

United States Court of Appeals
FOR THE DISTRICT OF COLUMBIA CIRCUIT

Argued February 22, 2016

Decided June 3, 2016

No. 14-1210

STATE OF NEW YORK, ET AL.,
PETITIONERS

v.

U.S. NUCLEAR REGULATORY COMMISSION AND UNITED
STATES OF AMERICA,
RESPONDENTS

COMMONWEALTH OF MASSACHUSETTS, ET AL.,
INTERVENORS

Consolidated with 14-1212, 14-1216, 14-1217

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

Andrew W. Amend, Senior Assistant Solicitor General,
Office of the Attorney General for the State of New York,
argued the cause for petitioners State of New York, et al.
With him on the briefs were *Eric T. Schneiderman*, Attorney

General, *John J. Sipos*, *Kathryn M. DeLuca*, *Laura E. Heslin*, Assistant Attorneys General, *Barbara D. Underwood*, Solicitor General, *Anisha S. Dasgupta*, Deputy Solicitor General, *Monica Wagner*, Deputy Bureau Chief, *Maura Healy*, Attorney General, Office of the Attorney General for the Commonwealth of Massachusetts, *Seth Schofield*, Assistant Attorney General, *Joseph F. Halloran*, *George Jepsen*, Attorney General, Office of the Attorney General for the State of Connecticut, *Robert D. Snook*, Assistant Attorney General, *William H. Sorrell*, Attorney General, Office of the Attorney General for the State of Vermont, and *Kyle H. Landis-Marinello*, Assistant Attorney General. *Melissa A. Hoffer*, Assistant Attorney General, Office of the Attorney General for the Commonwealth of Massachusetts, entered an appearance.

Kevin W. Bell was on the brief for *amicus curiae* The California State Energy Resources Conservation and Development Commission in support of petitioners State of New York, et al.

Geoffrey H. Fettus argued the cause for petitioners Natural Resources Defense Council, Inc., et al. With him on the briefs were *Diane Curran* and *Mindy Goldstein*.

Wallace L. Taylor was on the brief for *amicus curiae* Sierra Club in support of petitioners.

Andrew P. Averbach, Solicitor, U.S. Nuclear Regulatory Commission, argued the cause for federal respondents. With him on the brief were *John C. Cruden*, Assistant Attorney General, U.S. Department of Justice, *John E. Arbab*, Attorney, *Robert M. Rader*, Senior Attorney, U.S. Nuclear Regulatory Commission, and *Michelle D. Albert*, Attorney. *Charles E. Mullins*, Senior Attorney, entered an appearance.

David A. Repka argued the cause for intervenor-respondents. With him on the brief were *Ellen C. Ginsberg*, *Jonathan M. Rund*, *Brad Fagg*, *Jay E. Silberg*, and *Kimberly A. Harshaw*.

Before: KAVANAUGH, *Circuit Judge*, and EDWARDS and SENTELLE, *Senior Circuit Judges*.

Opinion for the Court filed by *Senior Circuit Judge* SENTELLE.

SENTELLE, *Senior Circuit Judge*: Several states, a Native American community, and numerous environmental organizations have filed petitions for review of a rule and generic environmental impact statement promulgated by the Nuclear Regulatory Commission (the “NRC”), concerning the continued, and possibly indefinite, storage of spent fuel from nuclear power plants in the United States. The petitioners argue that the NRC fails to comply with its obligations under the National Environmental Policy Act (“NEPA”), 42 U.S.C. § 4321 *et seq.* Specifically, the petitioners contend that the NRC did not consider alternatives to and mitigation measures for the continued storage of spent nuclear fuel, miscalculated the impacts of continued storage, and relied on unreasonable assumptions in its environmental impact statement. Because we hold that the NRC did not engage in arbitrary or capricious decision-making, we deny the petitions for review.

I. BACKGROUND

The United States has committed to the development of nuclear energy, yet to-date it lacks a permanent solution for one consequence of that commitment—the generation of spent nuclear fuel, which “poses a dangerous, long-term

health and environmental risk.” *New York v. NRC (New York I)*, 681 F.3d 471, 474 (D.C. Cir. 2012). This case is not the first, nor even the second, time that concerned parties have petitioned this Court to address the spent-nuclear-waste problem. See, e.g., *Minnesota v. NRC*, 602 F.2d 412, 413, 418-19 (D.C. Cir. 1979) (remanding the NRC’s decision to expand “on-site capacity for the storage of spent nuclear fuel assemblies” in light of “[t]he complex and vexing question of the disposal of nuclear wastes”); *New York I*, 681 F.3d at 483 (vacating the NRC’s rule governing the temporary storage of spent nuclear fuel); see also *In re Aiken Cnty.*, 645 F.3d 428, 430 (D.C. Cir. 2011) (considering a challenge to the Department of Energy’s attempt to withdraw its application for a permanent repository for spent nuclear fuel); *Ind. Mich. Power Co. v. DOE*, 88 F.3d 1272, 1277 (D.C. Cir. 1996) (requiring the Department of Energy to fulfill its contractual obligations to dispose of spent nuclear fuel generated by operators of civilian nuclear power plants).

In light of this extensive history, we provide only an overview of the spent-nuclear-fuel issue. The so-called “nuclear fuel cycle” consists of three primary phases. See Blue Ribbon Commission on America’s Nuclear Future, *Report to the Secretary of Energy* 9-11 (2012) [hereinafter BRC Report]. First, “uranium is mined and processed into fuel for use in a nuclear reactor.” *Id.* at 9. Second, nuclear plants use the uranium fuel. *Id.* Third, spent fuel, even if reprocessed, ultimately must be sent for disposal. *Id.* The term “nuclear fuel cycle” is therefore somewhat of a misnomer; “every foreseeable approach to the nuclear fuel cycle still requires a means of disposal that assures the very long-term isolation of radioactive wastes from the environment.” *Id.* at 11. And “virtually all spent fuel[] remain[s] radioactive for thousands of years” *Id.* at 14.

Congress passed the Nuclear Waste Policy Act of 1982 for the purpose of “establish[ing] a schedule for the siting, construction, and operation of repositories that will provide a reasonable assurance that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste and . . . spent nuclear fuel” Pub. L. No. 97-425, § 111(b)(1), 96 Stat. 2201, 2207 (codified at 42 U.S.C. § 10131(b)(1)). In 2008, after nearly two decades of regulatory and political discord, the Department of Energy sought construction authorization from the NRC to establish a repository at Yucca Mountain in Nevada. *See In re Aiken Cnty.*, 645 F.3d at 431-32. But a change in the presidential administration brought with it a shift in nuclear energy policy, and in 2010 the Department of Energy withdrew its application. *Id.* at 432. Our characterization in *New York I* of the nation’s spent-fuel-storage policy still rings true today: “[a]t this time, there is not even a prospective site for a repository, let alone progress toward the actual construction of one.” 681 F.3d at 474.

Absent a permanent repository, the majority of spent nuclear fuel remains stored on-site at reactors. BRC Report, *supra*, at 14; *see also New York I*, 681 F.3d at 474. After removal from a reactor, “spent fuel is transferred to a deep, water-filled pool . . . for at least five years” in order to cool. BRC Report, *supra*, at 11. Once the spent nuclear fuel has “cooled sufficiently in wet storage [i.e., a pool], it may be transferred to dry storage[,]” which “generally consist[s] of a fuel storage grid placed within a steel inner container and a concrete and steel outer container[,]” also known as a “dry cask.” *Id.* “Most [spent nuclear fuel], however, will remain in spent-fuel pools until a permanent disposal solution is available.” *New York I*, 681 F.3d at 474.

From 1984 until this Court's decision in *New York I*, the NRC relied on a "Waste Confidence Decision" in order to assess the risk of on-site storage of spent nuclear fuel and the likelihood that a permanent off-site storage solution will be available. *Id.* at 474-75 (citing *Minnesota v. NRC*, 602 F.2d at 418). In *New York I*, we vacated the 2010 update to the NRC's Waste Confidence Decision and its Temporary Storage Rule governing the storage of spent nuclear fuel. *Id.* at 483. In support of the Waste Confidence Decision and the Temporary Storage Rule, the NRC prepared an environmental assessment ("EA") with a finding of no significant impact. *Id.* at 476. We held that the NRC's analysis was deficient because: (1) the Waste Confidence Decision "did not examine the environmental effects of failing to establish a repository"; (2) the NRC "failed to properly examine the risk of [pool] leaks in a forward-looking fashion"; and (3) the NRC "failed to examine the potential consequences of pool fires" in addition to the probabilities that such fires might occur. *Id.* at 478-79.

In response to our *New York I* decision, the NRC altered its approach to the continued storage of spent nuclear fuel. Instead of relying on an EA with a finding of no significant impact, the NRC prepared a Generic Environmental Impact Statement ("GEIS") and proposed a Continued Storage Rule (the "Rule") to codify its analysis of the effects of continued on-site storage of spent nuclear fuel. See 79 Fed. Reg. 56,238 (2014) (Continued Storage Rule); 79 Fed. Reg. 56,263 (2014) (notice of GEIS); J.A. 263-1560 (GEIS). The stated purpose of the Rule "is to preserve the efficiency of the NRC's licensing process by adopting into the NRC's regulations the Commission's generic determinations of the environmental impacts of the continued storage of spent nuclear fuel . . . beyond the licensed life for operations of a reactor" 79 Fed. Reg. at 56,239. The Rule incorporates

the findings of the GEIS into all future reactor licensing proceedings and precludes reconsideration of those findings absent a waiver under 10 C.F.R. § 2.335. *See* 10 C.F.R. § 51.23(b); 79 Fed. Reg. at 56,243.

The petitioners in this case, a group of states and a Native American community (collectively, the “States”) along with a group of environmental organizations (collectively, the “NRDC”), submitted comments to both the GEIS and the Rule. The petitioners now challenge the Rule and the GEIS on the basis that the NRC failed to comply with NEPA. *Cf.* 42 U.S.C. § 4332(C) (detailing NEPA’s requirements for an environmental impact statement). They request that we vacate the Rule and the GEIS and remand to the NRC for further proceedings.

Because we hold that the NRC did not engage in arbitrary or capricious decision-making, *see* 5 U.S.C. § 706(2)(A), we deny the petitions for review.

II. ANALYSIS

The States and the NRDC raise a panoply of challenges to the NRC’s Rule and the GEIS. First, the petitioners contend that the Rule is a major federal action that requires consideration of alternatives and mitigation measures to reactor licensing. Second, they dispute the NRC’s assessment of the environmental impacts of the continued storage of spent nuclear fuel, asserting: (a) failure to employ conservative bounding estimates; (b) inadequate determination of the probability of failure to site a permanent geologic repository; (c) insufficient assessment of the cumulative impacts of the continued storage of spent nuclear fuel; and (d) unjustified dismissal of the risks of short-term, high-volume pool leaks. Relatedly, the petitioners challenge

as “illusory” the NRC’s process for granting a petition for waiver of the Rule in site-specific licensing proceedings. Finally, the petitioners characterize several of the NRC’s underlying assumptions in the GEIS as unreasonable. We hold that none of these arguments is persuasive and deny the petitions.

**A. THE NRC APPROPRIATELY CHARACTERIZED ITS
RULE AND CONSIDERED ALTERNATIVES AND
MITIGATION MEASURES**

The parties disagree over the proper characterization of the NRC’s Rule. According to the NRC, the Rule “codif[ies] its generic determinations regarding the environmental impacts of continued storage of spent fuel at-reactor, or away-from-reactor sites beyond a reactor’s licensed life for operation.” 79 Fed. Reg. at 56,241. The NRC contends that “the Rule is *not* a licensing action” NRC’s Br. 16. The States and the NRDC respond that the federal action at issue is reactor licensing. *See* States’ Br. 44; NRDC’s Br. 20. And because licensing is indisputably a “major Federal action[]” under NEPA, 42 U.S.C. § 4332(C), the States and the NRDC argue that the NRC was required to prepare a complete environmental impact statement (“EIS”), including a consideration of alternatives and mitigation measures for the continued storage of spent fuel. *See* 42 U.S.C. § 4332(C) (“[M]ajor Federal actions significantly affecting the quality of the human environment” require an EIS or its equivalent.); *see also NRDC v. NRC*, -- F.3d --, No. 14-1225, 2016 WL 1639661, at *1 (D.C. Cir. Apr. 26, 2016) (same). We agree with the NRC and hold that, while the Rule is a “major Federal action” under NEPA, the NRC complied with its NEPA obligations by preparing the GEIS. Because the Rule is not a licensing action, the NRC need not have considered

the alternatives to licensing in the GEIS. We therefore deny the petitions for review on this issue.

Under NEPA, an agency must consider both the environmental impacts of a proposed action and alternatives to that action. See 42 U.S.C. § 4332(C). Part of the alternatives analysis includes review of measures available to mitigate adverse effects. See 40 C.F.R. §§ 1508.25(b), 1502.14(f). “[W]e review both an agency’s definition of its objectives and its selection of alternatives under the ‘rule of reason.’ . . . That is, as long as the agency ‘look[s] hard at the factors relevant to the definition of purpose,’ we generally defer to the agency’s reasonable definition of objectives.” *Theodore Roosevelt Conservation P’ship v. Salazar* (*Theodore Roosevelt II*), 661 F.3d 66, 73 (D.C. Cir. 2011) (quoting *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991)) (alteration in original). Furthermore, “NEPA does not require agencies to discuss any particular mitigation plans that they might put in place, nor does it require agencies—or third parties—to effect any.” *Theodore Roosevelt Conservation P’ship v. Salazar* (*Theodore Roosevelt I*), 616 F.3d 497, 503 (D.C. Cir. 2010) (citation and internal quotation marks omitted).

Our decision in *New York I* compels the result that the NRC’s Rule is a major federal action requiring the preparation of either an environmental assessment with a finding of no significant impact or an environmental impact statement. See 681 F.3d at 476. Like the NRC’s prior Waste Confidence Decision and Temporary Storage Rule, the NRC’s Rule in this case “ha[s] a preclusive effect in all future licensing decisions” *Id.* But unlike in *New York I*, the NRC has done exactly what NEPA requires for major federal actions; it prepared an environmental impact statement. See *id.*; 42 U.S.C. § 4332(C); 40 C.F.R. § 1502.3. So long as that

environmental impact statement complies with NEPA, and we hold that it does, no more is required.

The face of the NRC's Rule also makes it clear that it is not a licensing action. To the contrary, the Rule "codif[ies] [the NRC's] generic determinations regarding the environmental impacts of continued storage of spent fuel at-reactor, or away-from-reactor sites beyond a reactor's licensed life for operation." 79 Fed. Reg. at 56,241. "[T]he rule does not authorize the storage of spent fuel at any site [and] . . . reflects only the generic environmental analysis for the period of spent fuel storage beyond a reactor's licensed life for operation and before disposal in a repository." *Id.* at 56,243. Because the GEIS is only an input for future site-specific reactor licensing and does not itself impose regulatory requirements on reactors, the NRC need not have considered the alternative of ceasing licensing in the GEIS. The NRC instead analyzes that alternative during site-specific licensing proceedings. *See* J.A. 1040 ("The alternative of not issuing or not renewing a nuclear power plant license is considered during the site-specific review of an individual license application."). The NRC did consider alternatives for the only action it took in the Rule—i.e., incorporating the GEIS into future licensing proceedings. *See* J.A. 338-43.

Furthermore, contrary to the petitioners' claims, the GEIS discusses mitigation measures for pool fires, J.A. 1240-41, 1284-85, and pool leaks, including short-term, high-volume leaks, J.A. 838, 1394-96. It also evaluates measures such as the expedited transfer of spent fuel to dry storage casks, J.A. 973-74, 1454-55, limiting the use of high-burnup fuel, J.A. 912-19, 1246, 1258, 1339, and implementing hardened on-site storage, J.A. 1458. We find nothing in the GEIS to indicate that the NRC went astray of NEPA's rule of reason. Regardless, because mitigation is equally relevant during the

life of a licensed reactor as it is during decommissioning, the NRC can defer consideration of such measures to site-specific review. *See Public Utils. Comm'n of Cal. v. FERC*, 900 F.2d 269, 282-83 (D.C. Cir. 1990) (“[T]he Commission’s deferral of decision on specific mitigation steps until the start of construction, when a more detailed right-of-way would be known, was both eminently reasonable and embraced in the procedures promulgated under NEPA.”). Regardless, “NEPA does not require agencies to discuss any particular mitigation plans that they might put in place.” *Theodore Roosevelt I*, 616 F.3d at 503 (citation and internal quotation marks omitted).

Our holding with respect to this issue is consistent with our decision in *New York I*. In that case, we held that the NRC’s prior Waste Confidence Decision was “a major federal action requiring either a [finding of no significant impact] or an EIS.” 681 F.3d at 476. Although we described the Waste Confidence Decision as “a pre-determined ‘stage’ of each licensing decision,” *id.*, nowhere did we conclude that the NRC undertook licensing with its waste confidence rulemaking. The Rule in this case is likewise a major federal action because it has a preclusive effect on *future* licensing proceedings. *See* 10 C.F.R. § 51.23(b). But the proposition that all licensing actions are major federal actions does not imply its converse. When the NRC does make a licensing decision in partial reliance on the GEIS, it must *at that time* ensure that it has fully complied with NEPA. *See* 42 U.S.C. § 4332(C); *cf.* 40 C.F.R. § 1502.14 (delineating the requirements for including alternatives in the EIS); *Ctr. for Sustainable Economy v. Jewell*, 779 F.3d 588, 599-600 (D.C. Cir. 2015) (noting that the obligation to comply with NEPA “do[es] not mature until . . . there [has] been an irreversible and irretrievable commitment of resources” by the agency (citation and internal quotation marks omitted) (first alteration

in original)). The NRC acknowledges as much. See Oral Arg. Rec. 40:43-41:40 (statements by the NRC that the decision whether to issue a license is site-specific and that the agency will consider mitigation measures and alternatives at that time). At this stage, we take the NRC at its word. But should the agency fail to consider a necessary aspect of the problem during site-specific proceedings, the parties might be able to challenge the final licensing decision. See, e.g., *Massachusetts v. NRC*, 924 F.2d 311, 315 (D.C. Cir. 1991) (adjudicating consolidated petitions for review of “the [NRC’s] licensing of Seabrook Nuclear Power Station”); *York Comm. for a Safe Env’t v. NRC*, 527 F.2d 812, 813 (D.C. Cir. 1975) (considering a challenge to “a final decision . . . to grant a license . . . for operation of a light-water-cooled nuclear reactor to be used for generating electricity”).

We therefore deny the petitions for review on this issue.

**B. THE GEIS SUFFICIENTLY ANALYZES THE
IMPACTS OF CONTINUED STORAGE OF SPENT
NUCLEAR FUEL**

**1. The GEIS Thoroughly Considers
Essentially Common Risks to Reactor
Sites**

The States argue that the NRC could not generically analyze the impacts of the continued storage of spent nuclear fuel because it failed to employ “conservative bounding assumptions” in the GEIS, particularly with regard to estimating the risks of pool fires and pool leaks. Specifically, the States contend that the NRC based its environmental impact determinations on data from two reactor sites—one in Surry, Virginia, and another near Lake Michigan. According to the States, neither plant captures the full range of risks across the country because the population density near the

Surry plant is 300 people per square mile, and the density near the Lake Michigan plant is 860 people per square mile. See J.A. 862-63, 868, 870. Because the GEIS ignores population-wide effects and the impacts at atypical sites, the States posit that the NRC must consider these impacts on a site-specific basis.

We noted in *New York I* that “[b]oth the Supreme Court and this court have endorsed the [NRC’s] longstanding practice of considering environmental issues through general rulemaking in appropriate circumstances.” 681 F.3d at 480. We also stated that “we see no reason that a comprehensive general analysis would be insufficient to examine on-site risks that are essentially common to all plants.” *Id.* Furthermore, “whether the analysis is generic or site-by-site, it must be thorough and comprehensive,” *id.* at 481, and we are “most deferential” to the “NRC’s technical judgments and predictions . . . [.]” *Blue Ridge Env’tl Def. League v. NRC*, 716 F.3d 183, 195 (D.C. Cir. 2013) (citation and internal quotation marks omitted). While we acknowledged in *New York I* that a generic analysis of impacts is “particularly” appropriate when the NRC utilizes “conservative bounding assumptions and the opportunity for concerned parties to raise site-specific differences at the time of a specific site’s licensing,” we did not make those factors essential. 681 F.3d at 480. Instead, the cornerstone of our holding was that the NRC may generically analyze risks that are “essentially common” to all plants so long as that analysis is “thorough and comprehensive.”

In this case, we are convinced that the NRC has met that standard. True, the NRC’s analysis is not “bounding” in a strict sense. For example, in assessing the risks of pool fires, the GEIS relies on seismic data that covers “about 70 percent” of reactor sites. J.A. 870. This data therefore does not

“bound” the environmental impacts of spent fuel storage but instead approximates the variance in harms. For pool leaks, the NRC provides a high-level analysis of spent fuel discharges but neglects any estimate of the expected errors for its input variables, instead averring to specific “low” values for these parameters. *See* J.A. 849. Furthermore, the GEIS attempts to justify its reliance on data from the Surry and Lake Michigan plants by noting that the average risks to individuals are independent of population density. *See* J.A. 868. However, the NRC admits that this data covers only “the 90th percentile population density” and that “the accident consequences could be greater at higher population sites.” J.A. 868; *see also* J.A. 1367 (conceding that values in the GEIS “do not represent worst-case values”).

Nonetheless, according deference to the NRC’s technical decision-making, *see Blue Ridge*, 716 F.3d at 195, we find nothing in the GEIS to undermine the NRC’s conclusion that the identified risks are “essentially common” to all reactor sites. The GEIS incorporates research demonstrating how the risk analysis for pool fires is conservative, *see* J.A. 1348, 1366-67, and analyzes the variance in seismic risks, *see* J.A. 870. The NRC also considers “typical hydrologic characteristics at nuclear power plant sites” when assessing the impacts of pool leaks. J.A. 1054. Furthermore, the GEIS “explain[s] qualitatively the factors that may cause the risk to be lower or higher than” at the Surry and Lake Michigan plants. J.A. 1367. Regardless, the NRC need not provide a perfect analysis, only one that is “thorough and comprehensive” *New York I*, 681 F.3d at 481. We hold that the GEIS meets this requirement.

The States rely on *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 738 (3d Cir. 1989), for the proposition that the NRC cannot generically analyze the site-specific

consequences of reactor accidents, and hence, we are told, also the impacts of continued storage of spent nuclear fuel. However, not only is *Limerick* non-binding on this Court, but we recognized in *NRDC v. NRC* that the Third Circuit's dicta in *Limerick* "did not foreclose the possibility that [reactor accident mitigation alternatives] could be dealt with 'generically' through a subsequent rulemaking." 2016 WL 1639661, at *2; see also *id.* at *2 n.2.

Accordingly, we deny the petitions for review on this issue.

2. The NRC Evaluated the Probability of Failure To Site a Repository

The NRDC argues that the NRC fails to quantify the probability of failure to site a repository. Because we hold that the NRC adequately considered both the probability and consequences of failure to site a permanent repository for spent nuclear fuel, we deny the petitions on this issue.

Under its regulations, the NRC need only quantify "the various factors" in the GEIS "to the fullest extent practicable" 10 C.F.R. § 51.71(d). However, "[t]o the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms." *Id.* The NRC complied with these obligations. The agency provided a qualitative analysis of the likelihood of failure to site a repository, see J.A. 290, 770, and considered the reasonably foreseeable impacts of that scenario, see J.A. 458, 461, 469-70, 472-73, 476, 480, 487, 496, 501, 509, 511, 517, 521, 523-24, 550, 570, 572, 577, 580, 583, 585, 587-89, 591, 593, 596, 602-03, 605, 607, 610-11, 616, 618, 621. The NRDC provides no indication of how the NRC can or should otherwise assess the risk of failure to site a repository. Nor

does our decision in *New York I* require the NRC to do so. *Cf.* 681 F.3d at 478-80 (noting only that “an agency must look at both the probabilities of potentially harmful events and the consequences if those events come to pass”). The NRC’s analysis was therefore sufficient to comply with NEPA.

3. The GEIS Assesses the Cumulative Impacts of the Continued Storage of Spent Nuclear Fuel

The NRDC argues that the GEIS fails to discuss the cumulative impacts of continued storage of spent nuclear fuel “when added to other past, present, and reasonably foreseeable future actions” 40 C.F.R. § 1508.7. We disagree.

While it is true that NEPA requires an agency to consider “cumulative or synergistic environmental impact[s]” of related, concurrently pending proposals, *Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976), “the purpose of the cumulative impact requirement is to prevent agencies from dividing one project into multiple individual actions each of which has an insignificant environmental impact, but which collectively have a substantial impact,” *Theodore Roosevelt I*, 616 F.3d at 514 (citation and internal quotation marks omitted). In this case, there are no concurrently pending proposals before the NRC because the NRC is not licensing any reactors. Instead, the NRC has codified the GEIS for use in future licensing proceedings. The GEIS also includes a detailed discussion of the cumulative impacts of continued storage of spent fuel over the lifetime of a licensed reactor. *See* J.A. 628-93. Pursuant to its “tiered” approach to assessing environmental impacts, *see* 40 C.F.R. § 1502.20, the NRC also considers the environmental impacts of waste disposal through 10 C.F.R. § 51.51, Table S-3, prior to any licensing action. *See also* J.A. 351, 1297. Because there is no

indication that the NRC has improperly segmented its environmental impact analysis, we deny the petitions on this issue.

4. The NRC Did Not Ignore Short-Term, High-Volume Leaks

The States argue that the NRC unreasonably “assumed” that short-term, high-volume pool leaks have no environmental consequences. While styled as a challenge to the NRC’s assumptions in the GEIS, the crux of the dispute is with the NRC’s assessment of the probability and consequences of short-term, high-volume leaks. Because we hold that the NRC adequately considered the risks of short-term, high-volume leaks, we deny the petitions.

The GEIS extensively analyzes the impacts of short-term, high-volume leaks in addition to historic data on spent fuel leakage. *See* J.A. 839-55. In particular, the NRC notes that “[s]pent fuel pool leaks, while unpredictable, seldom occur.” J.A. 839. Furthermore, NRC regulations require plant licensees to monitor reactor sites, thereby increasing the likelihood of high-volume leak detection. *See, e.g.*, 10 C.F.R. §§ 20.1501, 50.65; *see also* J.A. 836-37, 840, 1397-98. We therefore find nothing in the record to suggest that the NRC arbitrarily or capriciously disregarded the risks of short-term, high-volume leaks.

5. The NRC’s Waiver Process Ensures Consideration of Site-Specific Impacts

Finally, we note that the NRC’s regulations already provide a means by which the petitioners can raise site-specific challenges during licensing proceedings. Specifically, under 10 C.F.R. § 2.335(b), “[a] participant to an adjudicatory proceeding [before the NRC] . . . may petition

that the application of a specified Commission rule or regulation or any provision thereof...be waived or an exception be made for the particular proceeding.” The standard by which the NRC will grant such a petition “is that special circumstances with respect to the subject matter of the particular proceeding are such that the application of the rule or regulation (or a provision of it) would not serve the purposes for which the rule or regulation was adopted.” *Id.* We hold that the NRC’s waiver provision provides an adequate mechanism by which the petitioners can challenge the GEIS in site-specific proceedings.

The petitioners raise two objections to the NRC’s waiver provision. First, they argue that the waiver provision shifts the burden of NEPA compliance from the NRC to the party requesting waiver. Second, the petitioners characterize the waiver process as “illusory.” States’ Br. 34. Neither argument is persuasive. First, for the reasons stated above, *see supra* Part II.B.1-4, the GEIS fulfills the NRC’s NEPA obligation to analyze the impacts of the continued storage of spent nuclear fuel. The NRC, in the GEIS, has therefore presented sufficient evidence to carry its burden of persuasion under NEPA that the impacts of continued storage of spent nuclear fuel are generic to all licensed reactors. The burden of production therefore necessarily shifts to the parties raising objections to provide substantial evidence demonstrating that the GEIS neglects those site-specific considerations, thereby obstructing the GEIS’s purpose “to preserve the efficiency of the NRC’s licensing process” 79 Fed. Reg. at 56,239. Of course, the NRC always retains the burden of persuasion under NEPA to consider fully the environmental impacts and alternatives for its proposed action. *See* 42 U.S.C. § 4332(C); 40 C.F.R. § 1502.1.

Second, the NRC conceded during oral argument that we have jurisdiction to review its decision to deny a waiver petition under 10 C.F.R. § 2.335(b). *See* Oral Arg. Rec. 48:11-:40; *see also* *NRDC v. NRC*, 2016 WL 1639661, at *12 (considering whether the NRC properly denied a waiver petition); *cf. Massachusetts v. NRC*, 708 F.3d 63, 74 & n.17 (1st Cir. 2013) (same). Although we have stated that the NRC’s decision whether to grant a waiver petition “is entitled to deference,” that deference extends only so far as the NRC’s decision is not arbitrary or capricious. *NRDC v. NRC*, 2016 WL 1639661, at *12. Therefore, we expect that the NRC will give due consideration to waiver petitions raising non-frivolous site-specific challenges to reactor licensing. *Cf.* 79 Fed. Reg. at 56,242 (stating that “concerned parties who meet the waiver criteria in 10 C.F.R. § 2.335 *will* be able to raise site-specific issues related to continued storage at the time of a specific license application” (emphasis added)). Furthermore, the petitioners retain the ability to petition the NRC for a rulemaking to amend the GEIS. *Cf. NRDC v. NRC*, 2016 WL 1639661, at *5, *12. “Although rulemaking is far from the fastest route, it has transparency, extensive public input, and broad application to recommend it.” *Id.* at *12. We believe these protections are sufficient to prevent the NRC’s waiver process from becoming “illusory.”

Accordingly, we deny the petitions for review.

C. THE NRC’S ASSUMPTIONS ARE NOT ARBITRARY OR CAPRICIOUS

The States and the NRDC contend that the NRC utilized several unreasonable assumptions, including: (1) that spent nuclear fuel will be removed from spent-fuel pools within sixty years of reactor decommissioning; (2) that after the sixty-year period, spent fuel will be stored in dry casks that

are replaced every one hundred years; and (3) that institutional controls over spent nuclear fuel will exist into perpetuity. We hold that none of these assumptions is so unreasonable as to render the NRC's decision-making arbitrary or capricious. We therefore deny the petitions for review on this issue.

An agency does not engage in arbitrary or capricious decision-making by making "predictive judgment[s]" or even by relying on "[i]ncomplete data." *New York v. EPA*, 413 F.3d 3, 31 (D.C. Cir. 2005). To the contrary, such judgments are "entitled to deference," *id.*, and a challenge to the agency's assumptions must be more than "an effort by [a petitioner] to substitute its own analysis" for the agency's, *Transmission Access Policy Study Grp. v. FERC*, 225 F.3d 667, 737 (D.C. Cir. 2000). In this case, the NRC's assumptions in the GEIS are ably supported by the record.

First, NRC regulations already mandate removal of spent nuclear fuel within sixty years of the expiration of a reactor license. *See* 10 C.F.R. § 50.82(a)(3). Furthermore, as the NRC noted in its responses to comments, "(1) there is no need to cool spent fuel in a pool for more than 60 years after a reactor stops operating; (2) operational costs associated with pool storage exceed dry cask storage costs; and (3) experience with decommissioning of nuclear power plants indicates that spent fuel pools are decommissioned before the end of the 60-year period." J.A. 1093. According deference to the NRC's predictive judgments, we hold that the agency's assumption regarding the timeframe for the removal of spent nuclear fuel is reasonable.

Second, the NRC's assumption about the timeframe for dry cask storage and replacement is conservative. The NRC concluded that "the 100-year replacement period provides a

reasonable timeframe for the routine replacement of dry storage systems, and that actual storage facility replacement will be needed less frequently than assumed in the GEIS.” *Id.* The agency also noted the “low degradation rates for dry cask storage systems.” J.A. 1056. Furthermore, the NRC analyzed the costs of dry cask replacement. *See* J.A. 397-98. This assumption in the GEIS is therefore reasonable.

Third, the record demonstrates that assuming the continuation of institutional controls is both reasonable and necessary. The NRC acknowledged that the impacts of a failure in institutional controls would be “catastrophic.” J.A. 794, 798-99. Despite that conclusion, the agency also found that the probability of institutional controls failing is “remote.” J.A. 794; *see also* J.A. 796 (noting that it is unlikely that the government would abandon continued storage facilities and that those facilities are “highly visible”). Furthermore, this assumption facilitates the assessment of foreseeable environmental impacts from the continued storage of spent nuclear fuel. *See* J.A. 794-95; *see also* J.A. 1094-1100.

We therefore deny the petitions for review on this issue.

III. CONCLUSION

We acknowledge the political discord surrounding our nation’s evolving nuclear energy policy. But the role of Article III courts in this debate is circumscribed. “The scope of review under the ‘arbitrary and capricious’ standard is narrow and a court is not to substitute its judgment for that of the agency.” *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins.*, 463 U.S. 29, 43 (1983). To the extent that the petitioners disagree with the NRC’s current policy for the

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continued storage of spent nuclear fuel, their concerns should be directed to Congress.

For the reasons stated herein, the Court denies the petitions for review.

So ordered.