422). The Final Rule on review and 2024 GEIS update the earlier versions of the rule and GEIS for initial license renewal and expand the environmental analysis to include subsequent license renewal.

B, Table B-1 (“Table B-1”). The determinations in Table B-1 are made binding by 10 C.F.R. §§ 51.53(c)(3)(i) and 51.71(d). Other environmental impacts that NRC considers to be site-specific are classified as “Category 2” and are addressed in reactor-specific supplements to the GEIS. *Id.* The Category 2 impact findings are not binding and therefore may be challenged in individual license renewal proceedings under 42 U.S.C. § 2239(a)(1).

NRC initially applied the environmental impact findings of the 1996 GEIS and the 2013 GEIS to both initial and subsequent license renewal applications; but in 2022, the Commission ruled that the 1996 GEIS and 2013 GEIS covered only initial license renewal and therefore are not adequate to support subsequent license renewal. *Fla. Power & Light Co.*, 95 N.R.C. 26, 36 (2022). *See also Duke Energy Carolinas, LLC, et al.*, 95 N.R.C. 40, 41 (2022). Therefore, the Commission ordered NRC Staff to revise the 2013 GEIS to address the environmental impacts of both initial license renewal and subsequent license renewal. *Duke Energy Carolinas, LLC*, 95 N.R.C. at 41.⁴

⁴ Alternatively, licensees with pending subsequent license renewal applications who did not wish to wait for issuance of the revised License Renewal GEIS could elect a reactor-specific environmental review. *Id.*, 95 N.R.C. at 41-42.

FACTUAL BACKGROUND

I. CONCERNS AND UNCERTAINTIES REGARDING AGING OF NUCLEAR REACTOR SAFETY COMPONENTS OVER EIGHTY-YEAR OPERATION.

In 2014, after re-licensing seventy-three reactors for an initial renewal term, the NRC Staff reported to the Commissioners regarding preparations for “the anticipated receipt and review of subsequent license renewal applications” that would permit reactor operation out to eighty years. NRC Staff Memorandum SECY-14-0016 at 1-2 (Jan. 31, 2014) (“Memorandum SECY-14-0016”) (JA469). The Staff identified the “most significant technical issues challenging reactor operation beyond 60 years” as “reactor pressure vessel embrittlement; irradiation-assisted stress corrosion cracking of reactor internals; concrete structures and containment degradation; and electrical cable qualification and condition assessment.” *Id.*, Encl. 1 at 2-3 (JA481-82).

The Staff also reported on recent conferences and research programs, including an “expanded materials degradation assessment,” conducted jointly with the U.S. Department of Energy (“DOE”), to “identify materials and components which could be susceptible to significant degradation during operation beyond 60 years;” identify “any gaps in the current technical knowledge or issues not being addressed by planned industry or DOE research;” and identify aging management programs “that the staff believes will require enhancements for subsequent license

renewal.” *Id.*, Encl. 1 at 3 (JA482). Finally, the Staff recommended that the Commission promulgate new license renewal requirements to “provide additional assurance that aging-management activities would be effectively implemented and provide regulatory clarity, transparency, stability, and efficiency by defining requirements at the outset of the subsequent license renewal process rather than on a case-by-case basis during license renewal reviews.” *Id.* at 9 (JA477).

The Commission responded to Memorandum SECY-14-0016 by instructing the Staff to implement recommended “inspection enhancements” and to “keep the Commission informed” on its “progress” in resolving technical issues affecting reactor pressure vessels, reactor internals, concrete structures and containments, and electrical cables during the subsequent license renewal term. Staff Requirements Memorandum SECY-14-0016 (Aug. 29, 2014) (JA495). In addition, the Commission instructed the Staff to “continue to emphasize in communications with industry the need to strive for satisfactory resolution of these issues prior to NRC beginning a review of any [subsequent license renewal] application.” *Id.* However, the Commission declined to approve the Staff’s recommendation to initiate a rulemaking to revise NRC’s Part 54 safety regulations. *Id.*

Later in 2014, NRC and DOE issued a five-volume joint report, the *Expanded Materials Degradation Assessment* (NUREG/CR-7153, Oct. 2014) (“*NRC-DOE Degradation Assessment*”) (JA496). The *NRC-DOE Degradation*

Assessment identified “gaps in knowledge” regarding long-term aging of safety components and materials that need “future research.” *Id.*, Vol. 1 at iii (JA497). For instance, with respect to pressure vessels, the *Degradation Assessment* noted the existence of “[r]elatively sparse or nonexistent data at high fluences, for long radiation exposure (duration), and resulting high embrittlement,” creating “large uncertainties for embrittlement predictions.” *Id.*, Vol. 1 at 3 (JA500). With respect to irradiation-assisted stress corrosion cracking of reactor internals, the report observed a lack of a “consensus” on the “underlying mechanism.” *Id.*, Vol. 1 at 10 (Supplemental Appendix (“SA”) 013). For core internal structures, the report found that design testing was based on far less operational time than an eighty-year operating life, thus calling for re-examination of “the assumptions and limits” for core internal structures due to “the potential for thermal aging and fatigue damage during extended lifetimes.” *Id.*, Vol. 1 at 11 (JA505). With respect to irradiation-caused concrete degradation, the report noted a “knowledge gap” caused by a lack of sufficient test data. *Id.*, Vol. 1 at 26 (JA506). The report called for more research to “help assess the long-term integrity of the reactor concrete structures.” *Id.*, Vol. 1 at 3 (JA500).

II. CLIMATE CHANGE: A PROFOUND, FAST-MOVING AND REASONABLY FORESEEABLE THREAT TO THE HUMAN ENVIRONMENT.

A. Climate Change is a Defining Environmental Challenge of Our Time.

As the CEQ and other governmental agencies and institutions in the U.S. and worldwide recognize, climate change “is a defining national and global environmental challenge of this time, threatening broad and potentially catastrophic impacts to the human environment.” Notice of Interim Guidance; request for comments, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, 88 Fed. Reg. 1196, 1199 (Jan. 9, 2023) (JA542, 545) (“CEQ Guidance”). Across the United States, “the impacts of climate change are already being felt.” U.S. Global Change Research Program, *Fourth National Climate Assessment*, Vol. II at 25 (2018) (JA361) (“*2018 Climate Assessment*”).⁵ In the future:

More frequent and intense extreme weather and climate-related events, as well as changes in average climate conditions, are expected to continue to damage infrastructure, ecosystems, and social systems that provide essential benefits to communities. Future climate change is expected to further disrupt many areas of life, exacerbating existing challenges to prosperity posed by aging and deteriorating infrastructure, stressed ecosystems, and economic inequality.

⁵ The U.S. Global Change Research Program “began as a Presidential Initiative in 1989 and was codified in the Global Change Research Act of 1990 (Pub. L 101-606). 88 Fed. Reg. at 1199 n.28 (JA545).

Id. Concerning the U.S. energy sector, the *2018 Climate Assessment* found:

The Nation’s energy system is already affected by extreme weather events, and due to climate change, it is projected to be increasingly threatened by more frequent and longer-lasting power outages affecting critical energy infrastructure and creating fuel availability and demand imbalances. The reliability, security, and resilience of the energy system underpin virtually every sector of the U.S. economy. Cascading impacts on other critical sectors could affect economic and national security.

Id. at 179 (JA363).⁶

In addition, the international Intergovernmental Panel on Climate Change (“Intergovernmental Panel”) has stated with “high confidence” that climate change is a world-wide threat:

Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region around the globe. This has led to widespread adverse impacts and related losses and damages to nature and people.

Climate Change 2023: Synthesis Report, Summary for Policymakers at 5 (2023) (JA538) (“*2023 Synthesis Report*”).

As a result of these climate change effects, “urban infrastructure,” including “energy systems,” have been “compromised by extreme and slow-onset events,

⁶ For example, in 2020, run-off from near-record snowfall into the Missouri River caused failure of a protective berm at the Fort Calhoun nuclear plant, leading operators to transfer offsite power to onsite emergency diesel generators and temporarily shut down the cooling system for the reactor. *Id.* at 48 (JA362).

with resulting economic losses, disruptions of services and negative impacts to well-being.” *Id.* at 6 (footnote omitted) (JA539).⁷

B. Broad Agreement on Urgent Need to Avoid and Mitigate Climate Change-Related Impacts.

The climate crisis is both “profound” and fast-moving and “there is little time left to avoid a dangerous – potentially catastrophic – climate trajectory.” CEQ Guidance, 88 Fed. Reg. at 1197 (JA543). The CEQ has therefore recognized climate change as a “fundamental environmental issue” and concluded that the climate change effects on the human environment “fall squarely within NEPA’s purview.” *Id.* Accordingly, the CEQ has recommended that federal agencies examine the direct effects of the activity to be authorized. *Id.* at 1200 (JA546).

Additionally, recognizing that “greenhouse gas emissions already in the atmosphere will continue altering the climate system into the future, even with current or future emissions control efforts,” the CEQ urged federal agencies to evaluate “how climate change may impact proposed actions and alternatives” and to “consider climate resilience.” *Id.* at 1207 (JA553). To illustrate:

[A]n agency considering a proposed development of transportation infrastructure on a coastal barrier island should consider climate change effects on the environment and, as applicable, consequences of

⁷ The CEQ Guidance cited and relied on the *2018 Climate Assessment*, the *2023 Synthesis Report*, and other reports by the U.S. Global Change Research Program and the Intergovernmental Panel. *See* 88 Fed. Reg. at 1199 and notes 28, 30, 32, 35 (JA545); *id.* at 1,200 and notes 37,38,42, 43 (JA546); and *id.* at 1,207 and notes 120, 122 (JA553).

rebuilding where sea level rise and more intense storms will shorten the projected life of the project and change its effects on the environment.

Id. at 1209 (footnotes omitted) (JA555). Similarly:

[C]hemical facilities located near the coastline could have increased risk of spills or leaks due to sea level rise or increased storm surges, putting local communities and environmental resources at greater risk. Increased resilience could minimize such potential future effects.

*Id.*⁸

The CEQ's NEPA guidance is consistent with the U.S. Global Change Research Program's guidance, which recommends "planning and operational measures that seek to anticipate climate impacts and prevent or respond to damages more effectively, as well as hardening measures to protect assets from damage during extreme events." *2018 Climate Assessment* at 176. With respect to these and other measures for increasing the energy infrastructure resilience, "an escalation of the pace, scale, and scope of efforts is needed to ensure the safe and reliable provision of energy and to establish a climate-ready energy system to address present and future risks." *Id.*

⁸ *See also* Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7619 (Feb. 1, 2021) (SA017) (setting a goal of "increased climate resilience"). Executive Order 14008 was rescinded by Executive Order 14148 on January 20, 2025. Initial Recission of Harmful Executive Orders and Actions, 90 Fed. Reg. 8237 (Jan. 28, 2025) (SA033). Nevertheless, it is relevant here because NRC responded to it as reasonable guidance in the 2024 GEIS. *See id.* at F-12 (JA354) and discussion at 58, *infra*.

The CEQ's admonition also aligns with the Intergovernmental Panel's warning that "worldwide climate resilient development action is more urgent than previously assessed" and that governments will "play a crucial role in enabling and accelerating shifts in development pathways towards sustainability and climate resilient development." *2023 Synthesis Report* at 24 (JA540). "[F]easible" adaptation options" are available to "support infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems." *Id.* at 28 (JA541).

PROCEDURAL BACKGROUND

I. 1996 AND 2013 GEIS'S FOR INITIAL TWENTY-YEAR LICENSE RENEWAL.

In the 1996 GEIS, as revised and updated in the 2013 GEIS, NRC addressed the generic environmental impacts of renewing reactor operating licenses for an initial twenty-year renewal term, *i.e.*, for a total operating life of sixty years.

A. 1996 GEIS

In the 1996 GEIS, NRC recognized that "[p]otential deterioration of plant components and structures due to physical processes such as corrosion, erosion, mechanical wear, and embrittlement could result in the increased likelihood of component or structure failure." *Id.* at 5-10 (JA365). Further, "[t]hese increased failure rates, in turn, could lead to a higher frequency of accidents or more severe consequences." *Id.* Nevertheless, NRC determined that the environmental impacts

of continuing to operate all licensed commercial reactors during one additional twenty-year license renewal term would not increase significantly due to aging management programs imposed by NRC under its recently promulgated Part 54 safety regulations. *Id.* at 5-11 (JA366). Taking other factors into account, NRC generally concluded that the risks, *i.e.*, the environmental impacts of reactor accidents, are “of small significance for all plants.” *Id.* at 5-114 (JA367), 5-115 (JA368).⁹

NRC made no mention of climate change in the 1996 GEIS.

B. 2013 GEIS

The 2013 GEIS reiterated the binding generic determination of the 1996 GEIS that the environmental impacts of reactor accidents are “SMALL.” *Id.* at S-17 (JA423). With respect to the effects of aging equipment on accident risk, NRC determined that despite the potential for “an increased likelihood of component or structure failure that could increase the rate of plant accidents,” NRC’s 10 C.F.R. Part 54 safety regulations for license renewal would continue to minimize the

⁹ In all revisions of the License Renewal GEIS, NRC divides reactor “accidents” into two categories: “design-basis accidents,” *i.e.*, accidents “a facility must be designed and built to withstand without loss to the systems, structures, and components necessary to ensure public health and safety,” 2024 GEIS at J-11 (SA011); and “severe accidents,” *i.e.*, accidents “involving core damage.” 2024 GEIS at E-1 (JA245).

incremental risk posed by operating aging safety equipment for one license renewal term. *Id.* at 1-29 (JA424).

The 2013 GEIS formally recognized for the first time that “[c]hanges in climate have the potential to affect air and water resources, ecological resources, and human health, and *should* be taken into account when evaluating cumulative impacts over the license renewal term.” *Id.* at 1-29 (JA424) (emphasis added). *See also id.* at 4-146 (JA094). Thus, “[l]ike other federal agencies,” NRC had “begun to evaluate the effects of greenhouse gas (GHG) emissions and its implications for global climate change in its environmental reviews for both new reactor and license renewal applications.” *Id.* *See also Duke Energy Carolinas LLC and Tennessee Valley Authority*, 70 N.R.C. 927, 931 (2009) (directing the NRC Staff to evaluate greenhouse gas emissions from nuclear facilities in its licensing reviews.) The 2013 GEIS did not give any consideration to climate change effects on the safety of operating nuclear reactors for the initial twenty-year license renewal term.

II. DEVELOPMENT AND ISSUANCE OF THE FINAL RULE AND 2024 GEIS ON REVIEW.

A. Proposed Rule and Draft Revised License Renewal GEIS

In 2023, pursuant to *Fla. Power and Light*, 95 N.R.C. at 36, and *Duke Energy Carolinas, LLC*, 95 N.R.C. at 41, NRC published a proposed version of the rule on review and a draft of the supporting GEIS. Proposed Rule, Renewing Nuclear Power Plant Operating Licenses, 88 Fed. Reg. 13,329 (Mar. 3, 2023)

(JA005); Draft Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437, Feb. 2023) (“Draft GEIS”) (JA001). The Proposed Rule and Draft GEIS purported to address the environmental impacts of both initial license renewal for a total of sixty operating years and subsequent license renewal for a total of eighty operating years. In both the Proposed Rule and the Draft GEIS, NRC asserted that the environmental impacts of reactor accidents were “SMALL,” *i.e.*, insignificant, and classified them as Category 1. Proposed Rule, 88 Fed. Reg. at 13,355 (JA031); Draft GEIS at xiv (JA002), 4-147 (JA003).

However, neither the Proposed Rule nor the Draft GEIS addressed the effects on reactor accident risk of the knowledge gaps and uncertainties identified in Memorandum SECY-014-0016 and the *NRC-DOE Degradation Assessment* regarding the aging of reactor safety equipment past sixty years.¹⁰ Nor did the Proposed Rule or Draft GEIS address the degree and manner in which climate change contributes to reactor accident risk due to the increased frequency and intensity of storms, flooding, temperature changes, and other natural phenomena.¹¹

Instead, like the 2013 GEIS, the Draft License Renewal GEIS addressed only the quantity of greenhouse gas emissions that would be generated by reactors under their renewed licenses and concluded that reactors’ operation would have no

¹⁰ See discussion at 13-15, *supra*.

¹¹ See discussion at 16-20, *supra*.

significant greenhouse gas emissions. Draft GEIS at xlvi (SA001); *see also id.* at 2-14 (JA004). The Draft GEIS also found that climate change can have “additive effects on environmental resource conditions that may also be directly impacted by continued operations and refurbishments during the license renewal term,” concluding that those impacts are “location-specific and cannot be evaluated generically.” *Id.* at 2-14. But the Draft GEIS said nothing about the “additive” effects of climate change on reactor accident risk.

B. Petitioners’ Comments

Petitioners submitted comments on the Proposed Rule and Draft GEIS (JA568) with a supporting expert declaration by nuclear facility risk analyst Jeffrey T. Mitman and Mr. Mitman’s technical report (“Mitman Report”) including his Detailed Comments. (JA591, 605).

1. Effects of aging safety components on reactor accident risks

Petitioners criticized the Draft GEIS’ silence on the effects of aging on reactor safety equipment, especially in the subsequent license renewal term. Comments at 6-15 (JA573-82), Mitman Report at 10-11 (JA600-01), Mitman Detailed Comments at 3 (JA607). Petitioners charged that NRC erroneously assumed that compliance with 10 C.F.R. Part 54 safety regulations would adequately address aging phenomena, but those phenomena are not fully addressed by aging management programs, “especially in the [subsequent license renewal]

term when effects of aging on plant equipment may be masked and their behavior uncertain.” Comments at 6 (JA573) (citing Mitman Report at 10-11 (JA660-01)).

Petitioners also criticized the Draft GEIS for failing to discuss the aging problems NRC had identified in Memorandum SECY-14-0016: pressure vessel embrittlement, irradiation-assisted stress corrosion cracking of reactor internals, concrete structures and containment degradation, and electrical cable qualification and condition assessment. Comments at 7 (JA574). Petitioners contended that aging effects on these and other safety components are not fully addressed by aging management plans submitted under 10 C.F.R. Part 54, nor are they incorporated into probabilistic risk assessments for reactor safety. *Id.* at 6-7 (JA573-74). Petitioners also cited the *NRC-DOE Degradation Assessment* for numerous gaps in NRC’s understanding of the behavior of safety equipment in an extended license renewal term. *Id.* at 7-11 (JA574-78).

2. Climate change effects on reactor accident risks

Petitioners asserted that climate change is a “fast-developing issue” that “increases the likelihood or initiating event frequency of events” and can also “increase the probability of failure of design features or mitigation equipment.” Comments at 5 (JA572). As stated by Mr. Mitman, the potential climate change effects on reactor accident risk is significant:

Thirty years have passed since issuance of the 1996 GEIS, and additional decades since issuance of original EISs for U.S. reactors.

During that time, climate change has significantly degraded worldwide weather conditions and thus local weather conditions. As climate change continues, weather events will increase in both their intensity and frequency. Thus, it is reasonable to expect significant challenges to the safe operation of nuclear reactors. But the NRC has not taken into consideration these changes in intensity and frequency of weather events in their environmental analysis of accident impacts. This is a significant omission.

Mitman Report, Detailed Comments at 5 (JA609). Mr. Mitman's expert report included a detailed technical analysis demonstrating that NRC is well-aware of the issue of climate change and its impacts on nuclear safety. Mitman Report at 8 (JA598). The report provided illustrations of how climate change has affected or could affect the likelihood and severity of reactor accidents at individual sites, including increased flooding risks at the Oconee reactors that lie downstream of two large dams in South Carolina; the threat of sea-level rise to the Turkey Point reactors located in a low-lying coastal area of South Florida; and the actual recorded effects of a derecho on the Duane Arnold nuclear plant in Iowa. *Id.*¹² As contended by Petitioners, "[c]onsideration of these risks in an EIS would provide important information regarding climate-related accident risk as well as

¹² Mr. Mitman observed that the Duane Arnold accident illustrates the heightened accident risk associated with a climate change-induced severe windstorm. After high winds caused a loss of offsite power, debris accumulated at the suction of the service water systems which are necessary to cool the emergency diesel generators and the emergency core cooling system heat exchangers. NRC's risk analysis of the event showed an increase in the failure probabilities of the service water system, the emergency diesel generators and the emergency core cooling system due to this climate-related external event. *Id.* See also note 6, *supra*.

identification of mitigation measures to address those risks.” Comments at 5-6 (JA609-10).

C. Final Rule and 2024 GEIS

1. Effects of aging safety components on reactor accident risks

In the 2024 GEIS, NRC conceded the existence of “some uncertainty” regarding the aging of reactor equipment in the “future.” *Id.* at A-213 (JA212). But NRC “disagree[d]” with Petitioners’ assertion that the GEIS should consider aging effects on accident risk. *Id.* at A-212 (JA211). According to NRC, those aging issues are “outside the scope” of the environmental review for the GEIS because aging issues “are thoroughly addressed by NRC’s safety review for license renewal under Part 54 for passive systems, structures, and components and NRC’s ongoing regulatory oversight for active systems, structures, and components.” *Id. See also id.* at A-213 (JA212) (asserting that the “robust Maintenance Rule and license renewal rule and ongoing oversight activities are designed to minimize the uncertainty due to aging.”).

NRC also asserted that its *Generic Aging Lessons Learned Report for Subsequent License Renewal* (NUREG-2191, 2017) (“*2017 Generic Aging Lessons Learned Report*”) and a “new draft” of the same report issued in 2023 (“*2023 Draft Generic Aging Lessons Learned Report*”) provide information and guidance on

“managing the effects of aging” for subsequent license renewal. *Id.* at A-212 - A-213 (JA211-12).

Therefore, NRC made “[n]o changes” to the License Renewal GEIS in response to public comments on the need to address the effects of aging on reactor safety. *Id.* at A-103 (JA102). Nor did NRC change the binding generic Category 1 finding in the Rule that the environmental impacts of reactor accidents are “SMALL.” Final Rule, 89 Fed. Reg. at 64,195 (JA063).

2. Effects of climate change on reactor accident risks

a. Agreement that climate change impacts must be addressed under NEPA

In the 2024 GEIS, NRC agreed with commenters that “the NRC should take a hard look at climate change.” *Id.* at A-248 (JA232). *See also id.* at A-258 (SA005) (“[T]he NRC needs to consider and use site-specific information regarding changing environmental conditions and trends that can be associated with climate change.”). NRC also “agree[d]” with the CEQ that “[greenhouse gas] emissions and climate change effects are legitimate topics to consider in agency NEPA reviews.” *Id.* at A-250 (JA234). NRC acknowledged that the CEQ “has recognized that climate change is a fundamental environmental issue within NEPA’s purview.” *Id.* at 4-143 (JA091).

The 2024 GEIS also relied on data provided by the U.S. Global Change Research Program’s *2018 Climate Assessment*, stating that it “integrates the best

available information and current state of knowledge regarding climate change trends and effects and provides consensus-based estimates across 13 Federal member agencies.” *Id.* at A-246 (JA230). *See also id.* at G-32 – G-36 (JA355-59) (describing region-by-region assessment of climate change impacts on the environment). In addition, the GEIS cited climate studies by the Intergovernmental Panel, including the *2023 Synthesis Report*. *Id.* at 3-140 (JA086), 4-145 (JA093), A-256 (SA003), G-36 (JA359).

b. Limited scope of climate change impact review

Despite its citations to the work of the CEQ, the U.S. Global Research Program and the Intergovernmental Panel, NRC was selective in incorporating their advice. Rather than addressing the climate change effects on reactors or measures to increase the resiliency of reactors against climate change as those agencies had advised,¹³ the GEIS stated that the scope of the GEIS would be limited to (1) “greenhouse gas emissions [from nuclear reactors] on climate change” and (2) “climate change impacts on environmental resources.” *Id.* at 4-143 (JA091).¹⁴ NRC found that the impacts of greenhouse gas emissions from nuclear

¹³ *See* discussion at 18-20, *supra*.

¹⁴ To illustrate the term “climate change impacts on environmental resources” the GEIS explained:

Changes in climate have broader implications for environmental resources (e.g., water resources, air quality, and ecosystems). For instance, changes in precipitation patterns and increase in air temperature can affect water

reactors during the period of extended operation would be “SMALL for all plants.” *Id.* at 4-144 (JA092). The GEIS also described region-specific climate changes for the distinct regions of the U.S. where nuclear reactors are located. *Id.* at G-32 – G-36 (JA355-59). But NRC concluded that climate change impacts on environmental resources were too variable geographically to address generically, and therefore, classified them as “Category 2” impacts to be addressed with respect to each individual reactor license renewal decision. *Id.* at 4-146 (JA094).

c. Refusal to consider climate change effects on accident risks

NRC did not dispute Petitioners’ assertion that climate change could contribute significantly to the risks of reactor accidents during initial and subsequent license renewal terms. Yet, NRC explicitly “disagree[d]” with Petitioners’ assertion that climate change impacts and mitigation measures “should be considered for postulated accidents.” *Id.* at A-222 (JA221). According to NRC, climate change effects on accident risk “are outside the scope” of NRC’s license renewal environmental review in two respects. First, the environmental review “documents the potential [direct] environmental impacts of continued reactor

availability and quality. As a consequence, climate change can have overlapping impacts on environmental resources by inducing changes in resource conditions that can also be affected by the proposed action.

Id. at 4-143 (JA091). Thus, NRC clarified that impacts on “environmental resources” did not include impacts on the nuclear reactors themselves or their ability to operate safely and without significant adverse environmental impacts.

operations.” *Id.* Second, climate change impacts were already addressed under its Atomic Energy Act-based safety program. *Id.* at A-290 (JA235). *See also id.* at A-222 (JA221) (claiming that “adaptation of nuclear power plants to climate change is addressed through NRC’s existing regulations.”). Additionally, NRC asserted that it “continually evaluates nuclear power plant operating conditions and physical infrastructure through its reactor oversight programs to ensure ongoing safe operations.” *Id.*

NRC further promised to evaluate “new information” as it “becomes available” and cited “NRC regulations” requiring it to “assess the need for an update of the [2024] GEIS on a 10-year cycle.” *Id.* at A-222 (JA221). Therefore, NRC “disagree[d]” with the notion that it would continue to rely on outdated information “decades from now.” *Id.*

Finally, despite having repudiated the relevance of climate change to its environmental analysis of accident risks, NRC asserted that the 2024 GEIS had, in fact, accounted for climate change effects on accident in two ways: first, by using “large margins” in its risk analysis that “can account for a variety of uncertainties;” and second, by considering “updated information about site-specific external events and hazards.” *Id.* at A-222 (JA221).

Accordingly, the NRC refused to “fully incorporate” the CEQ’s recommendations and made “[n]o changes” to the GEIS in response to public

comments on the need to address climate change effects on reactor accident risk.

Id. at A-250 (JA234), A-222 (JA221). Nor, in issuing the Final Rule, did NRC change the Category 1 finding that the environmental impacts of reactor accidents are “SMALL.” *See* 89 Fed. Reg. at 64,195 (JA063).

SUMMARY OF THE ARGUMENT

In 1996, when it began to renew commercial nuclear reactor licenses for initial license renewal terms, the NRC identified reactor accident risks as a primary concern of the NEPA-required environmental analysis it would prepare in support of license renewal decisions for dozens of reactors. 1996 GEIS at 5-10 (JA365). NRC also identified two significant contributors to license renewal-related accident risks: the “effects of aging” on safety equipment and the “changing environment” in which reactors operated. *Id.*

Since 1996, the NRC has purported to address these concerns in re-licensing the majority of U.S. commercial reactors for an initial twenty-year term, relying on binding generic determinations in the 1996 GEIS and 2013 GEIS that the environmental impacts of reactor accidents during twenty-year renewal terms would be insignificant. Now relying on the Final Rule and 2024 GEIS, the NRC proposes to extend the operating license terms of some reactors by an additional twenty years, allowing operation out to eighty years.

Petitioners challenge two related binding generic determinations in the Final Rule: that the environmental impacts of a nuclear reactor accident during an initial or subsequent license renewal term will be “SMALL,” *i.e.*, insignificant; and that given the insignificance of accident-related environmental impacts, NRC need not evaluate alternatives for their avoidance or mitigation. *Id.*, 89 Fed. Reg. at 64,195 (JA063). Petitioners contend that the Rule fails to satisfy NEPA or the APA because in the supporting 2024 GEIS, NRC refused to address two reasonably foreseeable factors it had previously identified as significant contributors to accident risks: the “effects of aging” on reactor safety equipment and the “changing environment” in which reactors are located. *See* 1996 GEIS at 5-10 (JA365). Specifically, NRC refused to account for knowledge gaps and uncertainties regarding how aging reactor components may increase accident risk during subsequent license renewal terms and how climate change may affect accident risk during both initial and subsequent license renewal terms.

NRC’s refusal to address these significant contributors to accident risk is legally erroneous because the agency conceded (1) its “uncertainty” regarding the effects of aging on accident risk during a subsequent license renewal term (2024 GEIS at A-213 (JA212)) and (2) the reasonably foreseeability of climate change’s environmental effects (2024 GEIS at 4-143 (JA091)); and had purported to address those effects in its safety program. *Id.* at A-212 (JA211), A-290 (JA235). Given the

conceded reasonable foreseeability of these environmental impacts, NEPA required their consideration as a matter of law. *See New York*, 681 F.3d at 478.

Further, NRC could not lawfully rely on its Atomic Energy Act-based safety programs to resolve the safety risks posed by aging reactor equipment and climate change, because NEPA's obligations are separate and independent from the Atomic Energy Act. *Limerick Ecology Action*, 869 F.2d at 729-30. Finally, NRC's legal position that NEPA allows it to forego consideration of climate change effects because they are not directly caused by reactor operation is legally erroneous because it is fundamentally at odds with NEPA's well-established requirement to consider indirect and cumulative impacts, as well as decades of NRC's own decisions and practices.

The Rule is also arbitrary and capricious because it depends on environmental impact determinations in the 2024 GEIS that fail to address the environmental effects of aging equipment and climate change on accident risk. With respect to aging equipment, the GEIS completely failed to address conceded knowledge gaps and uncertainties. Instead, NRC shifted that responsibility to licensees in unenforceable guidance.

With respect to climate change, the 2024 GEIS made conflicting and unsupported representations. First, the GEIS asserted that climate change effects are addressed in the NRC's regulatory programs and general oversight of nuclear

reactors. Yet, it provided no evidence to support its assertion and no such evidence can be found. Second, NRC claimed to conduct general oversight of potential climate change-related risks, falling short of the scientific analysis of future climate-related effects required by NEPA. *See New York*, 681 F.3d 481. Third, the NRC claimed to have accounted for climate change in its environmental analysis by using generous margins in its risk analysis. But the GEIS made no demonstration that climate change was intentionally included in these margins in addition to the other multiple factors they covered. Similarly, the GEIS claimed to consider updated information regarding climate change, without giving a single example or explaining “how that consideration [was] the functional equivalent of the NEPA requirements.” *Limerick Ecology Action*, 869 F.2d at 731.

Fourth, the 2024 GEIS arbitrarily and selectively ignored the key recommendation of the CEQ, the U.S. Global Change Assessment, and the Intergovernmental Panel – authorities whose counsel it had otherwise deemed reasonable -- to evaluate measures for increasing the resilience of energy facilities and other infrastructure against the destructive forces of climate change. The GEIS’ failure to provide any explanation for this selective disregard of sound and scientific recommendations from authorities NRC considered reliable was arbitrary and capricious.

Finally, NRC's refusal to allow site-specific consideration of accident mitigation measures further compounds its failure to comply with fundamental environmental review requirements. The agency's sweeping, binding determination that reactor accident risks remain "SMALL" for all plants and therefore need not be mitigated -- without ever examining how aging infrastructure and intensifying climate threats may affect those risks -- is unsupported, arbitrary, and capricious.

PETITIONER'S STANDING

Petitioners are membership organizations that have associational and prudential standing under the test established in *Nuclear Energy Inst., Inc. v. EPA*, 373 F.3d 1251, 1278 (D.C. Cir. 2004) (citing *Hunt v. Wash. State Apple Adver. Comm'n*, 432 U.S. 333, 343 (1977); *Reytblatt v. U.S. Nuclear Regulatory Comm'n*, 105 F.3d 715, 720 (D.C. Cir. 1997)). Petitioners have associational standing because each organization represents members or employees that satisfy the three elements of standing: injury-in-fact, causation and redressability. *Friends of the Earth, Inc. v. Laidlaw Env'tl. Servs. (TOC), Inc.*, 528 U.S. 167, 180-81 (2000). As demonstrated by Petitioners' standing declarations, each of these individuals lives within ten miles of a nuclear reactor whose continued operation will or could be allowed or affected by the Rule and the License Renewal GEIS and are concerned about NRC's failure to adequately address the environmental impacts of renewing

reactor operating licenses. *See* Declaration of John S. Adams, Jr. (Oct. 25, 2024) (Beyond Nuclear and Sierra Club member) (JA622); Declaration of Ernest Eric Gyll (Oct. 24, 2024) (Beyond Nuclear member (JA625); Declaration of Frank M. Powell (Oct. 30, 2024) (Beyond Nuclear and Sierra Club member (JA628); and Declaration of Jane F. Powell (Oct. 30, 2024) (Beyond Nuclear member) (JA631). NRC's failure to completely or adequately address their concerns in the 2024 GEIS constitutes an injury to their interests for purposes of demonstrating standing. *Nuclear Info. & Res. Serv. v. Nuclear Regulatory Comm'n*, 509 F.3d 562, 567 (D.C. Cir. 2007). That injury would be redressed by preparation of a new GEIS that adequately addressed the environmental impacts of the proposed action and alternatives that would avoid or mitigate them.

Further, the interests Petitioners seek to protect are germane to their purposes. *Sierra Club v. EPA*, 292 F.3d 895, 898 (D.C. Cir. 2002). Beyond Nuclear is a nonprofit, nonpartisan membership organization that aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abolish both to protect public health and safety, prevent environmental harms, and safeguard our future. *See* www.beyondnuclear.org/about (last visited Feb. 18, 2025). The Sierra Club is also a nonprofit, nonpartisan membership organization. The Sierra Club's purposes include promoting the responsible use of the earth's ecosystems and resources, educating and enlisting

humanity to protect and restore the quality of the natural and human environment, and using all lawful means to carry out those objectives. *See* www.sierraclub.org/about-sierra-club (last visited Feb. 18, 2025).

Petitioners also have prudential standing to bring this appeal, because their grievances “fall within the zone of interests protected or regulated by the statutory provision . . . invoked in the suit.” *Nuclear Energy Inst.*, 373 F.3d at 1266 (quoting *Bennett v. Spear*, 520 U.S. 154, 162 (1997)). Petitioners’ grievances fall within NEPA’s protected the zone of interests because they seek the “hard look” at environmental impacts that is required by the statute. *Robertson*, 490 U.S. at 350. Petitioners’ claims also fall within the zone protected by the Administrative Procedure Act, which requires federal agencies to follow the law and thereby protects the public’s interest in government accountability. 5 U.S.C. §§ 706(2)(A), (C); *see also Dep’t of Homeland Security v. Regents of the Univ. of Calif.*, 591 U.S. 1, 23 (2020).

ARGUMENT

I. STANDARD OF REVIEW

This Court reviews agency NEPA decisions under the Administrative Procedure Act. *N.J. Conservation Found.*, 111 F.4th at 53 (citing *Env’t Def. Fund v. FERC*, 2 F.4th 953, 961 (D.C. Cir. 2021)). An agency’s NEPA decision must be “reasoned, principled, and based upon the record.” *Id.*, 111 F.4th at 54 (quoting

Myersville Citizens for a Rural Cmty., Inc. v. FERC, 783 F.3d 1301, 1308 (D.C. Cir. 2015) (quoting *Am. Gas. Ass’n v. FERC*, 593 F.3d 14, 19 (D.C. Cir. 2010)).

The agency must “fully spell out the basis for its decision” and “articulate a rational connection between its factual findings and its decision.” *Id.* (citing *FERC v. Elec. Power Supply Ass’n*, 577 U.S. 260, 292 (2016)). Applying the “rule of reason,” the Court will determine whether the agency has taken “a hard look at the environmental consequences before taking a major action.” *Id.* (quoting *Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 97 (1983)). The “hard look” standard is satisfied if the agency’s EIS “contains sufficient discussion of the relevant issues and opposing viewpoints, and . . . the agency’s decision is fully informed and well-considered.” *Id.* (quoting *Nevada v. Dep’t of Energy*, 457 F.3d 78, 93 (D.C. Cir. 2006)).

The APA requires that the Court “hold unlawful and set aside agency action” that is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.” 5 U.S.C. § 706(2)(A). An agency’s action is deemed arbitrary and capricious if it considers factors beyond those authorized by Congress, neglects a critical aspect of the issue, or provides an explanation that contradicts the evidence available to it. *Mayo v. Reynolds*, 875 F.3d 11, 20 (D.C. Cir. 2017). With respect to legal questions, the APA requires “*de novo* review of all questions of law.” *Office of Communication of United Church of Christ v. FCC*,

707 F.2d 1413, 1423 n.12 (D.C. Cir. 1983). *See also Highmark Inc. v. Allcare Health Mgmt. Sys., Inc.*, 572 U.S. 559, 563 (2014) (internal quotations omitted) (“Traditionally, decisions on questions of law are reviewable de novo, decisions on questions of fact are reviewable for clear error, and decisions on matters of discretion are reviewable for abuse of discretion.”). *See also San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9th Cir. 2006) (quoting *Alaska Wilderness Recreation & Tourism Ass’n v. Morrison*, 67 F.3d 723, 727 (9th Cir. 1995) (“[I]t makes sense to distinguish the strong level of deference we accord an agency in deciding factual or technical matters from that to be accorded in disputes involving predominately legal questions.”)).

II. AS A MATTTTER OF LAW, NRC VIOLATED NEPA BY REFUSING TO CONSIDER THE EFFECTS OF AGING SAFETY COMPONENTS ON REACTOR ACCIDENT RISK.

A. NRC Must Consider the Effects of Aging Safety Components on Reactor Accident Risk Because It Conceded that They Are Reasonably Foreseeable and Uncertain.

NEPA requires that environmental impacts must be considered in an environmental impact statement if they are “reasonably foreseeable.” 42 U.S.C. § 4332(2)(C)(i). Since 1996, NRC has acknowledged the potential that aging and deteriorating safety equipment will increase the probability and consequences of reactor accidents. Indeed, the 1996 GEIS recognized “effects of aging” as a key subject of its environmental review for reactor license renewal. *See* 1996 GEIS at

5-10 (JA364). While the 1996 GEIS and the 2013 GEIS assert that aging management plans required by 10 C.F.R. Part 54 regulations are adequate to minimize accident risk to an acceptably low level during an initial twenty-year license renewal term, the 2024 GEIS acknowledges “some uncertainty regarding the future of nuclear power plants in the extended period.” *Id.* at A-213 (JA212). Therefore, having conceded that the adverse effects of aging equipment on accident risk are reasonably foreseeable and uncertain, NRC was required as a matter of law to consider the effects of aging safety equipment on reactor accident risk during a second license renewal term out to eighty years of operation. *See New York*, 681 F.3d at 476-78.¹⁵

Assuming for purposes of argument that NRC could rely on its regulatory program to reduce the aging-related impacts of accidents during subsequent license renewal to an insignificant level, the 2024 GEIS does not point to any NRC action or program that could be deemed to have resolved or minimized the knowledge

¹⁵ This case is similar to and yet more extreme than *New York*. In *New York*, this Court rejected NRC’s unsupported assertion of “confidence” in the eventual siting of a repository, finding instead that “the lack of progress on a permanent repository has caused considerable uncertainty regarding the environmental effects of temporary [spent fuel] storage and the reasonableness of continuing to license and relicense nuclear reactors. *Id.* 681 F.3d at 474. Thus, the Court required NRC to prepare an EIS on the impacts of temporarily storing spent reactor fuel. Here, in contrast to *New York*, NRC has *conceded* uncertainty about the effects of aging on safety equipment operating as long as eighty years. And yet – in violation of *New York* – it has refused to address the risks that safety equipment will fail during that subsequent license renewal term.

gaps and uncertainties identified in Memorandum SECY-14-0016 and the *NRC-DOE Degradation Assessment*. NRC has made no changes to the Part 54 safety regulations for license renewal to address the uncertainties and knowledge gaps associated with subsequent license renewal.

To the contrary, while NRC Staff recommended amending the Part 54 safety regulations in Memorandum SECY-14-0016, the Commission rejected that recommendation and chose instead to rely on non-binding guidance. *See* Staff Requirements Memorandum.¹⁶ This guidance -- set forth in the *2017 Generic Aging Lessons Learned Report* and the *2023 Draft Generic Aging Lessons Learned Report* -- does not purport to resolve the knowledge gaps and uncertainties raised by Memorandum SECY-14-006 and the *NRC-DOE Degradation Assessment*. Instead, after listing the “most significant technical issues identified as challenging operation beyond 60 years” -- *i.e.*, pressure vessel embrittlement; irradiation-assisted stress corrosion cracking of reactor internals; concrete structures and containment degradation; and electrical cable environmental qualification, condition monitoring, and assessment -- the guidance documents “emphasize[] that

¹⁶ These guidance documents are non-binding by their own terms. *See* 2017 Generic Aging Lessons Learned Report at iii (SA016) and 2023 Draft Generic Aging Lessons Learned Report at iii (SA032) (using identical language to describe their contents as “*recommendations* on specific areas for which existing [aging management programs] should be augmented for [subsequent license renewal].”) (emphasis added).

“it is the *industry’s responsibility* to resolve these and other issues to provide the technical bases to ensure safe reactor operation beyond 60 years.” *2017 Generic Aging Lessons Learned Report* at xxvii (JA508); *2023 Draft Generic Aging Lessons Learned Report* at xxiii (JA562) (emphasis added). By bucking resolution of uncertainties and knowledge gaps to licensees -- who have a vested interest in avoiding the costs of environmental protection -- NRC abdicated its statutory responsibility to take a “hard look” at the environmental impacts of its licensing actions. *See Robertson*, 490 U.S. at 350.¹⁷

B. NEPA Precludes NRC from Substituting its Atomic Energy Act-Based License Renewal Reviews and General Oversight for a NEPA-Based Review of the Effects of Aging on Accident Risk.

NRC had no lawful basis for its reliance on its Atomic Energy Act-based regulatory program as a substitute for NEPA compliance with respect to the environmental impacts of relying on aging safety equipment during a second license renewal term. *See 2024 GEIS* at A-212 (JA211) (asserting that aging issues

¹⁷ Even assuming for purposes of argument that the 2023 Draft Generic Aging Lessons Learned for Subsequent License Renewal Report had any value with respect to the resolution of knowledge gaps and uncertainties regarding aging safety equipment, NEPA does not permit NRC to take credit for its promises to evaluate the risks posed by aging safety components in future license renewal guidance that has not been finalized. Any “improvements” that may be yielded “are thus far untested.” *New York*, 681 F.3d at 481. *See also Robertson*, 490 U.S. at 369 (“NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.”).

“are thoroughly addressed by NRC’s safety review for license renewal . . . and the NRC’s ongoing regulatory oversight for active systems, structures, and components.”). NRC’s obligations under NEPA are not “in any sense” restricted or narrowed by the Atomic Energy Act-based safety review. *Fla. Power & Light*, 54 N.R.C. at 13 (internal quotation marks omitted). *See also Limerick Ecology Action*, 869 F.2d at 729-31.

Similarly, NRC was not excused from NEPA compliance by its claim that its regulations for license renewal and equipment maintenance “are designed to minimize the uncertainty due to aging.” *Id.* at A-213 (JA212). As this Court recognized in *New York*, finding a “reasonable assurance” of safety under the Atomic Energy Act is “a far cry” from finding the likelihood of a significant adverse environmental impact to be “remote and speculative.” 681 F.3d at 479. *See also id.* at 482 (quoting *Limerick Ecology Action*, 869 F.2d at 739) (“Only if the harm in question is so ‘remote and speculative’ as to reduce the effective probability of its occurrence to zero may the agency dispose with the consequences portion of the analysis.”). While NRC claims to rely on the “robust” Maintenance Rule, 2024 License Renewal GEIS at A-213 (JA212), the Maintenance Rule’s essential elements are monitoring and preventive maintenance, not prediction of environmental risk years into the future. *See* 10 C.F.R. § 50.63(a); *New York*, 681 F.3d at 481 (“With full credit to the Commission’s considerable enforcement and

inspection efforts, merely pointing to [a] compliance program is in no way sufficient to support a scientific finding” required by NEPA.

III. AS A MATTER OF LAW, NRC VIOLATED NEPA BY REFUSING TO CONSIDER CLIMATE CHANGE EFFECTS ON REACTOR ACCIDENT RISK.

A. NRC Must Consider Climate Change Effects on Reactor Accident Risk Because It Conceded That They Are Reasonably Foreseeable.

NEPA requires consideration of environmental impacts if they are reasonably foreseeable. *See supra* at 6 (citing 42 U.S.C. § 4332(C)(2)(i); *New York*, 681 F.3d at 478-79; and *Limerick Ecology Action*, 869 F.2d at 739). There is no dispute that climate change effects are reasonably foreseeable or that NRC must consider them in its license renewal decisions. As NRC has conceded, it must take a “hard look” at climate change impacts, *id.* at A-248 (JA232), and “needs to consider and use site-specific information regarding changing environmental conditions and trends that can be associated with climate change.” *Id.* at A-258 (SA005).¹⁸ *See also N.J. Conservation Found.*, 111 F.4th at 55 (recognizing that climate change impacts are reasonably foreseeable and potentially significant).

NRC has also effectively conceded that climate change is reasonably likely to affect the safety of reactor operation during initial and subsequent license

¹⁸ Indeed, the 2024 GEIS provides quantitative measurements of already-increasing frequency and intensity of storms, flooding, temperatures, and other climate-change phenomena. *Id.* at G-32 - G-36 (JA355-59).

renewal terms. *See* 2024 GEIS A-222 (JA221) (asserting that the GEIS accounts for climate change by employing “large margins” in its risk analysis). Notably, nowhere has NRC asserted that climate change effects on reactor accident risk are “so low as to be remote and speculative.” *New York*, 681 F.3d at 478 (internal quotations omitted). Nor has NRC found the climate change-related risk of a reactor accident to be so low that a person of “ordinary prudence” would not take it into account. *Standing Rock Sioux Tribe*, 985 F.3d at 1050. Accordingly, as a matter of law, NRC was required to consider climate change effects on reactor accident risk during both the initial and subsequent license renewal terms.

B. NRC Legally Erred in Determining That Climate Change Effects on Accident Risk Lie Outside the Scope of a Required NEPA Review.

The 2024 GEIS asserts two legally erroneous grounds for why climate change effects on reactor accident risk are “outside the scope of NRC’s license renewal environmental review:” (1) that NEPA requires consideration of only the direct impacts of reactor operation and (2) NRC adequately addresses climate change in its safety programs. *Id.* at A-222 (JA221).

1. NEPA requires consideration of climate change’s indirect and cumulative impacts on accident risk.

In asserting that NEPA required the GEIS only to “document[] the potential environmental impacts of continued reactor operations,” GEIS at A-222 (JA221), NRC flouted NEPA’s “rule of reason.” *N.J. Conservation Found.*, 111 F.4th at 54.

In addition to the direct impacts of an agency action, NEPA undisputedly requires consideration of “[i]ndirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” *New York*, 681 F.3d at 477 (quoting 40 C.F.R. § 1508.8; *Public Citizen*, 541 U.S. at 763). NEPA also requires consideration of cumulative impacts, *i.e.*, “past, present, or likely future actions in the same geographic area.” *Tomac v. Norton*, 433 F.3d 852, 864 (D.C. Cir. 2006) (citing 40 C.F.R. § 1508.7). *See also* 10 C.F.R. § 51.71(d) (requiring NRC to consider cumulative impacts in license renewal decisions). Climate change constitutes an indirect and cumulative impact because its effects may occur or increase later in time but are still reasonably foreseeable and they add to the risks already caused by nuclear reactor operation.

NRC’s position is not only inconsistent with governing law, but also with NRC’s own adjudicatory decisions and its longstanding practice in all NEPA reviews. *See Pac. Gas and Elec. Co.*, 74 N.R.C. 427, 442-43 (2011) (establishing that consideration of factors “external” to the reactor itself, such as seismic risks, is required in NRC’s NEPA reviews).¹⁹ The License Renewal GEIS has also recognized the relevance of indirect and cumulative impacts to reactor license

¹⁹ Two recent Licensing Board decisions have also cited *Pac. Gas and Elec. Co.* for the relevance of climate change effects to reactor accident risks: *Fla. Power & Light Co.*, 99 N.R.C. 39, 68 n.73 (2024) (admin. appeal pending) and *Va. Elec. and Power Co.*, 100 N.R.C. 52, 88 (2024) (Gibson, A.J., concurring in part and dissenting in part) (admin. appeal pending).

renewal. One of the “two general categories” of safety and environmental issues NRC deems central to its environmental impact analysis for reactor license renewal is the “effects on accident consequences due to the changing environment in which the plant exists.” 1996 GEIS at 5-10 (JA365).²⁰

NRC has also recognized that “[c]hanges in climate have the potential to affect air and water resources, ecological resources, and human health, and *should* be taken into account when evaluating *cumulative impacts* over the license renewal term.” 2013 GEIS at 1-29 (JA424) (emphasis added). The 2024 GEIS itself evaluates the contribution to reactor accident risk of historically recorded natural phenomena such as “seismic and fire events,” “high winds, floods, tornadoes,” and “other external events.” *Id.* at E-23 (JA267). These external impacts are both indirect and cumulative.

Thus, it is undisputed that NEPA requires NRC to consider “external” factors affecting accident risk during extended license renewal terms, including the “changing environment” recognized in the 1996 GEIS. *Id.* at 5-10 (JA365). And it is now beyond doubt that the fast-moving and increasingly severe weather changes associated with climate change create a “changing environment” that challenges the safety and resilience of nuclear reactors. NEPA requires consideration of

²⁰ For instance, if the population near a reactor increases over time, the number of people who could be injured in a radiological accident increases, thereby increasing the environmental impacts of extended operation. *Id.*

climate change effects on accident risk because they constitute indirect and cumulative impacts that will increase and intensify over time, thereby exacerbating the risk posed by operating reactors. Therefore, NRC had no lawful basis to declare the effects of climate change on accident risk “out of scope.”

2. NEPA’s requirements are separate from and independent of NRC’s safety review and oversight.

NRC’s obligations under NEPA are “independent” of its Atomic Energy Act-based obligations, and nothing in the Atomic Energy Act precludes or limits NEPA. *Limerick Ecology Action*, 869 F.2d at 729-31. *See also Fla. Power & Light*, 54 N.R.C. at 13. Therefore, NRC lacked any lawful basis to claim in the 2024 GEIS that NEPA has been satisfied because “adaption of nuclear power plants to climate change is addressed through the NRC’s existing regulations.” *Id.* at A-222 (JA221).²¹

²¹ NRC also lacks any factual basis for this claim, and therefore, it is arbitrary and capricious. *See* Section IV.B, *infra*.

IV. THE FINAL RULE IS ARBITRARY AND CAPRICIOUS BECAUSE NRC FAILED TO SUPPORT ITS BINDING GENERIC DETERMINATION THAT THE ENVIRONMENTAL IMPACTS OF REACTOR ACCIDENTS ARE SMALL.

A. NRC Failed to Demonstrate that It Has Considered the Effects of Aging Safety Equipment on Reactor Accident Risk.

Nowhere in the Final Rule and 2024 GEIS record, including the license renewal guidance cited in the GEIS at A-212 - A-213 (JA211-12), does NRC demonstrate that it has addressed or resolved the knowledge gaps and uncertainties set forth in Memorandum SECY-14-0016 and acknowledged in the GEIS at A-213 (JA212). Instead, NRC has shifted that responsibility onto licensees, urging them to “strive for satisfactory resolution of these issues prior to NRC beginning a review of any [subsequent license renewal] application,” Staff Requirements Memorandum SECY-14-0016 (JA495) and reminding them that it is the *industry’s responsibility* to resolve these and other issues to provide the technical bases to ensure safe reactor operation beyond 60 years.” *2017 Generic Aging Lessons Learned Report* at xxvii (JA508); *2023 Draft Generic Aging Lessons Learned Report* at xxiii (JA562) (emphasis added). This inappropriate delegation to private

licensees of the agency's own responsibility for NEPA compliance fails to qualify as the "hard look" required by NEPA. *Robertson*, 490 U.S. at 350.

B. NRC Failed to Demonstrate that It Has Considered or Addressed Climate Change Effects on Reactor Accident Risk.

1. NRC failed to demonstrate that climate change effects on accident risk are considered in its Atomic Energy Act-based safety programs.

According to NRC, "adaptation of nuclear power plants to climate change is addressed through NRC's existing regulations." *Id.* at A-290 (JA235). But the NRC does not cite a single safety regulation in its entire regulatory scheme that explicitly or even implicitly requires reactor licensees to protect against the increasingly severe and frequent weather events characterized by climate change. This is unsurprising, given that most operating reactors were licensed decades ago before the NRC first mentioned the term "climate change" in the 2013 GEIS. To the extent the regulations consider natural hazards, they look at historical data instead of anticipating future risks.

For instance, NRC asserts that nuclear reactors must be "designed to withstand the effects of natural phenomena, such as flooding, without loss of capability to perform safety functions." *Id.* Critically, the design requirement for natural phenomena is limited to "the most severe of the natural phenomena that have been *historically* reported for the site and surrounding area," with "sufficient margin for the limited accuracy, quantity, and period of time in which the

historical data have been accumulated.” 10 C.F.R. Part 50, Appendix A, General Design Criterion 2 (emphasis added). “[H]istorical data” are fundamentally different from projections of future environmental impacts decades from now or from when reactors were designed. *New York*, 681 F.3d at 481 (noting that “a proper analysis of the risks would necessarily look *forward*” to examine environmental effects of a proposed action and that a study of the impact of thirty additional years . . . must actually concern itself with the extra years.” (emphasis in original)). *See also* CEQ Guidance, 88 Fed. Reg. at 1197 (JA543) (noting the climate is “changing” and therefore demands “adaptation.”).²²

More importantly, NRC’s regulations preclude consideration in license renewal proceedings of any safety issues other than the adequacy of aging management plans under the NRC’s Part 54 safety regulations. 56 Fed. Reg. at 64,964 (license renewal review limited to “age-related degradation unique to license renewal”). Thus, the entire suite of regulations, license conditions, and technical specifications comprising a reactor’s current licensing basis -- which NRC claims to provide a means for addressing climate change effects, *see* 2024 GEIS at A-290 (JA235) -- is beyond the scope of a license renewal review. That

²² The fact that many reactors were licensed fifty or sixty years ago further widens the gap between the historical record on which the NRC’s regulatory program is based and the rapid changes in natural hazards caused by climate change. *See Virginia Elec. and Power Co.*, 100 N.R.C. at 87 (Gibson, A.J.).

leaves the NRC with only the vague promise of general oversight. For instance, the GEIS cites an “enhanced process to make sure there is an ongoing assessment of information on a range of natural hazards that could potentially pose a threat to nuclear power plants.” *Id.* at 1-15 (SA002). As this Court has held, however, a general assertion that the agency is “on duty” is “in no way sufficient” to substitute for a reasoned and forward-looking assessment of environmental risks that will arise during license renewal. *New York*, 681 F.3d at 481.

2. NRC failed to support its alternative claim that it does, in fact, consider climate change effects on accident risk under NEPA.

At the same time the 2024 GEIS summarily dismissed the effects of climate change on accident risk as ‘out of scope,’ *id.* at A-222 (JA221), it acknowledged the environmental significance of climate change by claiming to account for its effects through “large [safety] margins” and “updated information about site-specific external events and hazards.” *Id.* This contradictory stance undermines NRC’s claim that it had no legal obligation to address climate change risks. If climate change were truly outside the scope of NEPA review, there would have been no reason to rely on these alleged safety margins to justify the adequacy of the 2024 GEIS. The internal inconsistency of the 2024 GEIS thereby demonstrates a broken connection rather than “rational” connection between its “factual findings

and its decision.” *N.J. Conservation Found.*, 111 F.4th at 54 (internal citations omitted).

Further, the claims of the 2024 GEIS also “contradict[ed] the available evidence.” *Mayo*, 875 F.3d at 20. For instance, the 2024 GEIS claimed to address climate change effects on accident risk by incorporating “large margins” in its risk analysis. *Id.* at A-222 (JA221). Not only does the GEIS fail to affirmatively demonstrate that these margins are sufficient to account for the added risks posed by climate change alongside other factors for which safety margins were credited, but the range of uncertainties covered by those margins is too big to be credible.

For example, the GEIS relies on “appropriate safety margins” to address Fukushima-like events (A-112, JA111), credits “large inherent safety margins in the design and construction of spent fuel pools” to resolve fire risk concerns (A-160, JA159), and notes “significant margins” between FLEX strategies and qualitative health objectives to conclude severe accident impacts are “SMALL” (A-192, JA191). Similarly, the 2024 GEIS claimed to have considered “updated information about site-specific external events and hazards,” *id.* at A-222 (JA221), without giving a single example or explaining “how that consideration [was] the functional equivalent of the NEPA requirements.” *Limerick Ecology Action*, 869 F.2d at 731 n.10. Finally, the NRC’s clear policy *against* considering climate change effects on accident risk raises a question regarding whether such an

“update” actually was considered in the decision-making process. *Id.* (where NRC failed to “identify what consideration was given” to an environmental issue or “how that consideration is the functional equivalent of the NEPA requirements,” Court could not conclude that the agency had satisfied NEPA).

3. NRC failed to justify its selective reliance on only some portions of federal guidance for consideration of climate change in NEPA reviews.

While the NRC may choose the guidance it will follow, *Powertech (USA) Inc.*, 92 N.R.C. at 299, it must explain that choice in a rational way. *N.J. Conservation Found.*, 111 F.4th at 53. The 2024 GEIS is arbitrary and capricious because it failed to provide a rational explanation for rejecting the key recommendation of the CEQ Guidance, *2018 Climate Assessment*, and the *2023 Synthesis Report* to address climate change effects on the resilience of energy facilities and other public facilities, or to evaluate measures to increase their resilience.

NRC’s stance is particularly confounding because since 1996 the NRC has acknowledged that the “changing environment” and its impact on accident consequences as a key consideration in reactor license renewal review. *See* 1996 GEIS at 5-10 (JA365). It is a logical progression to move from examining the impact of climate change on the environment surrounding reactors to evaluating its

effects on the reactors themselves. The Final Rule and 2024 GEIS are arbitrary and capricious because the NRC utterly failed to do so.

V. THE FINAL RULE IS ARBITRARY AND CAPRICIOUS BECAUSE NRC HAS FAILED TO SUPPORT ITS BINDING GENERIC DETERMINATION THAT ACCIDENT MITIGATION MEASURES NEED NOT BE ADDRESSED IN INDIVIDUAL LICENSE RENEWAL PROCEEDINGS.

“Implicit in NEPA’s demand that an agency prepare a detailed statement on ‘any adverse environmental effects which cannot be avoided should the proposal be implemented,’ is an understanding that the EIS will discuss the extent to which adverse effects can be avoided.” *N.J. Conservation Found.*, 111 F.4th at 56 (quoting *Robertson*, 490 U.S. at 351-52 (citing 42 U.S.C. § 4332(C)(ii)). In violation of this requirement, the Final Rule makes a binding generic determination that “[s]evere accident mitigation alternatives do not warrant further plant-specific analysis because the demonstrated reductions in population dose risk and continued severe accident regulatory improvements substantially reduce the likelihood of finding cost-effective significant plant improvements.” 89 Fed. Reg. at 645,195 (JA063).²³

This determination is arbitrary and capricious because NRC has failed to demonstrate that consideration of the reasonably foreseeable effects of aging safety

²³ The classification of severe accident mitigation measures as Category 1 changes NRC’s previous classification of severe accident mitigation measures as a Category 2 site-specific issue. *See* 2024 GEIS at B-47 (JA244). Until publication

equipment and climate change on accident risks would result in no change to its determination. NRC's failure to resolve the uncertainties regarding these issues raises questions about "the reasonableness of continuing to license and relicense nuclear reactors." *New York*, 681 F.3d at 474.

NRC's refusal to consider accident mitigation measures is also inconsistent with NRC Staff's recommended mitigation measures in Memorandum SECY-14-0016, such as increasing reporting requirements for licensee experience with aging safety equipment and shortening the time for submittal of subsequent license renewal applications to give applicants more time to obtain operating experience with aging equipment. *Id.*, Encl. 2 at 4-5 (JA486-87). NRC's refusal to consider accident measures is also inconsistent with the guidance of the CEQ, the U.S. Global Change Assessment Program and the Intergovernmental Panel to consider "how climate change may impact proposed actions and alternatives and to consider climate resilience." *See, e.g.*, CEQ Guidance, 88 Fed. Reg. at 1207 (JA553) and discussion at 18-20, *supra*.

Finally, NRC's refusal to consider climate change-related mitigation measures is inconsistent with NRC's commitment in the 2024 GEIS to, at some time in the future, "submit a draft action plan describing steps the agency can take

of the Final Rule, NRC considered severe accident mitigation alternatives in individual reactor license renewal proceedings. *See* 2024 GEIS at B-47 (JA244).

with regard to its facilities and operations to bolster adaptation and increase resilience to the impacts of climate change.” *Id.* at F-12 (citing Executive Order 14008) (SA010).²⁴ NRC’s failure to include such a plan in the 2024 GEIS violated NEPA’s requirement to evaluate environmental impacts and alternatives before acting and demonstrates that NRC’s refusal to address accident mitigation measures before re-licensing reactors was arbitrary and capricious.

CONCLUSION AND REQUEST FOR RELIEF

For the foregoing reasons, the Court should vacate the Final Rule and remand the Rule and the 2024 GEIS to NRC to review of the effects of aging safety equipment and climate change on reactor accident risks, including measures to avoid or mitigate those risks.

²⁴ While the President has since withdrawn Executive Order 14008, *see* note 8, it is reasonable to presume that NRC considered it reasonable guidance or it would not have agreed to follow its recommendation. *Powertech (USA) Inc.*, 92 N.R.C. at 299.

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CERTIFICATE OF COMPLIANCE

Pursuant to Federal Rule of Appellate Procedure Rule 32(a)(7)(C) and Circuit Rule 32(a)(2)(C), I certify that the attached Final Opening Brief is proportionately spaced, has a typeface of Times New Roman, 14 points, and contains 12,923 words. This figure includes footnotes and citations, but excludes the Cover Page, Table of Contents, Table of Authorities, signature blocks, Certificate of Compliance, Certificate as to Parties, Rulings, and Related Cases, Addendum of Statutes, Rules, and Regulations, and Standing Addendum. I have relied on Microsoft Word's calculation feature for this calculation.

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