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Wasting Our Options? Revisiting the Nuclear Waste Storage Problem

Randall W. Miller

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Wasting Our Options? Revisiting the Nuclear Waste Storage Problem

Randall W. Miller*

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I. Introduction

An unfailing commitment to protect public health and safety, security, and the environment is essential to ensuring that nuclear power remains part of our diversified clean-energy portfolio. As part of that commitment, safe, long-term management and disposal of used nuclear fuel and high-level radioactive waste must remain a national priority.¹

Discussions about long-term nuclear waste storage date back to the 1950s. Now, the dialogue contains threads of urgency as nuclear waste continues to accumulate at nuclear power plants across the country. Although the federal government officially endorsed a site for the permanent disposal of spent nuclear fuel in 2002,² the government cut federal funding for the site's development less than ten years later.³ Since that time, the federal government has not adopted an alternative option to meet the nation's nuclear waste storage needs.⁴

On January 11, 2013, the Department of Energy (DOE) selected 2048 as the target date to open a permanent site to receive nuclear waste.⁵ This date comes 50 years later than the original target date of 1998.⁶

1. Steven Chu, *Preface to U.S. DEP'T OF ENERGY, STRATEGY FOR THE MANAGEMENT & DISPOSAL OF USED NUCLEAR FUEL & HIGH-LEVEL RADIOACTIVE WASTE* (2013) [hereinafter *Strategy for the Management and Disposal of Used Nuclear Fuel*], available at <http://energy.gov/sites/prod/files/Strategy%20for%20the%20Management%20and%20Disposal%20of%20Used%20Nuclear%20Fuel%20and%20High%20Level%20Radioactive%20Waste.pdf>.

2. See JAMES M. INHOFE, S. COMM. ON ENVIRONMENT & PUBLIC WORKS, *YUCCA MOUNTAIN: THE MOST STUDIED REAL ESTATE ON THE PLANET, REPORT TO THE CHAIRMAN*, at 9 (2006), available at <http://epw.senate.gov/repwhitepapers/YuccaMountainEPWReport.pdf> (indicating Congressional and Presidential approval of the Yucca Mountain repository development program).

3. See Matthew L. Wald, *Future Dim For Nuclear Waste Repository*, N.Y. TIMES, Mar. 6, 2009, at A1 (revealing that President Obama's 2009 budget proposal reduced much of the funding for the Yucca Mountain project) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

4. Although members of Congress have discussed possible solutions and the Administration has released its recommendations, Congress has not adopted an official plan for the permanent storage of nuclear waste.

5. See Steve Tetreault, *DOE Sets New Nuclear Waste Target Date*, LAS VEGAS REV. J. (Jan. 12, 2013), <http://www.lvrj.com/news/doe-new-target-date-for-a-nuclear-repository-is-2048-186542641.html> (recounting the DOE's statement that it intends to have a site open to receive nuclear waste by 2048) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

6. See *id.* (listing the past and present target dates for opening a nuclear waste site).

Although this date signals progress toward achieving a permanent solution for nuclear waste storage, the Administration and Congress must overcome disagreements and challenges that caused past setbacks and delays.⁷

Part II of this Note provides an overview of the importance of nuclear energy in the United States, defines nuclear waste, describes the process by which the nuclear waste is currently stored, and reveals the financial costs of not developing a permanent storage site. Part III of this Note examines the United States' process for selecting and developing a permanent storage site, summarizes two federal court opinions relating to nuclear waste storage, and discusses several factors that caused the eventual cessation of repository development in Nevada. Part IV of this Note reviews recent congressional and administrative proposals for interim and permanent storage of nuclear waste. Part V of this Note discusses some of the issues that Congress should address in drafting nuclear waste storage legislation. Part V also reveals the importance of gaining public support for a storage site.

This Note ultimately contends that Congress and the Administration must agree on a plan to develop both interim and permanent nuclear waste storage options and should consider reopening the Yucca Mountain program. Further delay on the development of the long-overdue repository will continue to cost the federal government, utilities, and utility customers billions of dollars.⁸ Further delay will also threaten the ability of the nuclear industry to expand and build new plants,⁹ and it will pose health risks to the human environment.¹⁰ This Note provides the requisite background information for understanding the nuclear waste storage problem. Specifically, this Note will focus on the storage of spent nuclear fuel from commercial reactor sites in the United States. Unless indicated otherwise, this Note will use the terms nuclear waste and spent nuclear fuel interchangeably.

7. *See id.* (referencing the termination of the Yucca Mountain repository development by President Obama in 2010 and Senator Harry Reid's persistent opposition to the development of a nuclear waste disposal site in Nevada).

8. *See* JAMES D. WERNER, CONG. RESEARCH SERV., R42513, U.S. SPENT NUCLEAR FUEL STORAGE 7 (May 24, 2012), available at <http://www.fas.org/sgp/crs/misc/R42513.pdf> (revealing that the federal government has paid \$1 billion in breach of contract claims and will likely pay more if a permanent storage solution is not developed).

9. *See id.* at 8 (indicating the storage issue could negatively affect the industry and reduce expansion).

10. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-797, SPENT NUCLEAR FUEL: ACCUMULATING QUANTITIES AT COMMERCIAL REACTORS PRESENT STORAGE & OTHER CHALLENGES, Highlights (2012), available at <http://www.gao.gov/assets/600/593745.pdf> (revealing potential health risks associated with long-term on-site spent nuclear fuel storage).

II. Nuclear Energy in the United States

A. Summary of Nuclear Energy Production and Environmental Benefits

Nuclear power plays a vital role in America's energy sector because it generates a substantial amount of electricity each year. Currently, 104 nuclear reactors are operating 24 hours a day in 31 states.¹¹ Each year the reactors produce about 20 percent of all electricity generated in the United States.¹² In Connecticut, Illinois, New Hampshire, New Jersey, South Carolina, Vermont and Virginia, nuclear energy produces more electricity than any other source.¹³ By 2035, the U.S. Energy Information Administration projects that the demand for electricity will rise by 22 percent in the United States.¹⁴ America must keep nuclear energy in the mix of energy sources to generate sufficient amounts of electricity to meet the nation's growing energy needs.¹⁵

Nuclear energy also provides clean-air benefits.¹⁶ Nuclear energy generation does not release greenhouse gases into the atmosphere and accounts for more than 75 percent of the carbon-free energy produced in the United States.¹⁷ In 2010, the electricity generated by nuclear power plants, as opposed to fossil fuel powered plants, prevented the release of nearly 650 million metric tons of carbon dioxide into the atmosphere.¹⁸ This reduction in emission is significant because electricity generation in the United States generally produces and emits more carbon dioxide than both transportation and industry.¹⁹ Nuclear power provides an essential amount

11. NUCLEAR ENERGY INSTITUTE, NEW NUCLEAR ENERGY FACILITIES WILL SUPPORT GROWTH, PROVIDE CLEAN ELECTRICITY (2012) [hereinafter *New Facilities*] <http://www.nei.org/resourcesandstats/documentlibrary/reliableandaffordableenergy/factsheet/usneedsnewplants> (on file with the Washington and Lee Journal of Energy, Climate, and the Environment); see also U.S. NUCLEAR REGULATORY COMM'N, NUCLEAR REACTORS: NRC REACTOR INSPECTION EFFORTS 30 (2012-13), available at http://www.nei.org/corporatesite/media/filefolder/Need_for_New_Plants_April_2012.pdf (noting the number of commercial nuclear power reactors licensed to operate in the United States as of August 2012).

12. *New Facilities*, *supra* note 12.

13. See *New Facilities*, *supra* note 12 (looking at nationwide nuclear energy production statistics and comparing Connecticut, Illinois, New Hampshire, New Jersey, Virginia, Vermont, and South Carolina with the rest of the country).

14. *New Facilities*, *supra* note 12.

15. See *New Facilities*, *supra* note 12 (recognizing that a "diverse mix of energy sources enables America to balance the cost of electricity production").

16. See *New Facilities*, *supra* note 12 (revealing that nuclear power plants are a "clean-air energy source[']").

17. *New Facilities*, *supra* note 12.

18. *New Facilities*, *supra* note 12.

19. See Ernest J. Moniz, *Why We Still Need Nuclear Power*, MIT ENERGY INITIATIVE, (Nov. 2, 2011), <http://mitei.mit.edu/news/mitei-news/why-we-still-need-nuclear-power>

of electricity in an ozone friendly manner, and the United States must ensure the longevity of this viable power source.

B. Defining Nuclear Waste

What many people commonly refer to as “nuclear waste” is more accurately termed spent nuclear fuel.²⁰ This ‘spent fuel’ results from nuclear reactors using low-enriched uranium as fuel in the nuclear fission process to generate electricity.²¹ The steam produced from the heat of the fission process turns a turbine generator, which in turn generates electricity.²² The amount of uranium used during this process is about the size of a pellet that a person can hold between her index finger and thumb.²³ A single metal casing, called a fuel rod, contains one of these uranium pellets.²⁴ Multiple fuel rods are bound together to compose a collective group called a fuel assembly.²⁵ A single fuel rod generally lasts 54 months, and utilities typically rotate assemblies as fuel rods ‘burn up.’²⁶ About every 18 months, a plant replaces nearly one-third of its used fuel assemblies with new assemblies.²⁷ The “replaced fuel assembly becomes spent nuclear fuel when it has been irradiated and removed from a nuclear reactor after it is no longer cost-effective to generate power.”²⁸ A typical fuel rod assembly operates for about four and a half years before being replaced and stored.²⁹

Once removed from the reactor, the fuel rods are placed on “racks within deep, water-filled pools for cooling and to protect workers from radiation.”³⁰ After the spent nuclear fuel cools, it can be placed in dry cask

(indicating that electricity generation accounts for a greater emission of carbon dioxide than transportation or industry) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

20. See Werner, *supra* note 9, at 9 (realizing that the term nuclear waste is often used instead of spent nuclear fuel, although the latter is more specific).

21. See Werner, *supra* note 9, at 10 (explaining that low-enriched uranium is used in nuclear fission in commercial reactors).

22. See Werner, *supra* note 9, at 10 (detailing the process by which the nuclear fission produces heat to rotate the turbine generator to create electricity).

23. See Werner, *supra* note 9, at 10 (indicating that a single “uranium pellet” fits inside a single fuel rod).

24. Werner, *supra* note 9, at 10.

25. See Werner, *supra* note 9, at 10 (explaining that a fuel assembly is composed of multiple fuel rods containing uranium and providing an illustration).

26. Werner, *supra* note 9, at 10.

27. See Werner, *supra* note 9, at 10 (indicating that about every “18 months, utilities generally conduct a refueling outage in which approximately one-third of the fuel assemblies are replaced with new assemblies”).

28. Werner, *supra* note 9, at 10.

29. Werner, *supra* note 9, at 10.

30. See *New York v. NRC*, 681 F.3d 471, 474 (D.C. Cir. 2012) (summarizing the process by which spent fuel is removed from the reactor and stored on-site).

storage.³¹ The majority of spent fuel, however, remains in storage pools awaiting a permanent disposal option.³² Generally, both the dry casks and storage pools are located on the same site as the nuclear reactors, and they are typically referred to as “on-site storage” options.

Even after the spent nuclear fuel is removed from the reactor, it continues to produce radiation, and some reports contend that the spent fuel necessitates cautious management for thousands of years.³³ The Government Accountability Office (GAO) reviewed studies that determined that radiation releases from a storage site could “harm human health or the environment”³⁴ and have dangerous consequences.³⁵ Although the Nuclear Regulatory Commission (NRC) reassured the federal government that the possibility of a radiation leak is low, the longer the spent nuclear fuel rests on sites created for temporary storage, the greater the potential for radiation releases.³⁶ To avoid the health and environmental risks of storing the spent nuclear fuel on plant sites beyond the intended period, the federal government must provide a permanent storage facility to receive the waste.

C. *The Facts Behind On-site Storage of Spent Nuclear Fuel*

On-site spent fuel storage is nearing capacity and has exceeded pool capacity at some reactor sites,³⁷ making the need for a permanent

31. *See id.* (indicating that spent fuel must be cooled before being placed in dry storage casks); *see also*, Werner, *supra* note 9, at 15 (explaining that dry casks are generally “in a cylindrical shape with an inner steel canister directly storing the [spent nuclear fuel] assemblies that is bolted or welded closed in an outer concrete cask” and “once constructed, filled, and sealed, they require no power for circulation of cooling water and are generally regarded as ‘passively safe’”).

32. *See* Werner, *supra* note 9, at 10 (reflecting that most spent fuel remains in pools until a permanent storage option is available).

33. *See* Werner, *supra* note 9, at 10–11 (cautioning that the removed spent nuclear fuel still emits heat and radiation and “requires careful management for thousands of years”).

34. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-797, SPENT NUCLEAR FUEL: ACCUMULATING QUANTITIES AT COMMERCIAL REACTORS PRESENT STORAGE & OTHER CHALLENGES, Highlights (Aug. 2012), available at <http://www.gao.gov/assets/600/593745.pdf>.

35. *See id.* (including “widespread contamination, a significant increase in the probability of fatal cancer in the affect population, and the possibility of early fatalities”).

36. *See id.* (recognizing that the “key risk posed by spent nuclear fuel involves a release of radiation”).

37. *See Fact Sheet on Dry Cask Storage of Spent Nuclear Fuel*, NUCLEAR ENERGY INSTITUTE (Feb. 2013), <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dry-cask-storage.html> (“[T]he spent fuel generated at many nuclear power plants has exceeded spent fuel pool capacity.”) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment); *see also*, *Nuclear Waste: Amounts & On-Site Storage*, NUCLEAR ENERGY INSTITUTE http://www.nei.org/resourcesandstats/nuclear_statistics/nuclearwasteamountsandonsitestorag

repository or other alternative imminent. The GAO published a report in August 2012, which examined the amount of spent fuel currently stored on-site and the amount expected to accumulate before it can be transported from nuclear reactor sites to a permanent storage site.³⁸ The GAO discovered that about 74 percent of spent nuclear fuel is stored in pools of water while the remaining 26 percent is stored in dry storage casks.³⁹ These storage facilities span 33 states and account for nearly 70,000 metric tons of spent fuel.⁴⁰ The GAO determined that the amount of spent fuel stored on-site would increase annually by 2,000 metric tons.⁴¹ Because a permanent disposal facility may take between 15 and 40 years to construct, the GAO estimated that the current amount of spent fuel could increase to 140,000 metric tons before it could be transported to an off-site repository.⁴² This growing dilemma illustrates the importance of developing an alternative storage option to on-site storage as soon as possible.

The large accumulation of spent nuclear fuel makes the development of a permanent solution more difficult. For example, the Nuclear Waste Policy Act (NWPA), which will be discussed in more detail in Part II, set a numerical limit on the amount of nuclear waste that a permanent storage site, such as a geologic repository,⁴³ can receive.⁴⁴ The NWPA prohibits an initial repository from receiving more than 70,000 metric tons of radioactive waste until a second repository begins receiving waste.⁴⁵ Congress also required that 90 percent of the waste received by the repository be commercial spent fuel, and Congress reserved the remaining 10 percent of storage space for DOE spent nuclear fuel, such as naval spent nuclear fuel.⁴⁶ Currently, commercial nuclear reactors store nearly 70,000 metric tons of spent nuclear fuel on-site, and this number does not account

e/ (last visited Apr. 28, 2013) (recognizing need for alternative storage options) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

38. See U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 35 (highlighting the amount of nuclear waste that will accumulate before it can be transported to a permanent off-site storage site).

39. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 35.

40. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 35.

41. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 35.

42. See U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 35 (estimating that a nuclear waste repository will take between 15 to 40 years to construct, allowing the spent nuclear fuel in the United States to increase to about 140,000 metric tons).

43. This is the most preferable permanent storage option and will be discussed in Part II of this Note.

44. See Werner, *supra* note 9, at 5 (describing the dilemma posed by the large amount of spent fuel and the amount of waste that a repository is legally allowed to receive under the NWPA).

45. See Werner, *supra* note 9, at 5.

46. See Werner, *supra* note 9, at 5 (indicating that a repository must accept both commercial and government spent nuclear fuel).

for the DOE spent fuel.⁴⁷ These storage amounts exceed the congressional limit placed on the amount of waste a single repository can receive.

In order to solve this problem, Congress must draft legislation that provides for multiple storage sites and/or raises the limit of radioactive waste that a repository may receive.⁴⁸ The DOE examined the potential capacity at a previously selected site for a nuclear repository, Yucca Mountain,⁴⁹ and determined that the site could receive more than 70,000 metric tons, should Congress decide to raise the nuclear waste limit.⁵⁰ The fact remains, however, that the United States has not developed or opened a permanent storage site to receive any amount of nuclear waste. The federal government must design and develop a geologic repository and interim storage options as soon as possible to ensure that the nuclear power plants do not exceed a storage capacity that endangers human health and the environment.

D. The Financial Cost of Not Developing a Permanent Storage Site

Aside from public safety and environmental concerns, the federal government faces significant legal liability for failing to receive nuclear waste from commercial reactors under the 1982 NWPA.⁵¹ The government has already paid about \$1 billion in response to breach of contract claims regarding its failure to provide storage for spent nuclear fuel on commercial reactor sites.⁵² The projected costs for the annual storage of spent nuclear fuel are about \$500 million.⁵³ Delaying the development of interim and permanent storage facilities will continue to cost the government billions of dollars.

47. See Werner, *supra* note 9, at 5 (stating that commercial reactors have 70,000 metric tons of waste stored on-site that needs to be removed and the DOE has thousands of tons of spent fuel not accounted for in the 70,000).

48. See Werner, *supra* note 9, at 5 (indicating that current amounts of spent nuclear fuel in the United States would fill the Yucca Mountain repository to the congressional limit necessitating a new repository or an increase in the limit of waste the repository is allowed to receive).

49. Yucca Mountain will be discussed in Part III of the Note.

50. See Werner, *supra* note 9, at 5–6 (realizing that Yucca Mountain can hold much more waste than the 70,000 metric ton limit).

51. See Werner, *supra* note 9, at 7 (indicating the federal government's liability under the NWPA for not opening a repository to receive spent nuclear fuel).

52. See Werner, *supra* note 9, at 7 (revealing that the federal government has already paid \$1 billion in breach of contract claims).

53. See Werner, *supra* note 9, at 8 (estimating future costs of storing commercial spent nuclear fuel at \$500 million per year).

The failure to establish a nuclear waste storage facility also costs nuclear energy utilities and consumers billions of dollars.⁵⁴ The NWPA mandated that utilities pay for nuclear waste disposal through a fee of 1.0 mil per kilowatt-hour into a Nuclear Waste Fund (NWF) in order to subsidize the construction of a permanent waste disposal site.⁵⁵ Utilities have passed these fees on to their energy consumers, or ratepayers.⁵⁶ The fees paid into the NWF exceeded \$24 billion in 2010 with investment income, and projections indicated that the 2012 balance would exceed \$28 billion.⁵⁷ Therefore, the federal government's failure to develop a plan for a permanent storage option unfairly prejudices both utilities and ratepayers who have paid and are paying fees into the NWF with the expectation that their money will be used for the construction of a waste storage site.

The uncertainty surrounding nuclear waste storage may also lead to a decline in the investment of new nuclear power plants, which could prevent the industry from expanding.⁵⁸ An American Physical Society Panel, consisting of former NRC chairmen and a former Under Secretary of Energy, stated, "there is a concern that the buildup of spent fuel at reactor sites and lack of progress on final disposition could be serious constraints on the growth of the domestic nuclear power industry by discouraging investment in new nuclear power plants. . . ." ⁵⁹ Investments for new plants are not the only cause for concern because public support for expanding the nuclear industry may also fade without a workable "regime for disposing of our existing and future nuclear power wastes."⁶⁰

In its report submitted to the DOE, the Blue Ribbon Commission on America's Nuclear Waste (BRC) stated, "this nation's failure to come to grips with the nuclear waste issue has already proved damaging and costly

54. See *Nat'l Association of Regulatory Utility Comm'rs v. DOE*, 680 F.3d 819, 821–22 (D.C. Cir. 2012) (indicating that, along with interest, ratepayers have paid over \$24 billion dollars into the NWF since the NWPA's enactment).

55. Nuclear Waste Policy Act of 1982, 42 U.S.C. § 10222(c) (1982).

56. *Id.*

57. See *Nat'l Association of Regulatory Utility Comm'rs*, 680 F.3d at 821–22 (indicating that the NWF totals over \$24 billion and will exceed \$28 billion by the end of 2012).

58. See Werner, *supra* note 9, at 8 (indicating that failing to solve the storage issue could negatively affect the industry).

59. See Werner, *supra* note 9, at 8 (citing Am. Physical Soc'y Nuclear Energy Study Grp., *Consolidated Interim Storage of Commercial Spent Nuclear Fuel: A Technical and Programmatic Assessment*, (Feb. 2007)).

60. See Werner, *supra* note 9, at 8 (citing RICHARD B. STEWART & JANE B. STEWART, *FUEL CYCLE TO NOWHERE: U.S. LAW & POLICY ON NUCLEAR WASTE* (Vanderbilt Univ. Press 2011)).

and it will be more damaging and more costly the longer it continues. . . .⁶¹

III. *An Overview of Permanent Waste Storage in the United States*

The 1982 NWPA recognized that the disposal of nuclear waste was a national problem and provided a statutory framework for developing a permanent waste storage site.⁶² Specifically, the NWPA assigned the waste disposal responsibility to the federal government and assigned the cost of such disposal to nuclear utilities.⁶³ The NWPA emphasized protection of public health, safety, and the environment for current and future generations.⁶⁴ It “established a schedule for siting, construction, and operation of repositories” and “defined relationships between [f]ederal, [s]tate, and affected . . . local governments with regard to potential repositories.”⁶⁵ The NWPA also assigned certain responsibilities to the President, Congress, and certain agencies.⁶⁶ This legislation included all stakeholders and provided a feasible plan for resolving the nuclear waste storage problem.

The following sections provide an overview of the pre-NWPA storage initiatives, implementation of the NWPA, litigation surrounding the selection of Yucca Mountain as the permanent storage site, and the political decisions that derailed the development of Yucca Mountain.

A. *A Chronology*

In September 1955, the United States’ most distinguished scientists, known collectively as the National Academy of Sciences (NAS),⁶⁷ met to

61. See Werner, *supra* note 9, at 8 (citing Blue Ribbon Comm’n on Am.’s Nuclear Future, *Report to the Secretary of Energy*, vi (Jan. 26, 2012)).

62. See Philip Justus, *Federal Laws: Responsibilities and Regulations for Geologic Disposal of High-Level Radioactive Waste in the U.S.*, U.S. N.R.C., 1, 8, (June 22, 2005), available at <http://pbadupws.nrc.gov/docs/ML0515/ML051520482.pdf> (revealing that the NWPA officially “established permanent disposal as a national policy”).

63. See *id.* (providing that the federal government must provide an option for waste disposal and that utilities pay for the storage).

64. See *id.* (“Public health, safety and the environment should be protected for this and future generations.”).

65. *Id.* at 9.

66. See *id.* (assigning responsibilities to DOE, EPA, NRC, DOI, the President and Congress).

67. See James M. Inhofe, U.S. Senate Comm. on Env’t & Public Works Majority Staff, *YUCCA MOUNTAIN: THE MOST STUDIED REAL ESTATE ON THE PLANET 1*, 10 (Mar. 2006), available at <http://epw.senate.gov/repwhitepapers/YuccaMountainEPWReport.pdf> (revealing that the “scientists met at Princeton University under the auspices of the National Academy of Sciences (NAS)”).

discuss the potential for creating a method to dispose of radioactive waste.⁶⁸ In 1957, the NAS issued a report stating, “[t]he Committee is convinced that radioactive waste can be disposed of safely in a variety of ways and at a large number of sites in the United States.”⁶⁹ Although scientists considered many options, “such as rocketing the material into space or disposing of it beneath the ocean floor,”⁷⁰ scientists agreed that the disposal of radioactive material on land was the best option.⁷¹ Specifically, scientists determined that a geologic repository⁷² provided the requisite amount of safety to dispose of nuclear waste.⁷³

The United States tried to develop a geologic repository in Lyons, Kansas in the 1960s, but due to technological issues, the government abandoned the project.⁷⁴ In 1979, an Interagency Review Group suggested, “detailed studies of specific, potential repository sites in different geologic environments should begin immediately.”⁷⁵ As a result, the DOE conducted a study, known as the 1980 Environmental Impact Statement (EIS), to determine which type of repository was best suited for radioactive waste disposal.⁷⁶ The DOE, like the NAS, concluded that the mined geologic repository provided the best solution.⁷⁷

Based upon the DOE’s 1980 EIS, Congress passed the NWPA in 1982⁷⁸ to create the “process for selecting and developing a geologic disposal site.”⁷⁹ The NWPA gave the DOE “the responsibility to site, build, and operate a deep geologic repository for the disposal of high-level waste

68. See *id.* at 4 (confirming that the nation’s best scientists met in 1955 to discuss options for radioactive waste disposal).

69. *Id.*

70. *Id.*

71. See *id.* (“The land based disposal concept has been refined over time into a method known as deep geologic disposal and consensus support for this method has withstood many difficult challenges.”).

72. See *Geological Repository*, U.S. N.R.C. (Dec. 10, 2012), <http://www.nrc.gov/reading-rm/basic-ref/glossary/geological-repository.html> (defining a geological repository as “[a]n excavated, underground facility that is designed, constructed, and operated for safe and secure disposal of high-level radioactive waste”) (on file with the Washington and Lee University Journal of Energy, Climate, and the Environment).

73. See Inholfe, *supra* note 68, at 4 (determining that “a geologic repository is the generally accepted solution for management of long lived wastes in practically all countries faced by the problem”).

74. See Inholfe, *supra* note 68, at 4. (abandoning site for “numerous technical reasons”).

75. Inholfe, *supra* note 68, at 4–5.

76. See Inholfe, *supra* note 68, at 5 (considering Very Deep Hole Waste Disposal, Rock Melt Waste Disposal, Island-based Geologic Disposal, Sub seabed Disposal, Ice Sheet Disposal, Well Injection Disposal, Transmutation, and Space Disposal as potential disposal options).

77. Inholfe, *supra* note 68, at 5.

78. Nuclear Waste Policy Act of 1982, 42 U.S.C. §§ 10101–10270 (1982).

79. Inholfe, *supra* note 68, at 5.

and spent nuclear fuel,⁸⁰ while giving the Environmental Protection Agency (EPA) the task of creating general standards for protecting the environment from radioactive materials.⁸¹ The NWPA also assigned the NRC with the responsibility of licensing the DOE's selected repository.⁸² In order to pay for the waste disposal, the NWPA created the Nuclear Waste Fund (NWF), which collected fees "from the consumers of nuclear electricity."⁸³ The collected fees were to be used to supplement the development of the repository.

In 1983, the DOE satisfied the first requirement of the NWPA by selecting nine potential repository sites in six states.⁸⁴ Among the sites listed was Yucca Mountain in Nevada.⁸⁵ The DOE evaluated the nine sites and used the results of the assessments to determine the five best sites for further consideration.⁸⁶ Yucca Mountain remained one of the five.⁸⁷

In 1986, the DOE published a document comparing the five sites and ranking them in order of the most preferred.⁸⁸ The three highest ranked sites included Yucca Mountain, Deaf Smith County, Texas, and Hanford, Washington.⁸⁹ Yucca Mountain proved to be the overall best location based upon a number of factors.⁹⁰

Since passing the NWPA, the DOE spent \$1.1 billion and performed five years of scientific research to determine the best site for a repository.⁹¹ Because this effort demonstrated that Yucca Mountain was the best site for the repository, Congress passed the 1987 Amendment to the NWPA, which instructed the "DOE to focus its site characterization studies

80. 42 U.S.C. § 10224; *Laws and Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <http://www2.epa.gov/laws-regulations/summary-nuclear-waste-policy-act> (last visited Apr. 28, 2013).

81. 42 U.S.C. §10101 et seq.; see *Laws and Regulations: Summary of the Nuclear Waste Policy Act*, U.S. E.P.A., available at <http://www2.epa.gov/laws-regulations/summary-nuclear-waste-policy-act> (last visited Apr. 28, 2013) (reflecting that the NWPA direct the EPA to set environmental protection standards).

82. 42 U.S.C. §§ 10101–10270; see also, 42 U.S.C. §§ 10132–10135 (stating that the NRC is in charge of licensing the repository).

83. Inholfe, *supra* note 68, at 5.

84. Inholfe, *supra* note 68, at 5.

85. Inholfe, *supra* note 68, at 5.

86. See Inholfe, *supra* note 68, at 5 (determining best potential repository sites according to the scientific and technical information gathered during research).

87. Inholfe, *supra* note 68, at 5.

88. Inholfe, *supra* note 68, at 5.

89. Inholfe, *supra* note 68, at 5.

90. See Inholfe, *supra* note 68, at 5 (stating that Yucca Mountain was best site for repository based upon geohydrology, geochemistry, rock characteristics, tectonics, meteorology, costs and socioeconomic impacts).

91. See Inholfe, *supra* note 68, at 6 (stating the time and money invested in research and scientific study).

solely on Yucca Mountain.”⁹² The Amendment also offered the state of Nevada financial benefits if it waived its right to veto the selection of Yucca Mountain as the repository site.⁹³ Nevada, however, retained its right to veto.

From 1987 until 2002, the DOE spent \$3.8 billion performing studies on Yucca Mountain.⁹⁴ During this time, the DOE completed a five-mile tunnel through Yucca Mountain to serve as an Exploratory Study Facility and a two-mile tunnel to allow for experiments in the potential repository host rock.⁹⁵ Both independent scientists and DOE scientists joined efforts to drill additional holes and conduct experiments and excavations at Yucca Mountain and similar sites around the world in order to better understand Yucca Mountain’s “ability to safely contain radioactive wastes.”⁹⁶

In 1998, the DOE released the *Viability Assessment of a Repository at Yucca Mountain*,⁹⁷ which concluded:

Over 15 years, extensive research has validated many of the expectations of the scientists who first suggested that remote, desert regions of the Southwest are well suited for a geologic repository. Engineered barriers can be designed to contain waste for thousands of years, and the natural barriers can delay and dilute any radioactive material that migrates from waste packages.⁹⁸

In addition to releasing the Viability Assessment, the DOE sought independent expert review from Total System Performance Assessment (TSPA), a group of well-respected international scientists.⁹⁹ In November 2001, TSPA presented a summary of its conclusion:

92. Inholfe, *supra* note 68, at 6.

93. See *Nuclear Waste Policy Dilemma the First Fifty Years: A Chronology*, <http://www.state.nv.us/nucwaste/yucca/nwchron1.htm> (last visited Apr. 28, 2013) (revealing the financial incentives given for Nevada to waive its right to object to the Yucca Mountain project) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

94. Inholfe, *supra* note 68, at 6.

95. See Inholfe, *supra* note 68, at 6 (“These tunnels . . . created the world’s largest underground laboratory.”).

96. See Inholfe, *supra* note 68, at 6–7 (“During this time, more than 2500 scientists representing not only DOE and its direct contractors, but also five National Laboratories, the U.S. Geological Survey, and dozens of US Universities worked on the project.”).

97. U.S. DEP’T OF ENERGY, VIABILITY ASSESSMENT OF A REPOSITORY AT YUCCA MOUNTAIN (Dec. 1998), available at http://energy.gov/sites/prod/files/Yucca_Viability_01_Overview.pdf.

98. *Id.* at 36.

99. See Inholfe, *supra* note 68, at 8 (recognizing that DOE gained outside review from TSPA, “a joint peer review panel composed of top international experts assembled by the

While presenting room for improvement, the TSPA-Site Recommendation methodology is soundly based and has been implemented in a competent manner. Moreover, the modeling incorporates many conservatisms, including the extent to which water is able to contact the waste packages, the performance of engineered barriers, and retardation provided by the geosphere.

Overall, the International Review Team considers that the implemented performance assessment approach provides an adequate basis for supporting a statement on likely compliance within the regulatory period 10,000 years and, accordingly, for the site recommendation decision.¹⁰⁰

After receiving the endorsement by TSPA and conducting multiple reviews, the DOE opened up its work to the public in order to receive comments.¹⁰¹ Only after considering and responding to all 17,000 comments, did the Secretary of Energy finally recommend Yucca Mountain to President George W. Bush as the site for the repository.¹⁰² The Secretary issued the following summary about Yucca Mountain:

After over 20 years of research and billions of dollars of carefully planned and reviewed scientific field work, the Department has found that a repository at Yucca Mountain brings together the location, natural barriers, and design elements most likely to protect the health and safety of the public, including those Americans living in the immediate vicinity, now and long into the future.¹⁰³

President Bush approved the DOE's recommendation,¹⁰⁴ but in April of 2002, the Governor of Nevada vetoed this decision as allowed by the NWPAA.¹⁰⁵ Only a majority vote in the House and the Senate could

International Atomic Energy Agency and the Organization for Economic Cooperation and Development's Nuclear Energy Agency").

100. Inholfe, *supra* note 68, at 8 (citing *OECD/NEA-IAEA Joint International Peer Review of the Yucca Mountain Site Characterization Project's Total System Performance Assessment Supporting the Site Recommendation Process*, 4 (Nov. 2, 2001)).

101. See Inholfe, *supra* note 68, at 8 (subjecting work on Yucca Mountain to "intensive public scrutiny").

102. See Inholfe, *supra* note 68, at 9 (recommending Yucca Mountain after addressing all public comments).

103. Inholfe, *supra* note 68, at 9.

104. See Inholfe, *supra* note 68, at 9 (indicating the President's approval of the Secretary's recommendation).

105. See Inholfe, *supra* note 68, at 9 (indicating Nevada's Governor veto of Yucca Mountain was in accord with the NWPAA).

override the Governor's veto.¹⁰⁶ After heated debates, Congress achieved the votes necessary to override the Governor's veto with a vote of 306-117 in the House and 60-39 in the Senate.¹⁰⁷ President Bush finally signed the approval into law in July 2002 as the Yucca Mountain Development Act (YMDA).¹⁰⁸

While, the YMDA revealed strong Congressional and Administrative support of the Yucca Mountain program, the Governor's veto signaled the first of many attempts to halt the repository development in Nevada.

B. Litigation

1. *Nuclear Energy Institute v. Environmental Protection Agency (2004)*

In 2004, "the State of Nevada, local communities, several environmental organizations, and the nuclear energy industry" challenged the statutory and regulatory framework formed to develop and govern a nuclear waste repository at Yucca Mountain in the United States Court of Appeals for the District of Columbia (D.C. Circuit).¹⁰⁹ Among other issues, the petitioners challenged the constitutionality of the congressional selection and presidential and DOE approval of Yucca Mountain for the repository site¹¹⁰; this essentially challenged the constitutionality of the YMDA. The D.C. Circuit determined that Congress exercised appropriate power via Article IV, section 3 of the Constitution. The Court also found the President and DOE's "actions leading to the selection of the Yucca Mountain site . . . unreviewable."¹¹¹ As a result, the D.C. Circuit affirmed the constitutionality of the selection and approval of the Yucca Mountain repository.¹¹²

The D.C. Circuit rejected all remaining challenges brought by the petitioners except Nevada's challenge to the EPA's adoption of a 10,000-

106. See Inholfe, *supra* note 68, at 9 ("In the NWPA's unprecedented procedure for assuring that any site decision received thorough and fair consideration, the Governor's veto could only be overridden by a majority vote in both houses of Congress.").

107. See Inholfe, *supra* note 68, at 9 (indicating vote counts from the House and Senate).

108. See Inholfe, *supra* note 68, at 9 (revealing that the contentious debates resulted in the necessary majority votes from both houses to override the Governor's veto).

109. Nuclear Energy Inst., Inc. v. EPA, 373 F.3d 1251, 1257 (D.C. Cir. 2004) (listing the petitioners and the nature of their challenges).

110. See *id.* (stating petitioners' challenge the selection and approval Yucca Mountain as the repository site).

111. *Id.*

112. See, Inholfe, *supra* note 68, at 9-10 (indicating that the decision conveyed the Court's approval of the constitutionality of the YMDA).

year compliance period.¹¹³ The compliance period projects the maximum amount of radiation exposure that individual members of the public would annually receive from the nuclear waste stored in the repository.¹¹⁴ The Energy Policy Act (EnPA) requires the EPA to develop “public health and safety standards for Yucca Mountain ‘based upon and consistent with the findings and recommendations of the National Academy of Sciences.’”¹¹⁵ Such safety standards included adopting a proper compliance period.

The NAS recommended a period of about 1 million years because it determined that the compliance period should include the time when “radiation doses reach their peak.”¹¹⁶ The NAS objected to the 10,000-year compliance period because it determined that the shorter period “might be inconsistent with protection of public health.”¹¹⁷ Although the EPA conceded that it had no scientific basis for capping the compliance period at 10,000 years, it contended that such a period was appropriate because it served certain policy concerns that the NAS did not consider.¹¹⁸ The Court did not agree with the EPA and concluded that “the 10,000-year compliance period selected by EPA violates . . . the Energy Policy Act (EnPA) because it is not, as the EnPA requires, ‘based upon and consistent with’ the findings and recommendations of the National Academy of Sciences.”¹¹⁹ As a result, the Court vacated the EPA’s 10,000-year compliance period.¹²⁰ In response to the Court’s ruling, the Nuclear Energy Institute’s Executive Vice President Angie Howard said:

With regard to the EPA compliance period, the court notes two possible options. One is simply that the Environmental Protection Agency and the Nuclear Regulatory Commission revise their regulations to extend the compliance period beyond 10,000 years. The other is that

113. See *Nuclear Energy Inst., Inc.*, 373 F.3d at 1315 (determining that all challenges are without merit except the challenge to the 10,000-year compliance period).

114. See *id.* at 1267 (explaining that the compliance period was intended to project the “maximum annual effective dose equivalent to individual members of the public from releases to the accessible environment from radioactive materials stored . . . in the repository”).

115. *Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1266 (D.C. Cir. 2004).

116. See *id.* at 1270–71 (revealing the NAS’s recommendation and the reason for the one million year compliance period).

117. See *id.* at 1271 (expressing concern over the adoption of the 10,000 year period).

118. See *id.* at 1271–72 (revealing the EPA’s contention that it complied with NAS because it considered the NAS recommendation and then promulgated a rule based on that recommendation and the policy concerns).

119. *Id.* at 1257.

120. See *id.* at 1315 (“[W]e vacate 40 C.F.R. part 197 to the extent that it incorporates a 10,000-year compliance period because . . . that compliance period is not . . . consistent with the recommendations of the National Academy of Sciences. The remaining challenges to the EPA rule are without merit.”)

Congress could enact legislation empowering EPA to deviate from the beyond-10,000 year recommendation of the National Academy of Sciences.¹²¹

After the ruling, the EPA developed a new period for evaluating repository performance to conform to the NAS's recommendation of 10,000 out to a million years.¹²²

Ultimately, the *Nuclear Energy Institute* case demonstrates that, despite opposition and administrative corrections, the Courts, the NAS, Congress, and President Bush agreed that the Yucca Mountain project must continue.¹²³

2. *New York v. Nuclear Regulatory Commission (2012)*

Four states, an Indian community, and environmental groups effectively petitioned the D.C. Circuit for a review of the NRC's 2010 update to the Waste Confidence Decision (WCD or WCD Update).¹²⁴ After determining that the NRC needed to consider the environmental effects of storing nuclear waste on site beyond the expected storage period, the Court vacated the December 10, 2010 WCD Update and the storage rule.¹²⁵

a. *Brief Overview of the WCD and 2010 Amendments*

The NRC produced the original WCD after the D.C. Circuit's decision in the 1979 case of *Minnesota v. NRC*.¹²⁶ In *Minnesota*, the Court directed the NRC to "consider whether there is reasonable assurance that an offsite storage solution for spent fuel will be available by . . . the expiration of the plants' operating licenses, and if not, whether there is reasonable assurance that the fuel can be stored safely at the sites beyond those

121. Press Release, NUCLEAR ENERGY INSTITUTE, *U.S. Court of Appeals Rejects Constitutional Challenge to Yucca Mountain Repository* (Jul. 9, 2004), available at <http://www.nei.org/newsandevents/yuccaappeals> (on file with the Washington and Lee University Journal of Energy, Climate, and the Environment).

122. See U.S. E.P.A., *About Yucca Mountain Standards*, <http://www.epa.gov/radiation/yucca/about.html> (last visited Apr. 28, 2013) (reflecting the EPA's new evaluation period of 10,000 out to a million years conforms to the requisite standards recommend by the NAS) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

123. See Inholfe, *supra* note 68, at 10 (noting that that top scientists, Congress, the President, and the Courts have affirmed the Yucca Mountain program).

124. *New York v. NRC*, 681 F.3d 471, 473 (D.C. Cir. 2012) (recognizing that multiple parties challenged the 2010 WCD amendment).

125. *Id.*

126. See *id.* (citing *Minnesota v. NRC*, 602 F.2d 412 (D.C. Cir. 1979)).

dates.”¹²⁷ The NRC fulfilled the Court’s directive by publishing its findings in the WCD in 1984.¹²⁸ Amendments to two of the finding gave rise to the 2012 action.¹²⁹

The 1984 WCD contained five “Waste Confidence Findings.”¹³⁰ Finding 1 provided that safe disposal of spent nuclear fuel in a mined geologic repository was technically possible.¹³¹ Finding 2 declared that a repository would be available by 2007–2009.¹³² Finding 3 assured the safe management of waste until the availability of the repository.¹³³ Finding 4 indicated that spent nuclear fuel could remain safely stored on nuclear plant sites for at least thirty years beyond each plant’s licensed life.¹³⁴ Finding 5 declared that independent storage would be available if needed.¹³⁵ These Findings served as a framework to ensure the safe on-site storage of spent nuclear fuel and the future availability of a permanent repository.

In 1990, the NRC updated Finding 2 in the WCD to include its estimate that a repository would be available by 2025 instead of 2009.¹³⁶ Although the NRC reviewed the WCD in 1999, it did not alter it.¹³⁷

In 2010, after receiving public comments, the NRC revised Findings 2 and 4 of the Waste Confidence Findings in the WCD.¹³⁸ In Finding 2, the NRC omitted its previous projection that a repository would be available by 2025 and declared that a repository would be available “when necessary.”¹³⁹ In support of this ambiguous projection, the NRC pointed to its evaluation of the “political and technical obstacles to permanent storage,” and its conclusion that a permanent storage option would be available when temporary storage became insufficient.¹⁴⁰

In 2010, the NRC also amended Finding 4 to allow nuclear plants to store spent nuclear fuel on site for 60 years beyond a plant’s licensed

127. *Id.* at 474–75.

128. *Id.* at 474–75.

129. *Id.* at 475.

130. *Id.* (discussing the findings of the Waste Confidence Decision, 49 Fed. Reg. 34,658, 34,659–60 (Aug. 31, 1984)).

131. *Id.*

132. *Id.*

133. *Id.*

134. *Id.*

135. *Id.*; Waste Confidence Decision, 49 Fed. Reg. 34,658, 34,659–60 (Aug. 31, 1984).

136. *See* Waste Confidence Decision Review, 55 Fed. Reg. 38,474, 38,505 (Sept. 18, 1990) (predicting the availability of a repository in 2025, based upon “new understandings about waste disposal”).

137. *See* *New York v. NRC*, 681 F.3d 471, 475 (D.C. Cir. 2012) (noting that the NRC reviewed the WCD in 1999 but did not change it).

138. *Id.*; Waste Confidence Decision Update, 75 Fed. Reg. 81,037 (Dec. 23, 2010).

139. *See* *NRC*, 681 F.3d at 475 (editing Finding 2 by eliminating the projected date of 2025).

140. *Id.*

life;¹⁴¹ licensed life includes 20-year life extensions, which the NRC has and will grant to many plants.¹⁴² The Commission determined that the spent fuel would not have “significant environmental impacts for at least 60 years beyond the licensed life for operation.”¹⁴³ The NRC determined that potential leaks from spent-fuel storage pools¹⁴⁴ and the low possibility of storage pool fires did not pose a dangerous threat to the environment.¹⁴⁵ In addition, the Commission committed to forming a plan for longer-term storage while conducting an evaluation of environmental impacts of on-site storage beyond the new 60-year period.¹⁴⁶ The environmental impact findings for the new 60-year period were still pending during this case.¹⁴⁷

b. The Arguments

The petitioners contended that the NRC violated the National Environment Policy Act of 1969 (NEPA) by failing to prepare an Environmental Impact Statement (EIS) before amending the WCD.¹⁴⁸ Before taking a “major federal action significantly affecting the quality of the human environment,” NEPA requires all federal agencies to issue a report, or EIS, detailing the environmental consequences associated with the action.¹⁴⁹ NEPA’s purpose is to ensure “fully informed and well-considered decision making.”¹⁵⁰ The NRC argued that the WCD amendments did not constitute the requisite “major federal action.”¹⁵¹ Even

141. *See id.* (amending Finding 4 to allow the storage of spent nuclear fuel on nuclear plant sites for up to 60 years beyond the plant’s license expiration).

142. *See* U.S. N.R.C., *Fact Sheet on Reactor License Renewal* (June 2012), available at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-reactor-license-renewal.pdf> (explaining the license renewal process and the plants that have petitioned for and received renewals).

143. *See* *New York v. NRC*, 681 F.3d 471, 475 (D.C. Cir. 2012) (indicating that the NRC altered Finding 4 by increasing the time allowed for spent nuclear fuel to be stored on nuclear reactor sites from 30 years to 60 years); Waste Confidence Decision Update, 75 Fed. Reg. 81,037, 38 (Dec. 23, 2010).

144. *See NRC*, 681 F.3d at 475 (demonstrating that the NRC believes its regulatory scheme is sufficient to reduce the potential health risks associated with an increased period for on-site storage).

145. *See id.* (concluding that “pool fires are sufficiently unlikely as to pose no significant environmental threat”).

146. *See id.* (reflecting the NRC’s commitment to “developing a plan for longer-term storage” and assessing “environmental impact of storage beyond the sixty-year post-license period”); Waste Confidence Decision Update, 75 Fed. Reg. 81,040 (Dec. 23, 2010).

147. *See NRC*, 681 F.3d at 483 (revealing that the NRC is currently conducting an EIS regarding the sixty-year period).

148. *See id.* at 476 (summarizing petitioners’ claim that NRC violated NEPA).

149. *See id.* (stating the NEPA requirement at issue in the case).

150. *See id.* (describing purpose of NEPA).

151. *See id.* (arguing that amending the WCD is not a ‘major federal action’ under NEPA).

if it had taken action that triggered NEPA requirements, the NRC contended that its findings constituted an Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI), which makes an EIS unnecessary.¹⁵² The D.C. Circuit disagreed with the NRC.¹⁵³

The Court determined that the NRC's amendments to the WCD constituted a major federal action requiring an EIS or a FONSI.¹⁵⁴ The Court stated that the Commission's assertion that the WCD serves as an EA¹⁵⁵ does not satisfy the requirements of NEPA.¹⁵⁶ The Court correctly reasoned that the NRC's assurance that a permanent storage option would be available "when necessary" could not be interpreted to mean that the possibility of a repository not being available was so low that researching the environmental impact of not having a repository was unnecessary.¹⁵⁷ The Court concluded that the NRC needed to take into account the environmental effects of not developing a repository.¹⁵⁸

The D.C. Circuit also determined that the NRC needed to "look forward to examine the effect of the additional time in storage, as well as examining past leaks in a manner that would allow the Commission to rule out the possibility that those leaks were only harmless because of site-specific factors or even sheer luck."¹⁵⁹ The NRC's revision to Finding 4 contained no analysis of the possible effects of such leaks over the 60-year period; rather, the NRC relied on the conclusion that past leaks produced "negligible near-term health effects."¹⁶⁰

The Court ruled that the NRC did not meet NEPA's requirements and vacated the WCD Update.¹⁶¹ In doing so, the Court acknowledged that

152. *See id.* (reasoning that the its assessments are sufficient and an EIS is not required).

153. *See id.* (indicating that the Court agrees with the petitioners).

154. *Id.* at 476.

155. The EA must conclude with a finding of no significant environmental impact (FONSI) in order to preclude an EIS. *See id.* at 478 (describing an EA, a FONSI, and an EIS).

156. *See id.* at 478–79 (assuming that the WCD is an EA "for the permanent storage conclusion . . . the EA is insufficient because a finding that 'reasonable assurance exists that sufficient mined geologic repository capacity will be available when necessary,' does not describe a probability of failure so low as to dismiss the potential consequences of such a failure").

157. *Id.*

158. Concluding that the NRC failed to examine the environmental impact of not opening a repository, the Court stated that "[a]n agency may find no significant impact if the probability is so low as to be 'remote and speculative,' or if the combination of probability and harm is sufficiently minimal." *Id.* at 479.

159. *Id.* at 481.

160. *See id.* at 481 (revealing that the NRC did not take into account the possibility that future leaks could be more dangerous than past leaks).

161. *See id.* at 483 (vacating the WCD Update and signaling that the NRC "must conduct a true EA regarding the extension of temporary storage").

the Commission's future production of the EIS concerning environmental impacts of on-site storage beyond the 60-year period might address the shortcomings exposed in the current case.¹⁶² For the present time, however, the NRC lacked the needed research and information to substantiate its changes to the WCD. As a result, the Court vacated the WCD Update.¹⁶³ In response to this ruling, the NRC has developed a schedule and is working to comply with the Court's decision.

C. Politics Clash with Repository Development

After six years of preparation, the DOE submitted its 8,600 page license application for Yucca Mountain to the NRC on June 3, 2008.¹⁶⁴ The Secretary of Energy Samuel Bodman stated that he was confident that the NRC would validate the Yucca Mountain repository.¹⁶⁵ The NWA gave the NRC three years to review the license application.¹⁶⁶ In March 2010, less than two years after filing the application, the DOE filed a motion to withdraw the license application from the NRC.¹⁶⁷ The following events best explain this seemingly unexpected move.

During the 2008 Democratic presidential primary election, then Senator Barack Obama united with Senator Harry Reid and pledged to "end the notion of Yucca Mountain."¹⁶⁸ Upon his 2008 presidential election,

162. See *id.* (recognizing that "some or all of the problems here may be addressed" when the NRC conducts the required assessment of environmental impacts).

163. *Id.*

164. U.S. N.R.C., *DOE's License Application For A High-Level Waste Geologic Repository at Yucca Mountain* (Mar. 29, 2012), <http://www.nrc.gov/waste/hlw-disposal/yucca-lic-app.html> (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

165. See Press Release, Samuel W. Bodman, Sec'y of Energy, *Yucca Mountain Press Conference* (June 3, 2008), available at <http://www.id.doe.gov/news/PressReleases/PR080603-YuccaSam/YuccaMountainPressConference.pdf> ("We are confident that the NRC's rigorous review process will validate that the Yucca Mountain repository will provide for the safe disposal of spent nuclear fuel and high-level radioactive waste in a way that protects human health and our environment.")

166. See U.S. N.R.C., *Fact Sheet on Licensing Yucca Mountain* (Jan. 2012), <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-yucca-license-review.html> [hereinafter *Licensing Yucca Mountain*] (verifying that that Congress set a three-year schedule for the NRC to review the license application and reach a decision on whether to improve construction of the repository) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

167. Motion to withdraw, *In re DOE (High Level Waste Repository)*, No. 63-001-HLW (A.S.L.B.P. Mar. 3, 2010) available at http://energy.gov/sites/prod/files/edg/media/DOE_Motion_to_Withdraw.pdf [hereinafter *Motion to Withdraw*].

168. See Editorial, *Where Does It All Go?*, N.Y. TIMES, Dec. 20, 2008, at A26 (indicating that then-Senator Obama pledged to end the Yucca Mountain development as did Nevada Senator Harry Reid); see also, Megan Easley, *Standing in Nuclear Waste:*

President Obama cut most of the funding for the project in his 2009 budget proposal.¹⁶⁹ Making his intention to ‘end the project’ clearer, President Obama appointed Senator Reid’s former aide, Gregory Jaczko, to be the Chairman of the NRC and Steven Chu as Secretary of Energy.¹⁷⁰ President Obama, Secretary Chu, and the DOE resolved to withdraw the Yucca Mountain application, and in March 2010, the DOE attempted to withdraw the Yucca Mountain license application from the NRC’s review with prejudice.¹⁷¹

The NRC’s Atomic Safety and Licensing Board (ASLB) denied the motion to withdraw the application with prejudice.¹⁷² Dismissing the license application with prejudice would likely prevent future review of the application.¹⁷³ Supporting its petition to withdraw the application, the DOE simply stated that in regards to policy the site was “not a workable option.”¹⁷⁴ Despite the DOE’s objections, the ASLB continued to evaluate the license application for Yucca Mountain because the ASLB determined that Congress had clearly instructed the DOE to file a license application and directed the NRC to review the application and reach a decision.¹⁷⁵ The

Challenging the Disposal of Yucca Mountain, 97 CORNELL L. REV. 659, 672–73 (Mar. 2012) (discussing President Obama and Harry Reid’s agreement to end the Yucca Mountain project).

169. See Wald, *supra* note 4, at A1 (revealing that President Obama’s 2009 budget proposal reduced much of the funding for the Yucca Mountain project).

170. See Mary Manning, *Obama Names Ex-Reid Aide to Lead Nuclear Commission*, LAS VEGAS SUN, May 13, 2009, available at <http://www.lasvegassun.com/news/2009/may/13/former-reid-aide-likely-lead-nuclear-commission/> (indicating that Jaczko’s appointment will hinder the construction of a repository at Yucca Mountain).

171. See *Yucca Mountain Nuclear Waste Repository*, WASH. OFFICE OF ATT’Y GEN., <http://www.atg.wa.gov/page.aspx?id=27624#.UPYXjidEGws> (last visited Apr. 7, 2013) (“In January 2010, President Obama, Secretary Chu and DOE determined they would withdraw with prejudice the application submitted by DOE to the NRC for a license to construct a permanent repository at Yucca Mountain . . .”) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment); see also Motion To Withdraw, *supra* note 168 (recalling the DOE’s intention to withdraw the Yucca Mountain License Application).

172. See Todd Garvey, CONG. RESEARCH SERV., R41675, CLOSING YUCCA MOUNTAIN: LITIGATION ASSOCIATED WITH ATTEMPTS TO ABANDON THE PLANNED NUCLEAR WASTE REPOSITORY 7–8 (June 4, 2012) [hereinafter CLOSING YUCCA MOUNTAIN] (indicating the ASLB’s rejection of the DOE’s attempt to withdraw the Yucca Mountain license application).

173. See *id.* at 8 (dismissing with prejudice generally bars an application from being re-filed in the future).

174. See DOE’s Reply to the Responses to the Motion To Withdraw, *In re* DOE (High Level Waste Repository), No. 63-001-HLW (A.S.L.B.P May 27, 2010), available at <http://www.state.nv.us/nucwaste/licensing/doe100527response.pdf> (arguing that Yucca Mountain “is not a workable option”).

175. See Nuclear Waste Policy Act (NWPA) of 1982 § 114(b), 42 U.S.C. § 10134(b) (2006) (“Secretary shall submit to the Commission an application for a construction

exchange between the DOE and the ASLB prompted the DOE to appeal the ASLB decision to the NRC.¹⁷⁶ The NRC received briefs from the parties addressing the issue of whether the Commission should stand behind the ASLB's decision or reverse it.¹⁷⁷ After reviewing the briefs, the NRC held a vote that resulted in 2-2 tie with one member abstaining.¹⁷⁸ Although the tie vote meant that the ASLB decision stands, the NRC directed the licensing panel to close its review of Yucca Mountain by September 30, 2011, possibly because of the lack of federal funding for the project.¹⁷⁹

Even though the NRC decided to halt the repository development process at Yucca Mountain, the 2-2 vote failed to uphold or reject the ASLB's decision on the legal status of Yucca Mountain.¹⁸⁰ Senator Harry Reid stated, "[t]oday's decision by the NRC brings the Yucca Mountain saga closer to its final conclusion."¹⁸¹ In contrast, Congressman Fred Upton of Michigan said, "[t]oday's action means the Yucca Mountain license application remains alive."¹⁸² As a result, the legal status of the Yucca Mountain program remained uncertain even though the NRC directed the licensing panel to stop working on the project.¹⁸³

D. The Judiciary Does Not Resolve Yucca Mountain's Status

While the DOE and NRC were involved in adjudicatory proceedings regarding the issue,¹⁸⁴ states and citizens sued in the D.C.

authorization for a repository at such site"); *see also*, U.S.D.O.E., No. LBP-10-11, slip op. at 5; *see also* NWPAA § 114(d), 42 U.S.C. § 10134(d) ("Commission shall consider an application for a construction authorization for all or part of a repository").

176. *See Licensing Yucca Mountain, supra* note 167 (indicating that the DOE appealed the ASLB's decision to the NRC).

177. *See* Tom Gottshall & Ross Shealy, PowerPoint presentation, *Yucca Mountain Litigation—Aiken County*, available at <http://cab.srs.gov/library/meetings/2012/fb/09yucca.pdf> (last visited Apr. 28, 2013) (indicating the NRC's review of briefs by both parties).

178. *See* Tetreault, *supra* note 6 (noting the 2-2 vote in the NRC).

179. *See* Tetreault, *supra* note 6 (revealing that the "Obama administration had requested Congress zero out the NRC's work on Yucca, as it had previously terminated funding and closed shop at the [DOE]"); *see also Licensing Yucca Mountain, supra* note 167 (confirming the decision to close review on Yucca Mountain).

180. *See* Tetreault, *supra* note 6 (indicating that the 2-2 vote in the NRC did not reject or uphold the ASLB's decision).

181. *See* Tetreault, *supra* note 6.

182. *See* Tetreault, *supra* note 6.

183. *See* Tetreault, *supra* note 6 (acknowledging that the legal status of Yucca Mountain remained uncertain but recognizing that the effect of the ruling made it very difficult for the development of Yucca Mountain to be started again).

184. *See* Tetreault, *supra* note 6 (indicating that the agency proceedings were separate from the judicial proceedings).

Circuit contesting the DOE's motion to withdraw the application.¹⁸⁵ In the case of *In re Aiken County*, the Court determined that the challenges to the DOE's attempt to withdraw the license application were not ripe, and the DOE's announcement that it would terminate the repository process did not constitute final agency action.¹⁸⁶

In August 2012, the Court responded to a petition for Writ of Mandamus and ordered "that [*In re Aiken County*] be held in abeyance and that the parties . . . file updates on the status of Fiscal Year 2013 appropriations with respect to the issues presented."¹⁸⁷ The D.C. Circuit's decision to postpone review gave Congress and the Administration an opportunity to address the nuclear waste storage issue.

IV. Signs of Progress

A. 2012 and 2013 Legislative Dialogue Regarding Nuclear Waste Storage

Recognizing the need to develop a solution for spent nuclear fuel storage, Congress returned to the nuclear waste discussions in 2012.¹⁸⁸ New Mexico Senator Jeff Bingaman proposed a bill that would implement the major recommendations of the BRC,¹⁸⁹ which included a consent-based approach to the siting of one or more short-term storage sites and geological repositories.¹⁹⁰ One of the most controversial parts of the bill, which departed from the recommendations of the BRC, stated that a link must exist between a temporary "storage facility and an agreement on a permanent geological repository."¹⁹¹ The linkage provision deterred potential co-sponsors from endorsing the bill, but Bingaman refused to de-link the temporary and permanent storage sites because he feared that a temporary site could become a de facto repository.¹⁹²

185. See *In re Aiken County*, 645 F.3d 428 (D.C. Cir. 2011) (seeking review of motion to withdraw license).

186. See *id.* at 437 (determining that the case was not ripe for review).

187. *In re Aiken County*, No 11-1271, Nuclear Reg. Rep. P 20,728 (D.C. Cir. Aug. 3, 2012).

188. See Richard M. Jones, *Forward Step: Senate Bill on Nuclear Waste*, FYI: THE AIP BULLETIN OF SCIENCE POLICY NEWS (Nov. 2, 2012), <http://www.aip.org/fyi/2012/133.html> [hereinafter *Forward Step*] (reviewing a 2012 congressional committee hearing concerning legislation that sought to provide plan for permanent storage of spent nuclear fuel) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

189. See *id.* (indicating that Senator "Bingaman's bill would implement the major recommendations of the Blue Ribbon Commission").

190. See *id.* (pursuing a consent-based approach to selecting a site for a repository).

191. See *id.* (revealing the disagreement caused by linking the selection of an interim storage facility to a permanent waste disposal site in the proposed bill).

192. See *id.* (stating Bingaman's concern that the selection of an interim storage option without a permanent option could cause the interim option to become de facto permanent).

Also in 2012, the U.S. Senate Energy and Natural Resources Committee (ENRC) conducted a hearing on the proposed bill.¹⁹³ The DOE Assistant Secretary testified that “[t]he Administration supports working with Congress to develop a consent-based process that is transparent, adaptive, and technically sound.”¹⁹⁴ Natural Resources Defense Council (NRDC) Senior Project Attorney Geoffrey Fettus told the ENRC that the NRDC supports the bill’s linkage of a temporary storage site to a geologic repository.¹⁹⁵

Constellation Energy Nuclear Group President and CEO Henry Barron told the ENRC that Bingaman’s bill lacked needed changes but provided “a positive start.”¹⁹⁶ Speaking as a representative of the Nuclear Energy Institute (NEI), Barron urged the ENRC to direct the NRC to continue the licensing process for Yucca Mountain.¹⁹⁷ Although the federal government would have to pay utility companies billions of dollars in damages for not providing storage for spent nuclear fuel, Barron asserted that a storage option provided by the federal government would influence utilities to settle their claims against the government in lieu of suing for damages.¹⁹⁸ While Barron supported a temporary storage site, he warned the ENRC that consolidating the storage of spent fuel provides only a temporary solution, and creating a geologic repository is vital for permanent storage.¹⁹⁹

Congress did not vote on Bingaman’s bill before the end of the 112th session in 2012, but Congress is expected to take action on this bill or a similar one during the 113th session in 2013.²⁰⁰ In February 2013, Senator Ron Wyden, the ENRC Chairman, predicted that Congress would draft a nuclear waste storage bill by the end of the session.²⁰¹

193. *See id.* (providing a summary of the hearing).

194. *Id.* (quoting DOE Assistant Secretary Lyons on the consent-based approach).

195. *See id.* (citing statements of support by Fettus).

196. *Id.* (quoting Constellation Energy Nuclear Group President and CEO Henry Barron).

197. *See id.* (urging the Committee to finish developing the Yucca Mountain repository).

198. *See id.* (acknowledging that the federal government owes billions of dollars in damages to utilities who would likely settle the their if the government could provide a suitable storage option for spent nuclear fuel).

199. *See id.* (cautioning the Committee that a consolidated storage site would provide a temporary solution but would not eliminate the need for a permanent storage option).

200. *See id.* (indicating that Congress is expected to continue to discuss and possibly pass legislation regarding a storage option in the 113th session).

201. *See Sen. Wyden Expects Draft Nuclear Waste Bill ‘Shortly’*, E2 WIRE: THE HILL’S ENERGY & ENVIRONMENT BLOG (Feb. 27, 2013 3:20 P.M. EST) <http://thehill.com/blogs/e2-wire/e2-wire/285319-sen-wyden-expects-draft-nuclear-waste-bill-shortly> (noting Senator Wyden’s expectation that a nuclear waste bill will be drafted by the end of this congressional session) (on file with the Washington and Lee Journal of Energy, Climate, and Environment).

B. The Obama Administration Articulates a Strategy for Storing Nuclear Waste

On January 11, 2013, the DOE announced that it plans to have “a pilot facility for the interim storage of used fuel from shutdown reactor sites operational by 2021,” “a larger interim storage facility by 2025,” and “a final geologic repository by 2048.”²⁰² This announcement reflects the Administration’s view about nuclear waste storage as detailed in the DOE’s report, *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*.²⁰³ The report revealed the DOE’s strategy for “transporting, storing, and disposing of [spent] nuclear fuel.”²⁰⁴ The DOE published this report in response to the recommendations provided by the BRC,²⁰⁵ which the Secretary of Energy received on January 26, 2012.²⁰⁶ The three main themes of the report include system design, consent-based facilities siting, and governance and funding.²⁰⁷ The subsections that follow summarize these themes.

1. Recommended System Designs

The Obama Administration articulated its support for a nuclear waste management system that included:

- A pilot interim storage facility with limited capacity capable of accepting used nuclear fuel and high-level radioactive waste and initially focused on serving shutdown reactor sites;

202. *Industry Welcomes DOE Used Fuel Management Strategy*, NUCLEAR ENERGY OVERVIEW, NUCLEAR ENERGY INSTITUTE (Jan. 11–17, 2013), available at <http://www.ibewlu220.com/documents/CPNPP-NEO/01-18-2013.pdf>.

203. *Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2.

204. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 1 (characterizing the report as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel . . .”).

205. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 5 (“The Strategy . . . serves as a statement of Administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste . . . [I]t presents the Administration’s response to the final report and recommendations made by the Blue Ribbon Commission . . .”).

206. *See Report to the Sec’y of Energy*, BLUE RIBBON COMM’N ON AMERICA’S NUCLEAR FUTURE (Jan. 2012), available at http://www.nei.org/corporatesite/media/filefolder/BRC_FinalReport_Jan2012.pdf (identifying the date of transmittal to Energy Secretary Chu).

207. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 4 (revealing the Administration’s key strategy elements in Figure 1).

- A larger, consolidated interim storage facility, potentially co-located with the pilot facility and/or with a geologic repository, that provides the needed flexibility in the waste management system and allows for important near-term progress in implementing the federal commitment; and
- A permanent geologic repository for the disposal of used nuclear fuel and high-level radioactive waste.²⁰⁸

The Administration decided that an incremental implementation of a flexible system provided the best approach because it ensures safety and “gain[s] trust among stakeholders.”²⁰⁹

2. Consent-based Facilities Siting

The Administration’s consent-based approach requires agreement at several jurisdiction levels and transparent communication of the benefits and risks of hosting an interim storage site or a repository.²¹⁰ Although Congress must define what constitutes consent,²¹¹ the proposed consent-based approach seems to provide an equitable way for the government to work with local communities to develop both interim storage facilities and a permanent repository.²¹² In reality, however, this approach may create more challenges than expected. For instance, opponents of nuclear energy may use the consent requirement as an opportunity to persuade communities to reject a nuclear waste storage site. If Nevada’s opposition to Yucca Mountain serves as an indicator, gaining the requisite public support may become the highest hurdle for the federal government to overcome in selecting and developing interim storage and repository sites.

If the government does not gain the requisite amount of consent from potential host communities, Congress must provide an alternative process for identifying, evaluating, and developing nuclear waste storage

208. *Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 4.

209. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 4 (“The objective is to implement a flexible waste management system incrementally in order to ensure safe and secure operations, gain trust among stakeholders, and adapt operations based on lessons learned.”).

210. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 4 (summarizing the strategy of consent-based facility siting in Figure 1).

211. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 9 (acknowledging that Congress must define consent and determine how much consent is required).

212. *See Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 9 (characterizing the host communities as ‘partners’ with the federal government during the siting processes).

sites. For instance, Congress could consider purchasing land from states or individuals to develop a storage site.

3. Governance & Funding

Adopting the recommendation of the BRC, The Administration supports the creation of a new waste management and disposal organization (MDO) to ensure “stability, focus, and credibility to build public trust and confidence.”²¹³ Ultimately, the MDO’s responsibilities would include managing and disposing of spent nuclear fuel.²¹⁴ The Administration did not provide details regarding these responsibilities and the MDO’s power, but the Administration plans to work with Congress to ensure that the MDO has the requisite authority to carry out its mission.²¹⁵

According to the DOE’s report, the funding for the MDO should come from the “past and future fee receipts and accrued interest” resulting from the fees established under the NWPA.²¹⁶ Although Congress passed budgeting acts that disconnected “the revenues from the expenditures necessary for a waste solution,”²¹⁷ the Administration proposed changing the budgeting acts to redirect the revenue collected from the energy fees to cover the expenses associated with nuclear waste disposal.²¹⁸ After outlining its preferred changes, the Administration determined that “[a]ny new funding structure . . . will need to balance increased funding flexibility and rigorous spending oversight to help assure that the program is implemented in the most cost-effective manner possible, while still holding the MDO accountable to the President and Congress.”²¹⁹ Additional details regarding funding are expected to appear in the President’s fiscal year 2014

213. See *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 9 (reflecting the Administration’s support of the BRC’s recommendation of creating a new organization to manage waste disposal).

214. See *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 10 (providing an overview of the MDO’s responsibilities).

215. See *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 10 (indicating the Administration’s willingness to work with Congress to apportion appropriate powers to the MDO).

216. See *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 11 (funding the MDO through revenue raised through fees established under the NWPA).

217. *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 11.

218. See *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 11 (expressing the Administration’s desire to reform the budgeting acts in order to supplement the cost of disposing of the radioactive waste).

219. *Strategy for the Management and Disposal of Used Nuclear Fuel*, supra note 2, at 12.

budget proposal;²²⁰ however, such details must also address whether the funds in the NWF will be used only for expenditures associated with nuclear waste storage, or whether the funds will be used for ancillary expenditures not mentioned in the NWPA.

The Administration's response to the BRC's recommendation signals significant progress in developing a workable solution to spent nuclear fuel storage. As the recent past demonstrated, however, many obstacles remain in the way of interim storage and repository development. Despite these challenges, the federal government must forge ahead and develop both interim and permanent sites to store spent nuclear fuel.

V. The Next Step: Passing Legislation and Gaining Community Support

A. Congressional Action

By issuing its formal statement and strategy for storing nuclear waste, the Obama Administration passed the ball to Congress. Now Congress must adopt legislation to move the nation closer to opening a permanent storage site for spent nuclear fuel. Among other issues, the legislation should address the linkage matter and provide an alternative to the consent-based site selection. Because past delays and setbacks derailed repository development, Congress should deal with the entire storage problem by linking an interim storage option with a permanent repository. This linkage would ensure that the interim storage site does not become a *de facto* repository, as Senator Bingaman and NEI Spokesperson Henry Barron feared.²²¹ Although a linkage provision provides an ideal solution to developing waste storage sites, Congress should also provide an alternative process for developing interim storage sites if the linkage provision causes significant delay.

Along with providing a definition for consent, or community support, Congress should provide an alternative process that allows the DOE to file an application with the NRC for repository development if the government fails to gain the requisite level of consent. This alternative process should be specific and leave little discretion to the agencies. Such a process will guard against changing political powers that could prematurely terminate a permanent storage site's development.

Congress should also reconsider the Yucca Mountain site. Decades of research and billions of dollars of development have indicated that the

220. See *Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 13 ("The President's fiscal year 2014 budget will include additional details regarding funding for the program of work in this Strategy document.").

221. See *Forward Step*, *supra* note 189 (discussing Senator Bingaman's concerns that no permanent solution would be reached).

Nevada site contains the requisite qualities for safely storing radioactive waste.²²² Because such research and study rendered Yucca Mountain the best site for storing nuclear waste in the United States,²²³ its reopening merits strong consideration. Influential members of the House of Representatives have expressed their desire to see the Yucca Mountain project continued.²²⁴ Speaker of the House John Boehner expressed his desire to see the program revived, contending, “[w]e’ve invested tens of billions of dollars in a storage facility that’s as safe as anything we’re going to find.”²²⁵ Although some Congressmen openly support the Yucca Mountain project, the reopening of the project will only result from a bipartisan effort between the House, Senate, and the Administration.

The Yucca Mountain debate will continue to unfold before the NRC, in the D.C. Circuit, and between politicians in the years ahead.²²⁶ The new NRC Chairman, succeeding Chairman Jaczko,²²⁷ could have a substantial effect on the future of the Nevada site.²²⁸ Since her confirmation in June 2012,²²⁹ NRC Chairman Allison Macfarlane²³⁰ received a positive evaluation from members of the U.S. Senate Committee on Environment and Public Works.²³¹ Committee Chairman Senator Barbara Boxer said, “I’m really happy to see the cooperation and respect” among the NRC and

222. See generally CLOSING YUCCA MOUNTAIN, *supra* note 173 (chronicling the time and money that has been invested in the Yucca Mountain project).

223. See Inholfe, *supra* note 68, at 8–9 (determining that Yucca Mountain was best site for the repository).

224. See CLOSING YUCCA MOUNTAIN, *supra* note 173, at 28 (listing the chairpersons of the House Budget Committee, House Natural Resources Committee, and House Committee on Science, Space, and Technology among those who oppose the termination of the Yucca Mountain project).

225. See CLOSING YUCCA MOUNTAIN, *supra* note 173, at 28 (citing Statement by Rep. John Boehner to the City Club of Cleveland (August 24, 2010)).

226. See CLOSING YUCCA MOUNTAIN, *supra* note 173, at 28 (recognizing that the Yucca Mountain controversy will unfold in the NRC, D.C. Circuit, and politically).

227. See John Broder & Matthew Wald, *Chairman, NRC to Resign Under Fire*, N.Y. TIMES, May 21, 2012, at A13 (revealing that Chairman Jaczko’s resignation in May 2012 is effective upon the appointment of his successor).

228. See CLOSING YUCCA MOUNTAIN, *supra* note 173, at 28 (acknowledging that “changes in the makeup of the NRC may also have significant impact on the future of Yucca Mountain”).

229. Richard Jones, *Congeniality and Collaboration: Senate Hearing on New Leadership at the NRC*, FYI: THE AIP BULLETIN OF SCIENCE POLICY NEWS (Nov. 16, 2012), <http://www.aip.org/fyi/2012/137.html> (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

230. See CLOSING YUCCA MOUNTAIN, *supra* note 173, at 28 (listing Macfarlane as a “former member of the Blue Ribbon Commission and an associate professor of environmental science and policy at George Mason University”).

231. See Jones, *Congeniality and Collaboration*, *supra* note 230 (revealing that the Committee looked forward to a collaborative relationship with the new NRC Chairman).

the Senators.²³² Although some recognize Chairman Macfarlane as a Yucca Mountain critic,²³³ only time will tell if the cooperation between the NRC and Senate will result in legislation that solves the nuclear waste storage problem.

B. Gaining Public Support

Because both the DOE's report and Senator Bingaman's bill support a consent-based storage option for nuclear waste,²³⁴ gaining public and local support will be crucial for the development of both interim and permanent storage sites. Although public opinion of nuclear energy rested on shaky ground after the Fukushima Daiichi plant failure,²³⁵ a March 2012 poll indicated that 77 percent believed that nuclear energy would be "important in meeting the [United States'] future electricity needs."²³⁶ Of those polled, 80 percent believe that the federal government needs to develop a permanent nuclear waste disposal site.²³⁷ In regards to a temporary storage site, 62 percent agreed that fuel could be safely stored on-site, but 78 percent agreed that one or two storage sites are preferable for storing spent fuel.²³⁸ Public opinion seems to support the development of a federal repository; however, the real test will entail garnering enough local support to approve repository development.

As the DOE's 2013 report states, "[p]ublic trust and confidence is a prerequisite to the success of the overall effort . . . therefore, public perceptions must be addressed regarding the program's ability to transport, store, and dispose of used nuclear fuel . . . in a manner that is protective of the public's health, safety, and security and protective of the environment."²³⁹

232. See Jones, *Congeniality and Collaboration*, *supra* note 230.

233. See CLOSING YUCCA MOUNTAIN, *supra* note 173, at 28 (recognizing that some consider Chairman MacFarlane a critic of the Yucca Mountain program).

234. See *Forward Step*, *supra* note 189 (recommending a consent-based approach); see also *Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 9 (proposing a consent-based approach).

235. See Michael Cooper & Dalia Sussman, *Nuclear Power Loses Support in New Poll*, N.Y. TIMES, Mar. 23, 2011, at A15 (indicating that public support of nuclear power diminished after the Fukushima accident).

236. See *Gradual Growth in U.S. Support for Nuclear*, WORLD NUCLEAR NEWS (Sept. 24, 2012), http://www.world-nuclear-news.org/NP-Gradual_growth_in_US_support_for_nuclear-2409124.html (listing the results of the poll) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).

237. *Id.*

238. *Id.*

239. *Strategy for the Management and Disposal of Used Nuclear Fuel*, *supra* note 2, at 9.

VI. Conclusion

The Congressional dialogue regarding the nuclear waste storage issue and the Obama Administration's response to the BRC recommendations set forth in Part IV, *supra*, demonstrate that the federal government realizes the importance of developing a permanent storage site for spent nuclear fuel. By working together in a bipartisan manner, Congress can implement an effective strategy for removing spent nuclear fuel from plant sites to interim storage sites, and eventually to permanent storage sites.

First, Congress should seriously consider the strategies proposed in the DOE's 2013 report and the plan articulated in former Senator Bingaman's bill. Both the report and bill contain plausible strategies for resolving the nuclear waste storage problem and provide an informative starting point for Congress. Second, Congress should consider reopening the Yucca Mountain program. Both the federal government and scientific opinion recognized Yucca Mountain as the best site for safely storing nuclear waste. This option should be reconsidered because of its scientific merits and because the government has already invested decades of research and billions of dollars in ensuring the workability of this option.

The rapid cessation of the Yucca Mountain development demonstrated how quickly a long-term storage plan could end prematurely. The Yucca Mountain project should inform Congress' decisions as it drafts new nuclear waste storage legislation. For instance, Congress should create "safeguards" in its new legislation to prevent the termination of nuclear storage site development, except for legitimate health and safety risks. One safeguard should require the DOE to produce sufficient evidence of threats to health and safety before the DOE can withdraw a repository license application from NRC review. Such safeguards will help our nation move forward with a decisive storage plan that will not result in lost time and wasted development funds. While Yucca Mountain may eventually store spent nuclear fuel, it currently serves as an example of a wasted option. Congress and the Administration must work together to develop an enduring storage solution. Now is the time for collaboration. Now is the time to solve the nuclear waste storage problem.