

From Waste Confidence to Continued Storage: Legal theories supporting the US NRC's licensing of nuclear facilities without a repository

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In *New York v. Nuclear Regulatory Commission* (New York 2012),¹ the US Court of Appeals for the District of Columbia (DC) Circuit vacated the 2010 update to what was commonly known as the US Nuclear Regulatory Commission's (NRC or Agency) "Waste Confidence Decision". The Waste Confidence Decision was premised upon the NRC's professed confidence that spent nuclear fuel could and eventually would be disposed of in an underground repository and that spent fuel could be stored safely and without significant environmental consequence until that time. For decades, the decision had provided legal support for the Agency's issuance and renewal of licences for power reactors to operate, even as the process for licensing and constructing a repository in the United States became delayed and ultimately stalled (as it remains today). The court ruled in *New York 2012* that the NRC's continued reliance upon its Waste Confidence Decision to support these licensing decisions was inconsistent with the US National Environmental Policy Act (NEPA), which requires US federal agencies to consider the full panoply of the environmental impacts of certain "major federal actions" (including decisions to licence nuclear facilities).² The court required the Agency to further develop its analysis of the impacts of storing spent fuel for an extended period of time and to address the possibility of a repository not becoming available.

In the wake of the decision in *New York 2012*, the NRC suspended making final decisions on applications for reactor licences and spent fuel storage facilities until it performed an analysis that addressed the infirmities that had been identified by the DC Circuit. The Agency's analysis resulted in the preparation and publication in 2014 of a Generic Environmental Impact Statement (GEIS)³ describing the impacts of spent fuel storage across a variety of scenarios for repository availability, including one in which no repository is ever constructed. Concurrently, the NRC adopted a regulation, known as the NRC's "Continued Storage Rule", providing that for purposes of NEPA, the impacts identified in the GEIS constitute the post-operation fuel-storage-related impacts that can be reasonably expected to occur as a consequence of the issuance of a licence to operate a reactor or spent fuel storage facility anywhere in the

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1. 681 F.3d 471 (DC Cir. 2012).
2. National Environmental Policy Act of 1969, as amended (NEPA), Pub. L. 91-190, 42 USC 4321-4347.
3. NRC (2014), *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*, NUREG-2157, NRC, Washington, DC.

United States.⁴ The Commission also issued an adjudicatory decision in 2015 affirming the NRC's authority to issue licences under the US Atomic Energy Act (AEA), which requires licensees to demonstrate that they can operate proposed facilities in a manner consistent with the public health and safety and common defence and security, even in the absence of meaningful progress towards repository construction.⁵

The NRC's resolution of the legal issues arising under NEPA – through its preparation of a GEIS and its adoption of the Continued Storage Rule – and the AEA – through the issuance of an adjudicatory decision – cleared the way for the Agency to resume final reactor and spent fuel storage licensing decisions after the ruling in *New York 2012*. Since August 2014, the NRC has issued eight new and renewed licences for power reactors and spent fuel storage installations that rely on the analysis contained in the GEIS. And the Agency's approach to resolving the NEPA deficiencies identified in *New York 2012* was upheld by the US Court of Appeals for the District of Columbia Circuit in a second *New York v. NRC* case (*New York 2016*).⁶

This article examines the history of the NRC's Waste Confidence Decision, the Agency's efforts to cure the legal deficiencies that were identified in the decision in *New York 2012* and the legal challenges that were raised both in court and before the NRC to the Agency's resumption of reactor licensing following its adoption of the Continued Storage Rule.

I. NRC's Waste Confidence Decision

The first US commercial nuclear power reactor began operating in 1958. It was originally assumed that the waste generated as a result of such operations – specifically, so-called spent nuclear fuel – would be cooled in spent fuel pools and shipped offsite for reprocessing. However, reliance upon reprocessing as a solution to the waste issue faded over time, and reprocessing has largely been abandoned in the United States as a viable alternative.

In 1976, as concern mounted that no viable solution to the waste problem was on the horizon, the Natural Resources Defense Council (NRDC), a US non-governmental environmental group, filed a petition requesting that the NRC conduct a “rulemaking” – one of the primary avenues through which US federal agencies formulate policy – to determine whether spent fuel “can be generated in nuclear power reactors and subsequently disposed of without undue risk to the public health and safety”.⁷ NRDC asserted that, without this determination, the Agency should refrain from making final decisions on pending or future requests for operating licences. The NRC denied NRDC's petition and found that, as a matter of statutory interpretation, the AEA did not require it to make the finding concerning disposal feasibility that NRDC requested as a prerequisite to reactor licensing.⁸

In denying the petition, the NRC acknowledged that it had certain obligations under the AEA with respect to spent fuel storage at the time of a reactor licensing decision, but that applicants need not have a developed plan for spent fuel disposal.⁹ Specifically,

4. 10 *Code of Federal Regulations* (CFR) 51.23.

5. *DTE Electric Co. (Fermi Nuclear Power Plant, Unit 3)*, CLI-15-4, 81 NRC 221 (26 Feb. 2015); Pub. L. No. 83-703, 68 Stat. 919 (original text of the 1954 Act). The AEA, as amended, is codified at 42 USC 2011–2021, 2022–2286i, 2296a–2297h-13.

6. 824 F.3d 1012 (DC Cir. 2016).

7. Natural Resources Defense Council, Inc.; Filing of Petition for Rulemaking, 42 *Federal Register* (Fed. Reg.) 2730 (13 Jan. 1977).

8. Natural Resources Defense Council, Inc.; Denial of Petition for Rulemaking, 42 Fed. Reg. 34391 (5 July 1977).

9. *Ibid.*, p. 34391.

the NRC explained that at the time a licence is issued, the Agency must “be assured that the wastes generated by licensed power reactors can be safely handled and stored as they are generated”.¹⁰ And as part of the reactor licensing process, the NRC noted, an applicant must submit information to allow the Agency to conclude that “the design provides for safe methods for interim storage of spent nuclear fuel” pending a plan for final disposition.¹¹ Given the AEA’s textual focus during the licensing process on the safety of licensed operations, however, the Commission determined that the statute (combined with the US Congress’s awareness over time that a solution to the waste problem had still not been developed) did not require the Agency to make, as a precondition to licensing, an express determination that spent fuel generated during operation could be disposed of safely.¹²

The denial of NRDC’s petition also included a separate section containing “policy considerations”. In that discussion, the Agency stated that, independent of what it is legally empowered to do under the AEA, it would not continue to license reactors if it “did not have reasonable confidence that [spent fuel] can and will in due course be disposed of safely”. The Agency explained that its “implicit” finding that methods of safe permanent disposition were available could be “readily distinguished” from the type of safety findings that the Agency is called upon to make during the course of reactor licensing under the AEA and that any finding in this regard “would not have to be a definitive conclusion that permanent disposal of high-level wastes can be accomplished safely at the present time”.¹³

NRDC appealed the Agency’s denial of its petition, but the US Court of Appeals for the Second Circuit affirmed the NRC’s decision and endorsed the Agency’s conclusion that the AEA does not, as a prerequisite to licensing, require a finding of reasonable assurance that “highly hazardous and long-lived radioactive materials can be disposed of safely”.¹⁴ The court concluded that by seeking to require an express finding concerning safe disposal prior to licensing, NRDC had “simply read [...] too much into the [AEA]”.¹⁵

In addition to recognising that the text of the AEA does not mandate a specific finding concerning the safety of spent fuel disposal, the court relied on the US Congress’s decades-long tacit approval of nuclear power plant (NPP) licensing even in the absence of a plan for disposal. The court explained that if NRDC’s view of the AEA were correct, it would be “incredible that [the NRC and its predecessor Agency] would have been violating the AEA for almost twenty years with no criticism or statutory amendment by Congress, which has been kept well informed of [disposal] developments”.¹⁶ Accordingly, the court determined that it was “fair to read this history as a [d]e facto acquiescence in and ratification of the Commission’s licensing procedure by Congress”.¹⁷

The court did not rest its decision solely on the legislative history of the AEA or on tacit congressional approval of reactor licensing absent safety findings for a repository. “[I]f there were any doubt over the intent of Congress” not to require a safety finding on spent fuel disposal, the court explained, it was “persuaded that the

10. *Ibid.*

11. *Ibid.*

12. *Ibid.*, pp. 34391-93.

13. *Ibid.*, p. 34393.

14. *Natural Resources Defense Council, Inc. v. NRC*, 582 F.2d 166, 168 (2d Cir. 1978).

15. *Ibid.*, p. 171.

16. *Ibid.*

17. *Ibid.*, pp. 171-72.

matter was laid to rest by enactment of the Energy Reorganization Act of 1974” (ERA).¹⁸ The court noted that in the ERA,

Congress [had] expressly recognized and impliedly approved NRC’s regulatory scheme and practice under which the safety of interim storage of [spent fuel] at commercial nuclear power reactor sites has been determined separately from the safety of ... permanent storage facilities which have not, as yet, been established.¹⁹

Although NRDC’s arguments did not change the NRC’s licensing practice, it did not take long for the issue of spent fuel storage and disposal to return to the courts. In *Minnesota v. NRC*, two groups of petitioners filed suit in the Court of Appeals for the DC Circuit challenging the NRC’s approval of amendments to two NPP operating licences to allow for the use of higher-density spent-fuel-storage racks in the reactors’ spent fuel pools, asserting that the NRC could not grant the amendments without assurance that the wastes generated by the plants could be safely disposed of.²⁰

The petitioners’ arguments in *Minnesota v. NRC* garnered the court’s attention. The court observed that the Second Circuit had recently ruled in the 1978 NRDC case that “Congress did not intend in enacting the Atomic Energy Act to require a demonstration that nuclear wastes could safely be disposed of before licensing of nuclear plants was permitted”, and it did not expressly disagree with that result.²¹ But, referring to the language in the policy statement accompanying the NRC’s denial of the petition for rulemaking filed by the NRDC, the court expressed concern that the “reasonable confidence” conclusion contained in the NRC’s denial of the NRDC’s rulemaking petition was not supported by “the kind of comprehensive inquiry into ... disposal solutions that would be required to give content to a ‘generic’ determination”.²² Accordingly, the court directed the NRC to determine:

whether there is reasonable assurance that an off-site storage solution will be available by [the end of the licence term of the reactor licences at issue, namely 2007 and 2009], and if not, whether there is reasonable assurance that the fuel can be stored safely at the sites beyond those dates.²³

The court’s decision in the *Minnesota* case led to what the NRC termed its “Waste Confidence” proceeding, a rulemaking that generically assessed the environmental and safety implications of continued storage. This rulemaking culminated in a series of findings, known as the “Waste Confidence Decision”, concerning, first, whether high-level radioactive waste “can be safely disposed of” and “when such disposal or off-site storage will be available”; and second, “whether radioactive wastes can be safely stored on-site past the expiration of existing facility licences until off-site disposal or storage is available”.²⁴ The Agency’s analysis contained five formal findings:

18. *Ibid.*, p. 174.

19. *Ibid.*; see 42 USC 5801-5891.

20. *Minnesota v. NRC*, 602 F.2d 412 (DC Cir. 1979).

21. *Ibid.*, p. 417.

22. *Ibid.*

23. *Ibid.*, p. 418. “Reasonable assurance” has long been the safety standard employed by NRC in licensing under the AEA. See, e.g., *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 US 519, 527 n.5 (1978); 10 CFR 50.57(a)(3) (requiring the NRC to find, in approving an operating licence, that “[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”).

24. *Storage and Disposal of Nuclear Waste; Notice of Proposed Rulemaking*, 44 Fed. Reg. 61372, 61373 (25 Oct. 1979).

(1) The Commission finds reasonable assurance that safe disposal of high-level waste and spent fuel in a mined geologic repository is technically feasible.

(2) The Commission finds reasonable assurance that one or more mined geologic repositories for commercial high-level waste and spent fuel will be available by the years 2007-2009 and that sufficient repository capacity will be available within 30 years beyond the expiration of any reactor operating license to dispose of existing commercial high-level waste and spent fuel originating in such reactor and generated up to that time.

(3) The Commission finds reasonable assurance that high-level waste and spent fuel will be managed in a safe manner until sufficient repository capacity is available to assure the safe disposal of all high-level waste and spent fuel.

(4) The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of that reactor's operating license at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations.

(5) The Commission finds reasonable assurance that safe independent onsite or offsite spent fuel storage will be made available if such storage capacity is needed.²⁵

The findings were accompanied by a new regulation, 10 CFR 51.23, that applied the findings of no significant environmental impact to each applicable licensing proceeding and obviated the need for further NEPA analysis related to post-operation spent fuel storage in individual licensing proceedings.²⁶

While the NRC was engaged in its Waste Confidence rulemaking, the US Congress set about finding a solution to the nuclear waste problem. Its efforts led to passage of the Nuclear Waste Policy Act of 1982 (NWPAct), which established the US federal government's policy to dispose of high-level radioactive waste in one or more deep geologic repositories, which were to be funded by a surcharge on the generation of electricity at nuclear facilities.²⁷ In 1987, Congress designated Yucca Mountain in the state of Nevada as the single site for further study, and it subsequently designated that site for the development of a geologic repository.²⁸

Despite the intent expressed during the enactment of the NWPAct that a repository would commence operations in 1998, it soon became apparent that a repository (though not necessarily a federal interim storage facility) would be delayed. It also became apparent during the same time frame that many reactor licensees that received their licences during the 1960s and 1970s would be seeking to renew their licences. Accordingly, in 1990, the NRC revisited its Waste Confidence Decision and

25. Waste Confidence Decision, 49 Fed. Reg. 34658, 34659-60 (31 Aug. 1984).

26. See Requirements for Licensee Actions Regarding the Disposition of Spent Fuel Upon Expiration of Reactor Operating Licenses; Final Rule, 44 Fed. Reg. 34688, 34694 (31 Aug. 1984). The rule did not address the environmental impacts of storage during the life of each reactor.

27. 42 USC 10131, 10222. The Act authorised the US Department of Energy to enter into contracts with the generators of spent nuclear fuel providing for the Department to begin spent fuel acceptance commencing no later than 31 January 1998. *Ibid.* As a consequence of the delay in the development of a repository (for which a still-pending application was ultimately submitted in 2008), the US government has been deemed to be in breach of its contractual obligations and has paid and continues to pay damages to spent fuel generators for the cost of constructing and maintaining additional facilities to store spent fuel until a repository becomes available. See generally *Carolina Power & Light Co. v. United States*, 573 F.3d 1271 (Fed. Cir. 2009).

28. See 42 USC 10135, 10172.

updated the findings to reflect a new expected date for a repository to become available (“the first quarter of the twenty-first century”) and to include a 30-year licence renewal term in its analysis (i.e. to expand its determination concerning how long spent fuel could be stored on the site of a power reactor both safely and without environmental impact so as to include not just a single term of reactor operation, but a 30-year renewed term as well).²⁹

In 2010, with progress on a repository still delayed (as it remains today), the NRC determined that the “first quarter of the twenty-first century” prediction for repository availability contained in its 1990 update might not be accurate. Accordingly, the NRC issued another update that removed the anticipated date for repository availability altogether (explaining instead that a repository would be available “when necessary”) and expanded the time frame for safe and environmental-impact-free storage from 30 to 60 years after the end of the reactor’s licence term.³⁰

This update renewed the fears of those concerned about licensing plants without an operational spent fuel disposal programme. In 2010, four US states (Massachusetts, New Jersey, New York and Vermont), an Indian Tribe and a group of environmental organisations filed suit before the US Court of Appeals for the DC Circuit challenging the update to the Waste Confidence Decision. Calling attention to the political, legal and technical challenges that had been encountered in the efforts to license and construct a repository, these petitioners asserted that the NRC lacked a basis upon which to conclude that a repository would be available “when necessary”. They further asserted that certain aspects of the Agency’s conclusions concerning the storage of fuel pending repository availability were insufficient because, among other things, they had inadequately assessed the potential for spent fuel pool leakage and fires.

In 2012, the DC Circuit issued its decision in the first New York case, agreeing in substantial part with the challengers’ assertions. The court expressed doubt that the storage of fuel onsite in cases was, as the NRC characterised it, merely “temporary”, and it suggested that the Agency “apparently has no long-term plan other than hoping for a geologic repository”.³¹ The court vacated the NRC’s 2010 Waste Confidence update and found that the Agency had not satisfied its obligations under NEPA with respect to three issues: 1) the Agency did not consider the environmental impacts of a repository never becoming available; 2) the analysis of spent fuel pool leaks relied solely on past events and therefore was not forward-looking; and 3) the Agency had not sufficiently considered the consequences of spent fuel pool fires, notwithstanding the low risk that they would occur. In so doing, the court stressed that to satisfy its obligations under NEPA when licensing a reactor, the NRC was required to identify the reasonably foreseeable impacts that would be caused by licensed activity, including what the court perceived to be the non-remote possibilities that a repository would not be constructed or that a fire might occur in a reactor fuel pool, and that there might be leaks from fuel pools of a type that the Agency had failed to consider.³²

II. Development of the Continued Storage Rule and GEIS

In response to the court’s 2012 New York decision, the NRC considered revising the analysis underlying its Waste Confidence Decision and continuing to use the “findings” format developed in the Waste Confidence proceedings. The NRC

29. Waste Confidence Decision Review, 55 Fed. Reg. 38474 (18 Sept. 1990).

30. Waste Confidence Decision Update, 75 Fed. Reg. 81037 (23 Dec. 2010). The 60-year period corresponds to the maximum amount of time in which NRC licensees are permitted to decommission their facilities following licensed operation. See 10 CFR 50.82.

31. 681 F.3d 471, 474, 479 (DC Cir. 2012)

32. *Ibid.*, pp. 479-83.

recognised, however, both that the findings format was neither imposed by the court in *Minnesota v. NRC* nor used elsewhere, and that some of the language employed in the findings, particularly insofar as it adopted the AEA's "reasonable assurance" language, might have become confusing. Accordingly, the NRC concluded that a traditional and comprehensive NEPA analysis – in the form of an environmental impact statement (EIS) – would be a more effective vehicle for identifying the environmental impacts of continued storage.³³ Additionally, the Agency determined that employing an EIS to identify the impacts of continued storage would allow it to follow both the format used for similar analyses in licensing NPPs and the generic format used for analysis of environmental impacts in licence renewal proceedings.³⁴

Having chosen a new approach, the Agency embarked upon a two-year process to analyse the environmental impacts of continued storage and address several specific concerns identified by the court. The NRC published a proposed rule and draft GEIS in September 2013 and invited comments from the public.³⁵ As part of this effort, the NRC duly considered and, as appropriate, responded to over 1 000 unique written comment submissions as well as comments conveyed during 13 public meetings, held near NPPs across the United States. The final GEIS was issued in August 2014, along with a new Continued Storage Rule codified at 10 CFR 51.23. The rule makes clear that the analysis in the GEIS represents the Agency's determination, on a generic basis, of the post-operation fuel-storage impacts that are reasonably likely to result from a decision to issue a new or renewed licence from a power reactor anywhere in the US.³⁶ By design, the GEIS is to be used as one portion of the broader environmental analysis – the analysis pertaining to the impacts of storing spent fuel after the licensed life of a reactor – that must be undertaken each time the NRC issues a power reactor licence (including a reactor operating licence, a reactor combined licence, an early site permit or an independent spent fuel storage installation licence).

The GEIS includes discussions of the impacts of at-reactor and away-from-reactor storage, supporting appendices and responses to comments. The impacts to 17 separate resource areas, as well as impacts to these resources caused by accidents and acts of terrorism, are discussed in detail.³⁷ The NRC concluded that the impacts of continued storage, both direct and indirect, "will not vary significantly across sites, despite variations in site-specific characteristics", rendering a generic approach

33. As a general matter, NEPA requires US agencies undertaking "major federal actions" (whether on their own behalf or, as in the case of the NRC, when it issues a permit or licence to an applicant), to identify the reasonably foreseeable environmental impacts that are likely to result from a proposed action. 42 USC 4332. This process serves the dual purpose of ensuring that environmental considerations are taken into account as the Agency makes its decision and of fostering communication with the affected public concerning contemplated action. See generally *Robertson v. Methow Valley Citizens Council*, 490 US 332, 348-51 (1989). Notably, NEPA does not require an Agency to refrain from a particular action if environmental impacts are likely to result; it merely requires the Agency, as part of its decision-making process, to identify these impacts and to discuss ways in which adverse impacts might reasonably be mitigated. See *ibid.*

34. See License Renewal of Nuclear Power Plants; Generic Environmental Impact Statement and Standard Review Plans for Environmental Reviews, 78 Fed. Reg. 37325 (20 June 2013); 10 CFR Part 51, Subpart A, Appendix B.

35. Waste Confidence – Continued Storage of Spent Nuclear Fuel; Proposed Rule, 78 Fed. Reg. 56776 (13 Sept. 2013).

36. Continued Storage of Spent Nuclear Fuel; Final Rule, 79 Fed. Reg. 56238, 56263 (19 Sept. 2014).

37. The areas considered include land use, socioeconomics, environmental justice, climate and air quality, geology and soils, water resources (surface water and groundwater), ecological resources (terrestrial and aquatic), noise, aesthetics, waste management, transportation, and public and occupational health. NRC (2014), *supra* note 3, pp. xxxiv-xxxv.

appropriate.³⁸ The GEIS thus generically characterises impacts as small, moderate or large (and in some cases as a range), and it provides supporting explanation for each conclusion.³⁹

The identification of certain impacts, including the impacts of accidents, is informed by both the potential consequences and probability of the underlying events.⁴⁰ For example, the NRC specifically determined that the likely impacts of a fire in a spent fuel pool were small because, although the consequences could be “significant and destabilizing”, the probability of such an event is “extremely remote”.⁴¹

The Agency’s decision not to further update the “findings” of the Waste Confidence Decision enabled it to retire its historic practice of trying to predict the time frame for availability of a repository. Thus, instead of specifying its “confidence” in a specific date when a repository will become available, the GEIS analyses various repository-availability scenarios, including the possibility that a repository never becomes available.⁴² The GEIS analyses impacts for three postulated time frames: short-term, long-term and indefinite storage. The short-term time frame considers 60 years beyond the reactor’s licence term (including 2 20-year renewal terms, for a total of 80 years of operation); the long-term timeframe considers an additional 100 years; and the indefinite timeframe assumes that no repository becomes available.⁴³ The latter two scenarios assume that after the expiration of the short-term timeframe (during which fuel would be removed from spent fuel pools and placed into dry casks), reactor operators will be able to replace the casks using a dry transfer system and that this process would be repeated, as necessary, at 100-year intervals until the spent fuel is ultimately disposed of.⁴⁴ The NRC found repository availability

38. 79 Fed. Reg. at 56242.

39. For most resource areas, the impacts are designated as small. The GEIS indicates, however, that in certain scenarios, the impacts of continued storage caused by at-reactor storage may be “small to large” with respect to historic and cultural resources and may be “small to moderate” with respect to the generation of nonradioactive waste. NRC (2014), *supra* note 3, pp. xlvii-xlviii. For away-from-reactor storage, the GEIS also identifies several additional resource areas where the resources may be greater than small. *Ibid.*, p. lix. The same is true with respect to the GEIS’s evaluation of “cumulative impacts”, i.e. the effects of continued storage upon resource areas when added to the effects on those resources of other activities occurring within the same geographic areas. See *ibid.*, p. lx-lxi.

40. *Ibid.*, p. xxxiii.

41. *Ibid.*, Appendix F. Appendix F contains a description of the possible sequences of events that might occur in the event of a zirconium fire, including the exposure of the surrounding population and land, and estimates the number of early fatalities (within 10 miles, or approximately 16 kilometres) and latent fatalities (within 10 miles, or approximately 16 kilometres and 500 miles, or approximately 805 kilometres) that might result in the event that a fire occurred. These estimates are based on conservative (i.e. erring on the side of conditions that would result in greater consequences) assumptions. *Ibid.*, p. F-5.

42. *Ibid.*, p. xxx.

43. *Ibid.*, pp. xxx-xxxi. These scenarios govern the analysis to be applied on a going-forward basis each time the Agency issues a reactor licensing decision. Thus, for a new reactor licensing decision made in 2019 that utilises the GEIS, the short-term period would last from 2095 to 2159 (because it would begin in 80 years (after a 40-year term and 2 20-year renewals) and would end after another 60 years); the long-term period would begin in 2159 and end 100 years later; and the indefinite period would begin after the conclusion of the long-term period, i.e. in 2259. See *ibid.*, pp. 1-17.

44. *Ibid.*, p. xxxi. The GEIS describes the various dry transfer systems – i.e. systems that would enable the retrieval of fuel from dry casks for inspection or repackaging without a spent fuel pool – that have been evaluated in the United States over the last several decades. It notes that the NRC has previously concluded that the concept has not been tested through the licensing process but nonetheless “has merit”. *Ibid.*, pp. 2-20 to 2-24.

before the end of the short-term period to be “the most likely” scenario, though “not certain”, and it found the indefinite-timeframe scenario to be “highly unlikely”.⁴⁵

III. Legal challenges to the NRC’s current approach

A. Challenge under the National Environmental Policy Act

Publication of the GEIS in 2014 enabled the NRC to resume making final licensing decisions for reactor and spent-fuel-storage installation applications. A group of petitioners largely resembling the group that had prevailed in New York 2012, however, went back to the DC Circuit to challenge the NRC’s new framework, asserting that the Continued Storage Rule violated NEPA. In this case, known as New York 2016, the petitioners contended that, among other things, the impacts of continued storage could not be analysed generically; that the Agency failed to consider alternatives to spent fuel storage or to evaluate mitigation; and that the Agency made improper assumptions in support of its analysis. The petitioners specifically challenged the NRC’s assumptions that dry cask transfer systems will be available to replace existing systems (given that this technology does not currently exist), and they asserted that the NRC failed to provide sufficiently detailed analysis of the consequences of a failure to maintain “institutional controls” (i.e. the loss of governmental oversight) over such casks during a time span that could conceivably last tens or hundreds of thousands of years and in which civilisation and society as we know it today might not continue to exist.⁴⁶

The DC Circuit disagreed with each of the petitioners’ assertions.⁴⁷ The court first rejected the petitioners’ argument that the NRC’s promulgation of the Continued Storage Rule constituted a licensing decision requiring consideration of alternatives to plant licensing, including not licensing plants at all. Instead, the court agreed with the NRC’s argument that the impacts identified in the GEIS serve only as “input[s] for future site-specific reactor licensing”, such that alternatives to licensing are properly considered in connection in individual licensing proceedings. The court similarly ruled that “because mitigation is equally relevant during the licensed life of a reactor as it is during decommissioning, the NRC can defer consideration of such measures to site-specific review”. To this end, the court warned the Agency that it “take[s] the NRC at its word” that issues pertaining to alternatives and mitigation will be addressed each time a licence is issued that relies on the environmental analysis contained in the GEIS.⁴⁸

The court next declined the suggestion, advanced by New York and the states that joined its petition, that the generic analysis set forth in the GEIS is insufficient because it fails to employ conservative bounding assumptions in connection with its analysis of fires and leaks.⁴⁹ This argument relied in large part on site-specific variability

45. *Ibid.*, p. xxx.

46. In this regard, petitioners relied heavily on a NEPA analysis prepared by the US Department of Energy in connection with its application to construct a repository at Yucca Mountain, in which the Department of Energy estimated that, if no action were undertaken with respect to spent fuel stored at reactor sites, 1 000 latent cancer deaths were likely to take place over a 10 000-year period due to the entry of radionuclides into the accessible environment, with potentially even higher fatality rates in the years thereafter. US Department of Energy (2008), *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*, DOE/EIS-0250F-S1, DOE, Washington, DC, p. S-51.

47. New York 2016, 824 F.3d 1012 (DC Cir. 2016).

48. *Ibid.*, pp. 1017-18.

49. *Ibid.*, pp. 1019-20.

among plants (such as the population concentration near the Indian Point plant in New York and the particular susceptibility of the California coastline to seismic risk). The court accepted the Agency's conclusion that generic analysis was still possible, given the bounding nature of the NRC's analysis.⁵⁰ The court recognised that, even if the analysis in the GEIS is not bounding in the strictest sense, the Agency still properly reached a generic determination with respect to these issues because its analysis was "thorough and comprehensive" and identified impacts that are essentially common to all plants.⁵¹

In so doing, it accepted the NRC's arguments that its waiver and rulemaking processes⁵² ensure the ability to raise site-specific considerations or other information that would warrant departure in appropriate circumstances from the impacts identified in the GEIS and codified by the Continued Storage Rule. With respect to the last point, the court emphasised that it expected the NRC to give "due consideration" to waiver requests, the denial of which would be subject to judicial review.⁵³

Finally, the court rejected the petitioners' challenges to some of the assumptions upon which the impacts identified in the GEIS were based. Relying on the Agency's technical expertise and noting that its technical conclusions were entitled to deference, the court found reasonable the Agency's assumptions that spent fuel would be removed from spent fuel pools within 60 years and placed into dry storage; that dry casks would be replaced every 100 years (even if dry cask transfer technology is not presently available); and that institutional controls would be maintained.⁵⁴ The court specifically noted that assuming the maintenance of institutional controls facilitates the assessment of the impacts of continued storage and that, in any event, the Agency recognised in the GEIS that the loss of such controls would have "catastrophic" impacts akin to, though not necessarily quantitatively the same as, those that had been previously identified by the US Department of Energy.⁵⁵ And ultimately the court concluded that while there is "political discord surrounding the [the US's] evolving nuclear energy policy", concerns about the NRC's authority to continue issuing licences in the absence of a repository "should be directed to Congress" and not the courts.⁵⁶

B. Challenge under the Atomic Energy Act

In addition to participating in the legal challenge to the Continued Storage Rule in New York 2016, several environmental groups also responded to the Agency's actions by reasserting their challenge (previously raised and rejected in the 1978 NRDC decision) to the Agency's ability to continue to license plants under the AEA in the absence of findings concerning the safe storage of nuclear waste in a repository. These organisations raised these challenges before the Commission in several then-pending licensing proceedings. The AEA-based argument they raised, however, fared no better than the NEPA-based challenge that they filed in court. The Commission adhered to its position concerning the scope of the AEA, ruling that

at no time have we, Congress, or the courts articulated the view that the Atomic Energy Act requires a "finding" or "predictive safety findings" regarding the disposal of spent fuel in a repository as a prerequisite to issuing a nuclear

50. *Ibid.*, p. 1020.

51. *Ibid.*

52. 10 CFR 2.335(b), 2.802(e).

53. New York 2016, 824 F.3d at 1019-20, 1021-22.

54. *Ibid.*, p. 1023.

55. *Ibid.*, pp. 1022-23.

56. *Ibid.*, p. 1023.

reactor license. We see no reason to alter our long-standing interpretation of the Atomic Energy Act.⁵⁷

The Commission's decision largely recounted and endorsed the analysis of the AEA set forth in the Second Circuit's decision in the NRDC case. Echoing the view expressed in 1978, the Commission reiterated that Congress could have determined, had it desired, to strip the NRC of licensing authority in light of the lack of progress on a repository. It further observed that the years since 1978 had afforded numerous additional opportunities for Congressional action, and that Congress had nonetheless determined not to alter the status quo.⁵⁸

The Commission also provided additional context for the language contained in the "policy statement" it issued in 1978, concluding that it continued to adhere to the view that a repository was technically feasible:

When considered within the context of our denial of the petition for rulemaking, it is clear that the statement at issue was nothing more than what it purported to be: a statement of our policy regarding the licensing of nuclear power plants and our confidence in the availability of a disposal solution.⁵⁹

And the Commission explained that the delays in repository progress were attributable to political, rather than technical, issues:

[A]s the technical agency entrusted by Congress to make determinations of this sort, we have concluded – without qualification – that a geologic repository is technically feasible. As we acknowledged in the Continued Storage GEIS, the uncertainty in spent fuel disposal lies not with the technical feasibility of long-term storage and disposal, but with the political and societal factors that continue to delay the construction of a repository. We recognized this uncertainty in the Continued Storage GEIS by analyzing the possibility that a repository will never become available.⁶⁰

The Commission further noted that its determination concerning the feasibility of a safe permanent disposal programme was derived from numerous sources, both in the United States and internationally, and was based on both research and concrete examples of disposal technology proving effective:

Our analysis in the Continued Storage GEIS builds on decades of experience and multiple rulemaking proceedings. Specifically, our conclusion finds support in ongoing research in the United States and abroad, along with the ability to characterize and quantitatively assess the capabilities of geologic and engineered barriers, experience gained from the Staff's review of the Department of Energy's construction authorization application for a repository at Yucca Mountain, disposal activities at the Waste Isolation Pilot Plant, and continued progress toward a repository in other countries. Indeed, contrary to the situation that accompanied the issuance of the initial Waste Confidence Decision, our regulatory framework now includes specific standards and

57. DTE Electric Co. (Fermi Nuclear Power Plant, Unit 3), CLI-15-4, 81 NRC 221, 232 (26 Feb. 2015). Originally, the environmental group petitioners in New York 2016 notified the DC Circuit that they planned to raise the arguments raised in the DTE Electric adjudication as part of their challenge to the Continued Storage Rule. However, they opted not to raise these arguments in their briefs, and the issue was not pursued further in court.

58. *Ibid.*, p. 234.

59. *Ibid.*, p. 235.

60. *Ibid.*, p. 237.

requirements for licensing the storage of spent fuel and, in the case of Yucca Mountain, standards for licensing a repository.⁶¹

Finally, the Commission explained that it had both the legal tools and the expertise to ensure that spent fuel can be stored safely, even in the scenario (which it acknowledged as a possibility) that no repository becomes available. In so doing, it emphasised three important points. First, it stressed its ability to adapt its regulatory processes:

[O]ur regulatory process is dynamic: we continue to revise and refine our regulatory regime as our technical knowledge and experience grows. Thus, we rely both upon our ability to ensure that licensees conform to existing regulations and upon our comprehensive regulatory scheme that takes into account the length of time during which, and the conditions under which, the storage of spent fuel will occur.... We expect that our regulatory process will not be static and will continue to evolve in the future.⁶²

Second, it recognised its responsibility to ensure safety regardless of progress towards a repository:

Disposal in a deep geologic repository remains the option that Congress has selected for addressing the problem of spent nuclear fuel, and we have neither a mandate nor a reason to question this determination. For the reasons stated in the Continued Storage GEIS, we believe that a geologic repository is technically feasible and that, with sufficient political and societal commitment, a repository can become available within 25–35 years. But we have no crystal ball. We recognize, as we did in 1977, that the hazards associated with spent fuel could become acute at some distant time. We also recognize, as we must, that our statutory mission only confers upon us the authority to license, and not to construct, a permanent repository. Thus, our statutory obligation to ensure the adequate protection of public health and safety encompasses an ongoing responsibility to regulate the continued storage of spent fuel, with or without a repository. Our long history with these issues (including our ability to adapt our regulatory processes based upon changing circumstances) continues to support our conclusion that safe, permanent disposal of spent nuclear fuel is technically feasible and that spent fuel can be safely stored until a repository is available, or indefinitely should such storage become necessary.⁶³

And, third, it reaffirmed its view that continuing to license NPPs even in the absence of repository progress was consistent with the intent of the US Congress:

Congress has entrusted this agency to ensure adequate protection of public health and safety by granting us the authority to condition licenses and to enforce our regulations. In our view, licensing production and utilization facilities now and relying upon our overall regulatory regime to address both ongoing safe storage and the construction of a repository in the future does not constitute an abdication of our statutory obligations. Rather, we understand these actions to be precisely what Congress intended when it both authorized the NRC to issue licenses for nuclear power plants and granted the agency broad regulatory and enforcement authority to protect the public health and safety and common defense and security.⁶⁴

61. *Ibid.*, p. 238.

62. *Ibid.*, p. 241.

63. *Ibid.*, pp. 241-42.

64. *Ibid.*, p. 242.

C. Conclusion

Although there has been some progress in recent years towards one or more consolidated interim storage facilities in the United States, uncertainty remains over the construction of a repository for the permanent disposal of spent fuel.⁶⁵ Nonetheless, both the NRC and the courts have adhered to the view that given that an underground repository remains technically feasible, there is no impediment under US law to issuing new and renewed licences to facilities that will generate or store spent nuclear fuel. Although reasonable people might dispute whether, as a matter of a policy, it is wise to continue to issue new licences while political obstacles to a repository remain, the DC Circuit's conclusion in *New York* 2016 and the NRC's decision in the *DTE Electric* adjudication indicate that any cessation of reactor licensing in the United States due to the current lack of a disposal facility must come through legislation rather than through legal challenge.

65. Two applications for proposed consolidated interim storage facilities are currently pending before the NRC. Holtec International (Holtec) has requested, by letter dated 30 March 2017 (as supplemented), authorisation to construct and operate the HI-STORE Consolidated Interim Storage Facility, in Lea County, New Mexico. Holtec International's HI-STORE Consolidated Interim Storage Facility for Interim Storage of Spent Nuclear Fuel, 83 Fed. Reg. 32919 (16 July 2018). In addition, Interim Storage Partners, a joint venture between Waste Control Specialists, LLC (WCS) and Orano CIS, LLC, has requested, by letters dated 8 June 2018 and 19 July 2018, that NRC staff resume review of a licence application for the WCS Consolidated Interim Storage Facility in Andrews County in the US state of Texas. The previous applicant, WCS, had asked the NRC in 2017 to temporarily suspend all safety and environmental review activities. Interim Storage Partner's Waste Control Specialists Consolidated Interim Storage Facility, 83 Fed. Reg. 44070 (29 Aug. 2018).

