

YUCCA MOUNTAIN—NEVADA’S PERSPECTIVE

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I. INTRODUCTION

At the time of this writing, the Obama Administration has announced that the decades-old proposal to make Yucca Mountain, Nevada, the site of the country’s first geologic repository for high-level nuclear waste (HLNW) and spent nuclear fuel (SNF) will be terminated.¹ Despite optimism among those of us opposed to the project, this pronouncement has not yet resulted in an official end to the Yucca Mountain project. However, even if the project is terminated as the Administration proposes, the history of the failed attempt to locate a repository at Yucca Mountain offers useful lessons for the future.

While the United States Department of Energy’s License Application to construct and operate the \$96 billion HLNW repository² remains an active case before the U.S. Nuclear Regulatory Commission,³ the problems inherent with the

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1. *FY 2010 Appropriations Hearing Before the Subcommittee on Energy and Water Development of the House Committee on Appropriations*, 111th Cong. 10-11 (2009) [hereinafter *Appropriations Hearing*] (statement of Steven Chu, Secretary, U.S. Dep’t of Energy), available at http://appropriations.house.gov/Witness_testimony/EW/Steven_Chu_06_03_09.pdf.

2. U.S. Department of Energy Office of Civilian Radioactive Waste Management, *U.S. Department of Energy Releases Revised Total System Life Cycle Cost Estimate and Fee Adequacy Report For Yucca Mountain Project* (Aug. 5, 2008), <http://www.energy.gov/6451.htm>.

3. In the Matter of U.S. Dep’t of Energy, U.S. Nuclear Regulatory Comm’n, No. 63-001-HLW (May 11, 2009). See also Letter from Marvin S. Ferte, President and Chief Executive Officer,

proposed site and the license application are legion.⁴ Supporters of the project dismiss the tentative demise of Yucca Mountain as a political accommodation,⁵ but the truth is more complex. Over the twenty plus years that the State of Nevada has opposed the project, scientific and logistical realities have come to light which prove that Yucca Mountain is a singularly unsafe site. In addition to its location far distant from the waste itself, it cannot isolate the highly toxic and extremely long-lived waste from the accessible human and natural environment. What may have begun as an unprecedented upwelling of populist rage in Nevada at the injustice of being singled out politically to house the country's entire and growing stockpile of commercially-generated HLNW and SNF has become something more. It has grown into a compelling and well-documented case against a national program which represents unacceptable risks both environmentally and economically to the entire country.

The United States needs to find the right combination of scientifically sound solutions for HLNW disposal. While progress has been made in development of dry cask storage technology at reactor sites, eventually the nation will need regional repositories for ultimate disposition. An international consensus prefers geologic disposal⁶ because the right geological setting will isolate and contain the waste, thus limiting the transport of radionuclides into the human and natural environment when containers fail. Unlike the stable geological settings being examined in countries like Sweden and Finland,⁷ the geology at Yucca Mountain provides little protection against degradation of the waste packages and movement of the waste to the accessible environment.⁸ Indeed, the proposed repository relies almost exclusively on a complex and highly suspect system of engineered barriers as the means to contain the waste.⁹

Nuclear Energy Inst., to Gregory B. Jaczko, Chairman, U.S. Nuclear Regulatory Comm'n 1 (Nov. 13, 2009), <http://www.state.nv.us/nucwaste/news2009/pdf/nei091113jacksko.pdf> (last visited Feb. 14, 2010).

4. On February 17, 2010, an NRC Construction Authorization Board panel temporarily halted the licensing proceeding, pending the expected DOE filing of a motion to withdraw its license application. See <http://www.kxnt.com/Yucca-Mountain-License-Hearings-Stopped/6380628>.

5. *Yucca Mountain Politics: Despite What Critics Say, Science Never Drove the Plan to Make Nevada a Nuclear Dump*, LAS VEGAS SUN, Mar. 18, 2009, available at <http://www.lasvegassun.com/news/2009/mar/18/yucca-mountain-politics>. During the presidential campaign, candidate Obama announced his opposition to the Yucca Mountain project. *Id.* This promise combined with the prominence of Nevada Senator Harry Reid, majority leader of the U.S. Senate and a vocal opponent of the project, are considered factors in the Administration's announcement of its intention to terminate the project. *Id.*

6. Paul P. Craig, *High Level Nuclear Waste: The Status of Yucca Mountain*, 24 Ann. Rev. Energy Environ. 461, 464 (1999), available at <http://arjournals.annualreviews.org/doi/pdf/10.1146/annurev.energy.24.1.461>.

7. *Yucca Mountain and High-Level Nuclear Waste Disposal: Hearing on the Status of the Yucca Mountain Project Before the Environment and Public Works Comm.*, 109th Cong. 4, n.7 (2006) (testimony of Allison M. Macfarlane), available at http://epw.senate.gov/109th/MacFarlane_Testimony.pdf.

8. *Id.* at 2.

9. See David Stahl, *Drip Shield and Backfill*, in UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION'S HIGH-LEVEL NUCLEAR WASTE 301, (Rodney C. Ewing and Allison M. Macfarlane eds., 2006). In the chapter entitled *Drip Shield and Backfill*, David Stahl discusses the titanium drip shields proposed by the U.S. Department of Energy for installation prior to the closure of the proposed repository. According to Stahl, the proposed titanium drip shields will be susceptible to the corrosive effects of fluoride in the underground water at Yucca Mountain and hydrogen-induced crack-

The basic problem, and one that is unique to the Nevada site, is that a repository at Yucca Mountain would be positioned above the water table in an oxidizing setting where corrosive infiltrating water will rapidly degrade the waste containers. This will cause the release of radionuclides and result in radiation doses in excess of the public health standard established by the U.S. Environmental Protection Agency (EPA).¹⁰ This violation is expected to occur within a few hundred years of repository closure.¹¹

II. SUMMARY

Yucca Mountain—that barren rise in the desert ninety miles from Las Vegas—is the nation's only site identified for the potential location of the first geological repository for commercially-generated HLNW and SNF. Many assume that Yucca Mountain has geologic and climatic qualities that make it uniquely suitable to isolate the thousands of metric tons of the world's most lethal, long-lived waste currently accumulating at 104 operating nuclear power plants across the United States.¹² Unfortunately, Yucca Mountain is an exceptionally bad site, and there are innumerable sound technical reasons to end the project. In addition, there is a history of institutional misconduct on the part of federal government agents which has so pervaded the controversial project that it has undermined whatever public confidence may have once existed in the program.¹³

Distilled to its essence, Yucca Mountain is geologically incapable of isolating deadly nuclear waste for the time required. Yucca Mountain is prone to earthquakes¹⁴ and has evidence of recent volcanic activity.¹⁵ Groundwater moves

ing. Neither of these effects is well-understood. At a minimum, Stahl recommends that further and more detailed investigation is required. *Id.* 301–13. As part of its safety case before the Nuclear Regulatory Commission, Nevada contends that DOE's plan to install the drip shields about 100 years after wastes are emplaced in the tunnels cannot be justified because if installation proves to be defective or impossible, it will be too late to assure safety by alternative methods.

10. Yucca Mountain and High Level Nuclear Waste Disposal: Hearing on the Status of the Yucca Mountain Project Before the Environment & Public Works Comm., 109th Cong. 4 (2006) (Statement of Robert Loux, Executive Director, Nevada Agency For Nuclear Projects), *available at* http://epw.senate.gov/109th/Loux_Testimony.pdf. This defect is one of hundreds which compose Nevada's safety case against the proposed Yucca Mountain repository. *See* State of Nevada Petition to Intervene, In the Matter of U.S. Dep't of Energy, U. S. Nuclear Regulatory Commission, No. 63-001-HLW, *available at* http://www.state.nv.us/nucwaste/licensing/Contentions_NV.pdf.

11. Jay Schecker, Los Alamos National Laboratory, Yucca Mountain: Nuclear Waste Repository Safe for Future Generations 3 (2009), www.lanl.gov/1663/633.pdf (last visited Feb. 14, 2010).

12. In addition to the 104 operating nuclear power plants, twenty-nine nuclear plants have been permanently shut down but waste continues to be stored at these facilities. *See* U.S. Dep't of Energy, Office of Civilian Radioactive Waste Mgmt., Waste Locations by Site, http://www.ocrwm.doe.gov/info_library/newsroom/photos/photos_natlmap.shtml#startcontent.

13. *See* U.S. DEP'T OF ENERGY, OFFICE OF INSPECTOR GEN., OFFICE OF INSPECTIONS AND SPECIAL INQUIRIES, INSPECTION REPORT: QUALITY ASSURANCE WEAKNESSES IN THE REVIEW OF YUCCA MOUNTAIN ELECTRONIC MAIL FOR RELEVANCY TO THE LICENSING PROCESS (2005) [hereinafter QUALITY ASSURANCE WEAKNESSES], <http://www.ig.energy.gov/documents/CalendarYear2005/ig-0708.pdf>.

14. Yucca Mountain is as seismically active as the California Bay Area. There have been more than 600 earthquakes within a fifty-mile radius of the site within the last twenty years. A major quake knocked windows out of a DOE facility in the early 1990s. In 1998 and 1999 there were a series of earthquakes at greater frequencies than previously observed. One trembler in Nevada derailed a train

rapidly through an extensively fractured, highly oxidizing subsurface environment where it becomes highly corrosive and will quickly erode the metal waste containers and move the deadly radioactive material into the aquifer below and, from there, rapidly into the environment.

Data generated by the U.S. Department of Energy (DOE) shows that the site is so porous that the mountain itself contributes almost nothing to waste isolation.¹⁶ Instead, DOE relies almost completely on a system of engineering fixes, the most outlandish of which are waste disposal containers that must last for at least one million years combined with approximately sixty miles of tunnels lined with thousands of titanium drip shields that DOE does not plan to install for 100 to 300 years or more.¹⁷ Nevada and independent scientists who have studied the composition of the proposed containers have shown they will corrode in a few hundred years or less.¹⁸ In addition to the fundamental deficiencies of the site itself, Yucca Mountain is located thousands of miles from most of the accumulating waste, a factor which presents great risks to communities over the thousands of miles the waste would travel during the forty to fifty years such transportation would be required. In short, Yucca Mountain cannot perform the func-

on a proposed nuclear waste transport route. There are thirty-four active fault lines in the area, including two that cross the repository site itself. See STATE OF NEVADA, AGENCY FOR NUCLEAR PROJECTS, EARTHQUAKES IN THE VICINITY OF YUCCA MOUNTAIN, <http://www.state.nv.us/nucwaste/yucca/seismo01.htm> (last visited Feb. 14, 2010); Earth Mountain View, Yucca Mountain Nuclear Waste Dump the Road to Disaster, <http://www.earthmountainview.com/yucca/yucca.htm> (last visited Feb. 14, 2010); YuccaMountain.org, Union Pacific Freight Train Derailment, Bridge Collapse and Repair, <http://www.yuccamountain.org/train08.htm> (last visited Feb. 14, 2010).

15. A notable feature of the Yucca landscape is a line of lava cones that extends to the west of Yucca Mountain. Further evidence supporting the presence of a magma pocket comes from research published in *Science* magazine under contract with the U.S. Nuclear Regulatory Commission. The crust at Yucca is expanding and moving westward at an accelerating rate. The authors conclude that this evidence is “consistent with” the presence of a magma pocket under Yucca Mountain. J.S. Savage et al., *Detecting Strain in the Yucca Mountain Area, Nevada*, 282 *SCIENCE* 1007 (1998); See also, Eugene I. Smith and Deborah L. Keenan, Yucca Mountain Could Face Greater Volcanic Threat, 86 *EOS, TRANSACTIONS, AMERICAN GEOPHYSICAL UNION* 317, 317-321 (2005), available at <http://www.state.nv.us/nucwaste/news2005/pdf/eos20050830.pdf>.

16. In 1996, DOE released a report by Los Alamos National Laboratory researchers that documented elevated levels of Chlorine-36 in five of the faults uncovered by the tunnel boring machine within the proposed repository block. These elevated Chlorine-36 levels could only have come from the atmospheric nuclear tests conducted in the Pacific Ocean less than fifty years ago. To get 600 or more feet below the surface where they were discovered in less than 50 years, this radioactive isotope had to have been carried there by water flowing rapidly downward from the ground surface—prima facie evidence that fast groundwater pathways exist at Yucca Mountain. The significance of this finding is that DOE's own siting guidelines, and the Nuclear Regulatory Commission licensing regulations, require a site to be disqualified if it is shown that groundwater travel time through the repository to the accessible environment (e.g., the aquifer) is shorter than 1,000 years. SCHOU S. LEVY ET AL., LOS ALAMOS NATIONAL LABORATORY, CHLORINE-36 INVESTIGATIONS OF GROUNDWATER INFILTRATION IN THE EXPLANATORY STUDIES FACILITY AT YUCCA MOUNTAIN, NEVADA, (1997), http://www.osti.gov/bridge/product.biblio.jsp?query_id=0&osti_id=555352.

17. See David W. Shoesmith, *Waste Package Corrosion, in UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION'S HIGH-LEVEL NUCLEAR WASTE* 287-99, (Rodney C. Ewing and Allison M. Macfarlane eds., 2006); David Stahl, *Drip Shield and Backfill, id.* at 301-13.

18. Press Release, State of Nevada, Agency for Nuclear Projects, Laboratory Experiments Indicate the Metal Alloy Nuclear Waste Containers at Yucca Mountain will in Time Dissolve (Dec. 12, 2002), <http://www.state.nv.us/nucwaste/news2002/nm11858.htm>.

tion for which it is intended. Indeed, the project is fraught with a host of insurmountable technical, safety, environmental, and institutional problems that simply cannot be engineered around or ignored.

With the election of President Barack Obama, the Yucca Mountain Project is on track for termination.¹⁹ Despite the Obama Administration's decision to end the project, however, Congress continues to fund it, albeit only with enough funding to allow for the continuation of the three to four year licensing proceeding before the United States Nuclear Regulatory Commission (NRC).²⁰ The Nuclear Waste Policy Act provides that the Secretary of Energy can *at any time* declare the site unsuitable, cease work, and report to Congress on more viable recommendations for future waste management approaches.²¹ To date, this has not occurred despite the considerable costs to all participants in NRC's licensing proceeding. However, a much-heralded "Blue Ribbon Commission" has been established to examine the nation's nuclear waste problem and make recommendations on alternative courses of action.²² In the meantime, progress has been made in the development of "dry cask" storage facilities at reactor sites.²³ These dry cask storage facilities have been certified by NRC to safely contain the SNF. NRC has found that SNF can be safely stored at reactor sites for at least 100 years or more,²⁴ a fact which obviates any "emergency" to establish a permanent geologic repository.

19. *Appropriations Hearing*, *supra* note 1 at 10. In June 2009, Secretary of Energy Steven Chu stated to the House Committee on Appropriations Subcommittee on Energy and Water Development:

The FY 2010 budget request of \$197 million for OCRWM [the United States Department of Energy's office of Civilian Radioactive Waste Management] implements the Administration's decision to terminate the Yucca Mountain program while developing nuclear waste disposal alternatives. All funding for development of the Yucca Mountain facility would be eliminated, such as further land acquisition, transportation access, and additional engineering. The budget request includes the minimal funding needed to explore alternatives for nuclear waste disposal through OCRWM and to continue participation in the Nuclear Regulatory Commission (NRC) license application process, consistent with the provisions of the Nuclear Waste Policy Act. The Administration intends to convene a "blue-ribbon" panel of experts to evaluate alternative approaches for meeting the federal responsibility to manage and ultimately dispose of spent nuclear fuel and high-level radioactive waste from both commercial and defense activities. The panel will provide the opportunity for a meaningful dialogue on how best to address this challenging issue and will provide recommendations for managing and disposing of spent nuclear fuel and high-level radioactive waste.

Id. at 10–11.

20. Yucca Mountain Funding Nears its Demise, Congress Daily, August 21, 2009, *available at* <http://www.govexec.com/dailyfed/0809/082109cdpm3.htm>.

21. Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10133(c)(3) (2006).

22. *Appropriations Hearing*, *supra* note 1, at 11. The much-heralded Blue Ribbon Commission to examine options for high-level nuclear waste disposal was finally named January 29, 2010. *See* Press Release, Secretary Chu Announces Blue Ribbon Commission on America's Nuclear Future (Jan. 29, 2010), *available at* <http://www.energy.gov/news/8584.htm>

23. U.S. NUCLEAR REGULATORY COMM'N, DRY CASK STORAGE OF SPENT NUCLEAR FUEL FACT SHEET (2008), <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dry-cask-storage.html>.

24. U.S. Nuclear Regulatory Comm'n, Standard Review Plan for Dry Cask Storage Systems (1997), <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1536/final/#abs>.

Because Yucca Mountain's fate is still officially uncertain, Nevada's sister western states, Washington and Idaho, may be worried that radioactive waste at Hanford and the Idaho National Engineering and Environmental Laboratory will be maintained where it is presently located. Whatever the destiny of the 70,000 metric tons²⁵ of accumulating commercial HLNW, SNF, and other DOE and defense-related radioactive waste slated for disposition at Yucca Mountain, it is clear that public health and protection of the environment, not political expediency, should be the guiding criteria for any geologic repository for high-level radioactive waste.

III. HISTORICAL BACKGROUND

In 1982, Congress passed the Nuclear Waste Policy Act (NWPA).²⁶ The seminal NWPA was originally intended to guide the nation in identifying and developing regional repositories for tons of HLNW and SNF accumulating at commercial nuclear power plants and nuclear weapons testing facilities scattered around the nation. The NWPA's supporters hailed the legislation as "momentous."²⁷ U.S. Representative Moorhead from California stated, "[W]e have a good bill, one that will adopt a permanent policy for this country and one which I think will work."²⁸ Idaho's Senator McClure declared that "this bill is a truly comprehensive approach to the ultimate solution to disposition of the large and varied quantities of nuclear waste existing today in the United States and nuclear waste which will be created in the years and decades ahead."²⁹ When he signed the bill into law in January 1983, President Reagan joined the chorus: "The step we are taking today should demonstrate to the public that the challenge of coping with nuclear waste can and will be met."³⁰ Predictably, not everyone was so sanguine:

In truth, the act is a case study in everything the federal government has done wrong for forty years. A political masterpiece of special-interest legislation, it creates only the illusion of a federal policy. As might be expected when Congress enacts a measure few of its members

25. 42 U.S.C. § 10134(d). The NWPA expressly limits the capacity of a geologic repository to a 70,000 metric ton cap apportioned by the DOE to consist of 63,000 metric tons of commercial high-level waste and 7,000 metric tons of defense high-level waste and spent nuclear fuel. 42 U.S.C. 10134(d). The now 62,000 metric tons of accumulated commercial high-level nuclear waste and spent nuclear fuel at nuclear power plants indicate the need for a second repository. The 70,000 metric ton amount will be reached by spring of 2010.

26. 42 U.S.C. § 10101, *et seq.* (2009) (originally enacted as Pub. L. No. 97-425, 96 Stat. 2201 (1983); amended by Pub. L. No. 100-203, 101 Stat. 1330-227 (1987) and Pub. L. No. 102-486, 106 Stat. 2923 (1992)).

27. DONALD L. BARTLETT & JAMES B. STEELE, *FOREVERMORE: NUCLEAR WASTE IN AMERICA* 129 (W.W. Norton & Co. 1985). *FOREVERMORE*'s authors were Pulitzer Prize-winning reporters for the *Philadelphia Inquirer* who spent eighteen months investigating reactor sites and nuclear waste dumping grounds trying to elucidate the grave technical and political problems of how to dispose of nuclear waste accumulating at nuclear power plants around the country. *Id.* at 9-11.

28. *Id.*

29. *Id.*

30. *Id.*

understand, the bill was a Christmas tree festooned with favors for private groups and influential politicians. It offered a little something for everyone and a catalog of excuses for not doing what government had promised since the 1960s—building a repository.³¹

The NWPA has a little something for everyone including advocates of reprocessing, opponents of reprocessing, and locales which may actually seek temporary storage sites. For the electricity-generating utilities, the NWPA provided a date certain for the federal government to dispose of the HLNW.³² For the states with targeted sites, the NWPA offered conditional vetoes subject to congressional overrides.³³

Notwithstanding the seemingly contradictory provisions of the NWPA and the government's persistent failure to abide by statutory mandates and deadlines, the NWPA recognized the essential role of host states (or Indian tribes) and the need to assure any eventual host entity of the proposed repository site's suitability and safety.³⁴ The NWPA went to some lengths to establish a credible, scientifically sound site selection process to be largely implemented by DOE. The basic prerequisite was that DOE should select a site that had basic geology capable of isolating radioactive waste from the human and natural environment for hundreds of thousands of years. Manmade barriers cannot substitute for geologic deficiencies.³⁵

A. Designation of Yucca Mountain as the Sole Site for Characterization

The NWPA required the Secretary of Energy to nominate five sites for a repository in 1984 and to recommend three of them to the President for further study by January 1, 1985.³⁶ The Act also required the Secretary of Energy to

31. *Id.*

32. 42 U.S.C. § 10222 (a)(5)(B) (2009) (“[I]n return for the payment of fees established by this section, the Secretary, beginning not later than January 31, 1998, will dispose of the high-level radioactive waste or spent nuclear fuel involved as provided in this subchapter.”). As of 2010, there is no repository on the horizon.

33. 42 U.S.C. § 10135(c) (“If any notice of disapproval of a repository site designation has been submitted to the Congress . . . such site shall be disapproved unless, during the first period of 90 calendar days of the continuous session of the Congress after the date of the receipt by the Congress of such notice of disapproval, the Congress passes a resolution of repository siting approval in accordance with this subsection approving such site, and such resolution thereafter becomes law.”).

34. 42 U.S.C. §§ 10136–38.

35. 42 U.S.C. §§ 10131–33. The Act addresses the applicable guidelines for DOE's characterization of candidate sites premised on the fundamental concept that geologic isolation of deadly high-level radioactive waste is the primary goal. This section states, in pertinent part: “Such guidelines shall specify *detailed geologic considerations that shall be primary criteria for the selection of sites in various geologic media.*” *Id.* at § 10132(a) (emphasis added). Thus the NWPA states that geology is to be the “primary criteria” for site selection, and Yucca Mountain's failure as an appropriate geologic site should have disqualified it based on its geologic unsuitability.

36. 42 U.S.C. § 10132(b). The NWPA sets out a staged process for DOE to choose an appropriate host site. The Act required the Secretary of Energy to begin by issuing general site-selection guidelines. *Id.* at § 10132(a). DOE would then use these guidelines to determine which candidate sites to recommend for more detailed investigation or “site characterization.” *Id.* at § 10132(b). The guidelines include a host of factors with an emphasis on geology, hydrology, geophysics, and seismicity. Based on

develop guidelines by which to evaluate potential repository sites.³⁷ The NWPA specifies factors that must be addressed by these guidelines and identifies them as a means for DOE to compare competing sites throughout the selection process and to assess the suitability of the site ultimately recommended for development as a repository.³⁸

In 1984, DOE issued guidelines after an extensive public rulemaking process.³⁹ Those original guidelines contained qualifying and disqualifying conditions for factors that encompassed each of the areas covered by Section 112 of the NWPA. While some of those guidelines were applicable only to the comparison of various sites (something that became unnecessary after 1987 when Congress directed DOE to evaluate only the Yucca Mountain site), the core group of guidelines was expressly intended to provide the criteria by which any acceptable repository site, including Yucca Mountain, would be evaluated.

these guidelines, the Secretary was directed to nominate at least five sites, and then to narrow the field to three for the President's consideration. *Id.*

37. 42 U.S.C. § 10132(a).

38. *Id.* This section requires:

[T]he Secretary [of Energy]...shall issue general guidelines for the recommendation of sites for repositories. Such guidelines shall specify detailed geologic considerations that shall be primary criteria for the selection of sites in various geologic media. Such guidelines shall specify factors that qualify or disqualify any site from development as a repository, including factors pertaining to the location of valuable natural resources, hydrology, geophysics, seismic activity, and atomic energy defense activities, proximity to water supplies, proximity to populations, the effect upon the rights of users of water, and proximity to components of the National Park System, the National Wildlife Refuge System, the National Wild and Scenic Rivers System, the National Wilderness Preservation System, or National Forest Lands. Such guidelines shall take into consideration the proximity to sites where high-level radioactive waste and spent nuclear fuel is generated or temporarily stored and the transportation and safety factors in moving such waste to a repository. Such guidelines shall specify population factors that will disqualify any site from development as a repository if any surface facility of such repository would be located (1) in a highly populated area; or (2) adjacent to an area 1 mile by 1 mile having a population of not less than 1,000 individuals. Such guidelines shall also require the Secretary to consider the cost and impact of transporting to the repository site the solidified high-level radioactive waste and spent fuel to be disposed of in the repository and the advantages of regional distribution in the siting of repositories. Such guidelines shall require the Secretary to consider the various geologic media in which sites for repositories may be located and, the extent practicable, to recommend sites in different geologic media.

39. In publishing its first set of site suitability rules in 1984, DOE paid careful attention to the geologic requirements, the physical qualifying and disqualifying conditions recommended by the National Academy of Sciences, and the 1980 environmental impact statement required by NWPA Section 112(a). 49 Fed. Reg. 47,714, 47,718 (Dec. 6, 1984). NRC concurred in the draft regulations but only upon DOE's promise to specify "that engineered barriers cannot constitute a compensating measure for deficiencies in the geologic media" during suitability evaluations. *Id.* at 47,719–20. EPA also warned DOE not to over-rely on engineered barriers. *Id.* at 47,727. DOE's final rules accordingly provided that "engineered barriers shall not be used to compensate for an inadequate site; mask the innate deficiencies of a site; disguise the strengths and weaknesses of a site and the overall system; and mask differences between sites when they are compared." 10 C.F.R. § 960.3-1-5 (1984). Thus, while this geologic qualifying criterion formed the key requirement for comparative analysis of proposed sites, it was equally clearly a requirement for the absolute scientific evaluation of *any* site. DOE knew that establishing performance of the "total system" was not inconsistent with establishing performance of each part of that system.

In 1987, because of political maneuvering by powerful states desirous of having potential sites within their borders removed from consideration, Congress short-circuited site comparisons and selected Yucca Mountain as the only site to be characterized for the proposed repository.⁴⁰ Despite the mounting evidence that Yucca Mountain could not geologically isolate nuclear waste, Congress effectively abandoned the site selection process originally set forth in the NWPA. Within Nevada, Congress's action was viewed as a purely political decision that the state's congressional delegation was powerless to stop.

U.S. Representative Morris Udall from Arizona remarked that the original NWPA:

[S]et up a process for finding the safest and most sensible sites for these repositories. We [the crafters of the original Act] tried to keep politics out of the decision. We were going to have the decision made on the basis of technical criteria. We bent over backwards to make the process fair. We gave the state and affected tribes a voice in the process; we gave them money to hire experts; we even gave them a veto over the final decision. We provided for two repositories so no one state or region would have to bear the burden for the country.

The Department of Energy...only had to follow faithfully the process we laid down. The fact is...DOE blew it. At the first sign of public opposition they cast aside the entire second repository program to help a few office seekers. They have handled the effort so badly that the public and many of us in Congress have lost all faith in the integrity of the process.⁴¹

Even in light of what became known in Nevada as the "Screw Nevada" amendment to the NWPA, the basic statutory prerequisites of a safe repository remained intact. In order to assure the safety of an underground repository, the NWPA requires that the prospective repository must be capable of meeting both the site criteria contained in the NWPA⁴² and all applicable public health and safety standards promulgated both by EPA and NRC.

To that end, the Act mandated that EPA⁴³ promulgate the fundamental public health and safety standard for protection of the general environment from offsite releases from radioactive material placed in the planned repository. It also required NRC to promulgate a licensing rule consistent with the applicable EPA

40. It is instructive to note the three sites under consideration in 1986 for the first repository were Texas, whose senior Congressional Representative was House Speaker Jim Wright; Washington, whose delegation included House Majority Leader Tom Foley; and Nevada, at the time a politically powerless state with just two junior representatives and two senators with little or no seniority.

41. REPORT AND RECOMMENDATIONS OF THE NEVADA COMMISSION ON NUCLEAR PROJECTS, at v (Dec. 2006), http://www.state.nv.us/nucwaste/news2006/pdf/nv2006dec_commission-report.pdf.

42. The original NWPA required DOE to establish specific qualifying and disqualifying criteria for use in determining site suitability; DOE formally promulgated these criteria in 1984. However, as it became more apparent that the site's deficiencies meant Yucca Mountain could not meet these criteria, DOE abandoned them in favor of a generalized, performance assessment based approach.

43. Energy Policy Act of 1992 (EnPA), P. L. No. 102-486, Title VIII, ch. 801, § 10141(a).

radiation standard to be used in that agency's consideration of a repository license application.⁴⁴ Both the EPA and NRC rules are the statutory benchmarks for protection of public health and safety.⁴⁵

By 1992, it was evident that, because of rapid water movement through the site, Yucca Mountain could not meet DOE's 1984 site suitability criteria. At the time, it was apparent that fractures in the rock of Yucca Mountain would allow release of the radioactive gas carbon-14 as the nuclear waste containers degraded over time.⁴⁶ In that same year, an EPA Science Advisory Panel considered Yucca Mountain to be incapable of meeting the EPA's standard for release of radioactive carbon-14 from geological repositories.⁴⁷ However, rather than rejecting Yucca Mountain as unsuitable, Congress kept Yucca Mountain alive by exempting it from the generally applicable radiation standard and by directing EPA to promulgate new, so-called "reasonable" standards specific for Yucca Mountain only but still consistent with recommendations to be made by the National Academy of Sciences (NAS).⁴⁸ Later, in 2004, the revised Yucca Mountain radiation standard was overturned by the United States Court of Appeals for the District of Columbia Circuit as inconsistent with the critical safety recommendations of the NAS report.⁴⁹

By 1995, sufficient scientific information existed to demonstrate that infiltrating water moving rapidly downward through fractures in the mountain would result in the release of deadly radionuclides from waste emplaced into the accessible environment.⁵⁰ This fact, rather than precipitating an appropriate Secretarial finding of unsuitability,⁵¹ resulted in a Yucca Mountain repository strategy change. DOE strategy moved away from reliance on the site's natural geology to

44. *Id.* at § 10141(b).

45. 42 U.S.C. §§ 10141(a) to (b).

46. NEVADA AGENCY FOR NUCLEAR PROJECTS, STATE OF NEVADA AND RELATED FINDINGS INDICATING THAT THE PROPOSED YUCCA MOUNTAIN SITE IS NOT SUITABLE FOR DEVELOPMENT AS A REPOSITORY (November 1998) [hereinafter NEVADA AGENCY FOR NUCLEAR PROJECTS], <http://www.state.nv.us/nucwaste/yucca/nuctome2.htm>. By 1992, it was widely apparent that the Yucca Mountain site could not meet the EPA standard's release limit for carbon-14. This radionuclide would be transported and released into the atmosphere above the site in the form of carbon dioxide gas because the proposed waste emplacement location would be in fractured rock above the water table, which has connected fractures in which air circulates into and out of Yucca Mountain. This finding should have resulted in the Energy Secretary's disqualification of the Yucca Mountain site under the provisions of DOE's site recommendation guidelines. *See* 10 C.F.R. pt. 960.

47. U.S. ENVIRONMENTAL PROTECTION AGENCY, RADIATION ADVISORY COMMITTEE, AN SAB REPORT: REVIEW OF GASEOUS RELEASE OF CARBON-14, 10-11, EPA-SAB-RAC-93-010 (1993), available at <http://yosemite.epa.gov/sab/sabproduct.nsf/WebReportsbyYearBOARD!OpenView> (follow "1993" hyperlink; then follow "Review of Gaseous Release of Carbon-14" hyperlink).

48. EnPA, P.L. No. 102-486, Title VIII, § 801.

49. *Nuclear Energy Institute v. U.S. Environmental Protection Agency*, 373 F.3d 1251, 1270 (D.C. Cir. 2004); *see* discussion *infra* Part III-B.

50. NEVADA AGENCY FOR NUCLEAR PROJECTS, *supra* note 46.

51. The NWPA provides that "[i]f the Secretary at any time determines the Yucca Mountain site to be unsuitable for development as a repository, the Secretary shall . . . notify the Congress, the Governor and legislature of Nevada of such termination and the reasons for such termination." 42 U.S.C. § 10133(c)(3)(B).

reliance on manmade barriers put in place to delay the inevitable release of the waste.⁵²

In spite of the NWPA's requirement for the Secretary of Energy to terminate all site characterization activities at Yucca Mountain if the Secretary determines the site to be unsuitable, the Secretary instead recommended that the President move ahead with plans for developing the site as a repository. On February 14, 2002, Secretary of Energy Spencer Abraham formally recommended the Yucca Mountain site to the President under provisions of the NWPA.⁵³ Less than 24 hours later President George W. Bush recommended the site to Congress.⁵⁴ On April 8, 2002, pursuant to the NWPA, Governor Kenny Guinn submitted Nevada's official Notice of Disapproval of the proposed Yucca Mountain repository to Congress, thereby vetoing the site selection decision of the President.⁵⁵ Pursuant to the NWPA, Congress passed a joint resolution overriding the Notice of Disapproval.⁵⁶ The President signed the Yucca Mountain Development Act (YMDA) on July 23, 2002.⁵⁷ With enactment of the YMDA, DOE was required by statute to submit a license application to the NRC within 90 days.⁵⁸ Again,

52. Letter from John E. Cantlon, Chairman, U.S. Nuclear Waste Technical Review Bd., to Dr. Daniel A. Dreyfus, Dir., Office of Civilian Radioactive Waste Mgmt., U.S. Dep't of Energy (Dec. 13, 1995), <http://www.nwtrb.gov/reports/95letter.pdf>; STATE OF NEVADA, COMMENTS ON NUREG-1804 YUCCA MOUNTAIN REVIEW PLAN (Aug. 2, 2002) [hereinafter NUREG 1804 COMMENTS], <http://www.state.nv.us/nucwaste/news2002/nn11770.pdf>. See also 10 C.F.R. § 63; 10 C.F.R. § 963. By the time DOE had accomplished some significant site characterization work in the mid 1990s, it became obvious that Yucca Mountain would likely not meet the requirements of 10 C.F.R. § 960 because estimates of water infiltration into Yucca Mountain were 100 times higher than had been expected. Moreover, there were unexpected fast pathways for the movement of radioactive material from the repository to the water table below. As a consequence, and instead of reporting to Congress that the site is inadequate and seeking an alternative, DOE adopted a different tactic—that of abandoning the primary focus on the geologic criteria in favor of a “Total System Performance Assessment” under which any combination of natural and engineered features, looked at cumulatively, could be considered to justify the recommendation of a repository being constructed at Yucca Mountain. STATE OF NEVADA, NUREG 1804 COMMENTS, *supra* this note, at 5. This formulation could and did permit DOE to premise a recommendation of a repository at Yucca Mountain almost entirely on a system of engineered barriers and in spite of the frailty of the natural barriers. *Id.* DOE's guidelines no longer required any determination that long-term waste isolation was primarily geologic, and no longer required specification of physical qualifying or disqualifying conditions. *Id.*

53. *Yucca Mountain Repository Development: Hearings on S.J. Res. 34 Before the S. Comm. on Energy and Natural Resources*, 107th Cong. 179–81 (2002) (letter from Spencer Abraham, U.S. Secretary of Energy, to George W. Bush, President of the United States).

54. *Yucca Mountain Repository Development: Hearings on S.J. Res. 34 Before the S. Comm. on Energy and Natural Resources*, 107th Cong. 215 (2002) (letter from George W. Bush, President of the United States, to Richard B. Cheney, President of the Senate).

55. *Yucca Mountain Repository Development: Hearings on S.J. Res. 34 Before the S. Comm. on Energy and Natural Resources*, 107th Cong. 216 (2002) (letter from Kenny C. Guinn, Governor of Nevada, to Robert C. Byrd, President Pro Tempore, United States Senate).

56. 42 U.S.C. § 10135(c); 148 Cong. Rec. H2180-01 (2002); 2002 WL 924667 (overriding Nevada's notice of disapproval).

57. Act of July 23, 2002, Pub. L. No. 107-200, 116 Stat. 73 (Joint Resolution approving the site at Yucca Mountain, Nevada).

58. 42 U.S.C. § 10134(b).

this statutory date came and went. The Yucca Mountain license application was finally submitted six years later, in June 2008.⁵⁹

B. *Nuclear Energy Institute v. United States Environmental Protection Agency*

Through the 1992 Energy Policy Act (EnPA),⁶⁰ Congress required EPA to establish site-specific standards for a repository at Yucca Mountain.⁶¹ The statute provides:

[T]he [EPA] Administrator shall, based upon and consistent with the findings and recommendations of the National Academy of Sciences, promulgate, by rule, public health and safety standards for protection of the public from releases from radioactive materials stored or disposed of in the repository at the Yucca Mountain site. Such standards shall prescribe the maximum annual effective dose equivalent to individual members of the public from releases to the accessible environment from radioactive materials stored or disposed of in the repository. The standards shall be promulgated not later than 1 year after the Administrator receives the findings and recommendations of the National Academy of Sciences...and shall be the only such standards applicable to the Yucca Mountain site.⁶²

In June 2001, EPA promulgated Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada.⁶³ The EPA standard established a regulatory period of 10,000 years for compliance with EPA's maximum individual dose standard of 15 millirems per year.⁶⁴ A separate groundwater protection standard was also established for the 10,000 year regulatory period, with dose and radionuclide concentration limits consistent with Safe Drinking Water Act standards that apply to all the nation's public drinking water supplies.⁶⁵ The EPA rule acknowledged that expected peak doses would likely occur after the 10,000 year regulatory period but only required DOE to calculate the peak individual dose during the period of geologic stability after 10,000 years and include the results in the Yucca Mountain Environmental Impact Statement (EIS) as an indicator of long-term disposal system performance.⁶⁶

59. U.S. NUCLEAR REGULATORY COMM'N, DOE'S LICENSE APPLICATION FOR A HIGH-LEVEL WASTE REPOSITORY AT YUCCA MOUNTAIN (2009), <http://www.nrc.gov/waste/hlw-disposal/yucca-lic-app.html>; see also Press Release, U.S. Dep't of Energy, DOE Marks Milestone in Submitting Yucca Mountain License Application (June 3, 2008), <http://www.energy.gov/news/6310.htm>.

60. Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776.

61. *Id.* at § 801(a)(1).

62. *Id.*

63. 40 C.F.R. § 197 (2009).

64. 40 C.F.R. § 197.20.

65. 40 C.F.R. §§ 197.30 to 31. See also Safe Water Drinking Act, 42 U.S.C. §§ 300(f) to (j)(26) (2000).

66. See 40 C.F.R. § 197. Although EPA expressly acknowledged that NAS recommended that the compliance period cover the time when the greatest risk of radiation exposure occurs and that the National Academy of Science had found it scientifically possible to predict repository performance for approximately one million years, EPA nevertheless concluded that "such an approach is

In July 2001, Nevada and others, including the Nuclear Energy Institute and the Natural Resources Defense Council, challenged the EPA standard in lawsuits filed in the United States Court of Appeals for the District of Columbia Circuit (D.C. Circuit).⁶⁷ In the consolidated case, *Nuclear Energy Institute v. U.S. Environmental Protection Agency (NEI v. EPA)*, Nevada challenged the 10,000 year regulatory period contained in the EPA standard as inconsistent with the EnPA required findings and recommendations of the National Academy of Sciences (NAS).⁶⁸

The D.C. Circuit articulated the challenge inherent in addressing the complexity of appropriate nuclear waste disposal:

Having the capacity to outlast human civilization as we know it and the potential to devastate public health and the environment, nuclear waste has vexed scientists, Congress, and regulatory agencies for the last half-century. After rejecting disposal options ranging from burying nuclear waste in polar ice caps to rocketing it to the sun, the scientific consensus has settled on deep geologic burial as the safest way to isolate this toxic material in perpetuity. Following years of legislative wrangling and agency deliberation, the political consensus has now selected Yucca Mountain, Nevada as the nation's nuclear waste disposal site.⁶⁹

Further, the Court described why HLNW and SNF require isolation for such a long period of time:

Radioactive waste and its harmful consequences persist for time spans seemingly beyond human comprehension. For example, iodine-129, one of the radionuclides expected to be buried at Yucca Mountain, has a half-life of seventeen million years. . . . Neptunium-237, also expected to be deposited in Yucca Mountain, has a half-life of over two million years.⁷⁰

In what represented a major substantive victory for Nevada, the D.C. Circuit vacated both the EPA radiation protection standard and the corresponding NRC licensing rule.⁷¹ The court found that these rules, which terminated their compliance periods after 10,000 years, (a) were not “based upon and consistent with” the findings and recommendations of the National Academy of Sciences” as Congress required in the EnPA,⁷² and (b) do not protect the public or the envi-

not practical for regulatory decision making.” 66 Fed. Reg. 32,074, 32,097(June 13, 2001).

67. *Nuclear Energy Institute v. U.S. Environmental Protection Agency*, 373 F.3d 1251 (D.C. Cir. 2004). In this case, which consolidated thirteen separately filed cases, the D.C. Circuit considered all the challenges filed by the State of Nevada, local communities, several environmental organizations, and the nuclear energy industry to the statutory and regulatory scheme devised to establish and govern a Yucca Mountain nuclear waste repository. *Id.*

68. *Id.*

69. *Id.* at 1257.

70. *Id.* at 1258 (citing COMM. ON TECHNICAL BASES FOR YUCCA MOUNTAIN STANDARDS, NAT'L RESEARCH COUNCIL, TECHNICAL BASES FOR YUCCA MOUNTAIN STANDARDS 18–19 (1995)).

71. *NEI v. EPA*, 373 F.3d at 1327–28.

72. *Id.*

ronment during the anticipated peak radiation risks that are expected after man-made waste packages fail.⁷³

Nevada's legal victory in *NEI v. EPA* underscored the Yucca Mountain site's inherent inability to isolate deadly radioactive waste for the time required to protect public health and safety. For a while it appeared the program would be halted in its tracks. Instead, EPA and NRC issued amended standards⁷⁴ and DOE adopted ever-more-exotic engineering fixes in an attempt to mask the site's fundamental deficiencies.⁷⁵ Once again, Nevada was challenging the amended standards.

C. Institutional Problems

During the 1990s, Nevada's congressional delegation was repeatedly called upon to head off one legislative "fix" after another. Each time DOE uncovered a new hurdle relating to the unsuitability of Yucca Mountain, the nuclear industry and Congress attempted to fix it through legislation.⁷⁶ Rather than addressing the repository project in an objective, technically sound way, politics held sway.

In 2005, the Yucca Mountain program was nearly devastated by the disclosure that scientists working for DOE and the U.S. Geological Survey (USGS) had falsified data and computer models to hide key deficiencies relating to site hydrology and important quality assurance functions.⁷⁷ These revelations from

73. *Id.* at 1273.

74. 40 C.F.R. § 197 (2009). The EPA radiation standard is known as the "2008 Yucca Mountain Rule," or the "Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada," executed by Stephen L. Johnson, Administrator of EPA. The 2008 Yucca Mountain Rule was promulgated on September 30, 2008. As authority for promulgating the 2008 Yucca Mountain Rule, EPA references section 801 of EnPA, Pub. L. No. 102-486, Title VIII, § 801, which in turn implicates the Atomic Energy Act ("AEA") of 1954 as amended, 42 U.S.C. §§ 2011-2296; the NWP, 42 U.S.C. § 101; and Reorganization Plan No. 3 of 1970, Pub. L. No. 98-890, 97 Stat 485 (1983). The NRC Licensing Rule, known as the 2009 NRC Yucca Mountain Rule is entitled "Implementation of a Dose Standard After 10,000 Years," and was executed by Annette L. Vietti-Cook, Secretary of the NRC, on March 9, 2009, and published in the Federal Register on March 13, 2009 (74 Fed. Reg. 10,811-10,830). NRC adopted the 2009 NRC Yucca Mountain Rule pursuant to its authority to adopt technical requirements and criteria under section 121(b) of the NWP, as amended, 42 U.S.C. § 10141(b), which in turn references the NRC's authority under the AEA of 1953, 42 U.S.C. § 2011, and the Energy Reorganization Act of 1974, 42 U.S.C. § 5801.

75. As discussed elsewhere, DOE's reliance on engineer barriers is necessary because the geology of Yucca Mountain fails to provide the required waste isolation. *See* Stahl, *supra* note 9. Primarily, DOE relies on the "waste packages" and the titanium drip shields to overcome the site's geologic deficiencies. Corrosion of waste packages and the consequent release of radionuclides into the groundwater led DOE to its proposed use of titanium drip shields which purportedly will protect the waste canisters from rockfall and water seepage. *See id.* at 301-13. Corrosion of the waste packages is also discussed at <http://www.state.nv.us/nucwaste/news2008/pdf/cc2phase2a.pdf>. Despite DOE's use of the "miracle alloy," scientific tests show that corrosion will occur and cause release of radionuclides into the accessible environment.

76. Nuclear Fuel Management and Disposal Act, S. 2589, 109th Cong (2006) (discussing the proposal to "fix" the Yucca Mountain legislation), available at http://www.state.nv.us/nucwaste/news2006/pdf/yucca_bill.pdf.

77. *No Criminal Charges in Yucca Mountain Email Science Scandal*, ENVIRONMENT NEWS SERVICE, Apr. 28, 2006, <http://www.ens-newswire.com/ens/apr2006/2006-04-28-03.asp>. The falsified emails came from two sources. The first was a selection of 1996-98 emails about the Yucca Mountain project culled from DOE document files that DOE posted on the web in June 2004 in order to meet its

internal e-mail correspondence among the scientists were uncovered in the course of preparing DOE documents for inclusion on NRC's Licensing Support Network.⁷⁸ The offending emails showed USGS scientists working under contract for DOE admitting to fabricating data and manipulating computer models to compensate for inadequate or missing data on hydrology and water infiltration issues.⁷⁹ As damaging as these disclosures were to the credibility of the program, they represented just another in a long series of problems that have eroded public confidence in the program. Those problems include the Yucca Mountain site's proven geologic deficiencies, the program's ubiquitous scientific and technical lapses, its continuing quality assurance issues, serious employee health and safety issues, mismanagement, and budget troubles.

Immediately following the public disclosure of the offending e-mails, Nevada's elected officials demanded an immediate investigation. U.S. Representative Jon Porter, then chairman of the House of Representatives Subcommittee on Federal Workforce and Agency Organization, held hearings and sought to compel DOE to fully disclose the extent of data falsification and fabrication within the project.⁸⁰ Nevada's representatives had long been aware of the tremendous pressure government researchers were under to reach predetermined conclusions about the Yucca Mountain site. DOE's persistent revisions of its repository design and performance models affecting such issues as waste disposal package performance, climate change, hydrology, groundwater travel time, and volcanism made it apparent that DOE was subjugating technical and scientific work in order to support conclusions consistent with its legal and political strategy for licensing and constructing the repository.⁸¹

As early as the late 1980s, DOE was desperate to counter data developed by State of Nevada scientists that showed fast water pathways or "fracture flow" through the mountain, a condition that could have and should have disqualified the site.⁸² Eventually, the DOE Inspector General's investigation report character-

responsibilities to NRC in advance of filing an application for an NRC license. DOE released hard copies of the second group of emails that were from the period 1998-2000, in response to a demand from Nevada Congressman Jon Porter.

78. See QUALITY ASSURANCE WEAKNESSES, *supra* note 13.

79. *Id.* at Appendix A. See also State of Nevada, Agency for Nuclear Projects, Chronology of Selected Yucca Mountain Emails (May 9, 2005), <http://www.state.nv.us/nucwaste/news2005/pdf/ymchron01.pdf>.

80. 151 Cong. Rec. D701-01 (2005); 2005 WL 1528582; 151 Cong. Rec. D691-01 (2005); 2005 WL 1522554; Press Release, U.S. House of Representatives, Comm. on Gov't Reform Subcomm. on the Fed. Workforce and Agency Org., Chairman Jon Porter (Apr. 2005), *available at* <http://www.state.nv.us/nucwaste/news2005/pdf/porter050401probe.pdf>.

81. Letter from Bob Loux, Executive Director, Nevada Agency for Nuclear Projects, to B. John Garrick, Chairman, U.S. Nuclear Waste Technical Review Board (Feb. 19, 2008), <http://www.state.nv.us/nucwaste/news2008/pdf/nv080219garrick.pdf> (articulating areas where DOE elevated politics and the perceived "mission" to construct the repository over technical and scientific work). Although expressly not part of DOE, the Nuclear Waste Technical Review Board advises DOE. 42 U.S.C. § 10262.

82. 10 C.F.R. § 960.4-2-1 (2009) (describing disqualifying geo-hydrological conditions). By the late 1980s and early 1990s Nevada's hydrology reviews indicated a discrepancy between the available data and the models of the unsaturated zone used for calculating site performance, which were developed by the U.S. Geological Survey and the DOE National Laboratories. Believing the DOE models were in error, the State challenged them through official comments on DOE documents. STATE OF

rized the scientists' fabrications as irresponsible and reckless.⁸³ Other than the development of a corrective action plan, the investigations resulted in no clear punitive responses from either USGS or DOE.⁸⁴ However, DOE discarded the affected model, replacing it with a new model developed by Sandia National Laboratory at a cost of millions of dollars.⁸⁵

IV. PENDING LITIGATION

A. Legal Challenges to the Current EPA and NRC Rules for Yucca Mountain

On August 22, 2005, following the D.C. Circuit's remand order in *NEI v. EPA*, EPA published a new draft radiation standard,⁸⁶ purporting to comply with the court's decision. The radiation standard, issued as a final rule on September 30, 2008, contains an unprecedented two-tiered standard which bifurcates the radiation exposure limits for the first 10,000 years after disposal and the period from 10,000 to one million years after disposal.⁸⁷

The re-issued EPA radiation standard is unprecedented in its application of a dose limit for the first 10,000 years based on conventional risk apportionment, while applying a contrived and arbitrary background-based dose limit for the remaining time period.⁸⁸ This has never been done in U.S. or international regulatory history. The proposed 350 millirems/year individual dose limit after 10,000 years is twenty-three times higher than the fifteen millirems/year mean (or average) dose standard applied up to 10,000 years, and 87.5 times higher

NEVADA, NUCLEAR WASTE PROJECT, COMMENTS ON THE U.S. DEPARTMENT OF ENERGY DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED HIGH LEVEL NUCLEAR WASTE SITE AT YUCCA MOUNTAIN. VOL.I AND VOL.II., (1985). A report commissioned by DOE from the International Atomic Energy Agency and the Nuclear Energy Agency (IAEA) of the Organization for Economic Cooperation and Development (OECD) reached shocking new conclusions. These agencies assembled some of the world's leading scientists to evaluate, over several months, the total system performance of Yucca Mountain as represented by DOE and its computer models. Among other things, these leading scientists concluded that DOE lacked sufficient information even to build a model to predict the suitability and hydrogeologic performance of the proposed repository. According to the peer review group, the water flow system at Yucca Mountain is "not sufficiently understood to propose a conceptual model for a realistic transport scenario." OECD NUCLEAR ENERGY AGENCY & INTERNATIONAL ATOMIC ENERGY AGENCY, AN INTERNATIONAL PEER REVIEW OF THE YUCCA MOUNTAIN PROJECT TSPA-SR 41 (2002), <http://www.nea.fr/html/rwm/reports/2002/nea3682-yucca.pdf>. Moreover, according to the report, DOE's level of understanding of the hydrogeology of the site is "low, unclear, and insufficient to support an assessment of realistic performance." *Id.* at 83. DOE's sensitivity studies in its computer model "does not give any clues to the important pathways for the water in the system." *Id.* at 88. Perhaps most troubling of all, in DOE's performance model of Yucca Mountain, "increased ignorance leads to lower expected doses, which does not appear to be a sensible basis for decision-making." *Id.* at 11.

83. QUALITY ASSURANCE WEAKNESSES, *supra* note 13, at 4.

84. *Id.*

85. SANDIA NAT'L LAB., *Energy, Resources, & NonProliferation: Looking One Million Years into the Future*, 2007 ANNUAL REPORT, <http://www.sandia.gov/news/publications/annual/2007/ern-future.html>.

86. 40 C.F.R. § 197.

87. 40 C.F.R. § 197.20.

88. Petition for Review, *Nevada v. U.S. Environmental Protection Agency*, No. 08-1327 at 4-6 (D.C. Cir. Oct. 10, 2008). See discussion *infra* note 89.

than the groundwater protection standard which EPA improperly proposes to truncate at 10,000 years.⁸⁹

The EPA standard, as finally promulgated, relented on its proposed background-based dose limit for the time after 10,000 years, replacing it with a still unprecedented individual dose limit of 100 millirems/year.⁹⁰ Incredibly, the EPA rule promotes DOE's plan to allow contamination of the Amargosa Valley aquifer as part of its "waste isolation strategy" for Yucca Mountain, using dilution of the radioactive waste in the underground water as a way of making it appear that the site is able to meet EPA's radiation health protection standards.⁹¹

On October 10, 2008, Nevada filed a Petition for Judicial Review of the EPA standard in the D.C. Circuit.⁹² Among Nevada's claims challenging EPA's 2008 Yucca Mountain rule are:

- EPA unlawfully instructed NRC to ignore certain natural and other events in performing dose calculations even if it believes they are important to safety. EPA's instructions intrude into NRC's authority and eviscerate the radiation safety assessment.⁹³
- EPA unlawfully rejected the principle of "apportionment," which would limit the total dose of exposure from *all* anthropogenic radiation sources to 100 millirems, with high-level waste disposal typically limited to a small fraction of this figure. Although the NAS reported a consensus of national and international bodies supporting this principle, EPA's 2008 Yucca Mountain rule disavows it, allowing a dose level that even EPA itself has previously recognized as inadequate to protect public health.⁹⁴
- EPA's use of "uncertainty" in the new rule to rationalize the two-tier standard is arbitrary and capricious, contrary to the data in DOE's license application, and contrary to EPA's practice elsewhere of using uncertainty to support standards that are more rather than less stringent.⁹⁵

89. Petition for Review, *Nevada v. U.S. Environmental Protection Agency*, No. 08-1327 at 4-6 (D.C. Cir. Oct. 10, 2008), <http://www.state.nv.us/nucwaste> (follow "Petition for Review" hyperlink under "Updated – Friday October 10, 2008" heading) (detailing Nevada's case against the radiation standard). Further exacerbating the inadequacy of the new standard is the provision that it be measured against the median of DOE's computer simulations, rather than the mean, as the standard is applied. This calculation means that the actually allowable dose could be as high as 1000 millirems for the period after 10,000 years.

90. 40 C.F.R. § 197.20(2).

91. See Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada, 73 Fed. Reg. 61,273 (Oct. 15, 2008).

92. Petition for Review, *Nevada v. U.S. Environmental Protection Agency*, No. 08-1327 (D.C. Cir. Oct. 10, 2008), <http://www.state.nv.us/nucwaste> (follow "Petition for Review" hyperlink under "Updated – Friday October 10, 2008" heading).

93. *Id.*

94. *Id.*

95. *Id.*

Similarly, in *Nevada v. Nuclear Regulatory Commission*, Nevada challenged NRC's licensing rule.⁹⁶ In *NEI v. EPA*, the court, in addition to invalidating the EPA radiation standard, vacated NRC's licensing standards for Yucca Mountain to the extent that the NRC's licensing standards incorporated EPA's legally defective rule governing the compliance period. In March 2009, NRC adopted a new final rule on radiation dose standards governing Yucca Mountain, incorporating and implementing the 2008 EPA Rule.⁹⁷

The 2009 NRC rule specifically implements and incorporates the public health and safety standards of the 2008 EPA rule, including EPA's two-tiered individual protection annual dose standard and its constraints on the use of features, events, and processes (FEPs).⁹⁸ Accordingly, Nevada's claims in this action closely resemble those in the challenge to the 2008 EPA rule. The claims here, however, focus on NRC's own responsibilities under the EnPA, the NWPA, and the Atomic Energy Act. As to the exclusion of FEPs, Nevada contends that NRC has an independent duty to consider the events and processes that would lead to violation of the EPA standard. Both of these challenges are pending, and briefing is expected in early 2010.

B. Nevada's Water Case

Unlike NRC's authority over nuclear activities under federal law,⁹⁹ state law governs the use of water. In July 1997, DOE filed five applications with the office of the Nevada State Engineer "under provisions of state water law to permanently appropriate 430 acre-feet of groundwater in anticipation of a congressional decision authorizing" DOE to seek NRC approval to construct and operate a "proposed high-level nuclear waste repository at Yucca Mountain."¹⁰⁰ The State Engineer denied¹⁰¹ DOE's applications for water based on his determination that the purposes intended for the water, namely the construction and operation of the proposed Yucca Mountain high-level nuclear waste repository, threaten to prove detrimental to the public interest and therefore would violate state water law.¹⁰²

96. *Nevada v. Nuclear Regulatory Commission*, No. 09-1133 (D.C. Cir. May 12, 2009).

97. 10 C.F.R. § 63 (2009).

98. 10 C.F.R. §§ 63.311, 63.321.

99. The federal government originally reserved to itself absolute authority over the development of atomic power in the AEA of 1946. Act of August 1, 1946, ch. 724, sec. 2, 60 Stat. 755. A movement developed, however, to permit private industry to enter the technological field. These efforts resulted in the enactment of the AEA of 1954, which abolished the governmental monopoly over nuclear technology and allowed private operation of nuclear reactors under strict Atomic Energy Commission (now NRC) supervision. Act of August 30, 1954, ch. 1073, 68 Stat. 919 (codified as amended at 42 U.S.C. §§ 2011-2281 (2006)).

100. See Nevada Agency's Memorandum in Opposition to Motion to Lift Stay and to Grant Leave to File a Supplemental and Second Amended Complaint for Declaratory and Injunctive Relief at 3, *NEI v. EPA*, No. CV-S-00-0268-RLH (D. Nev. Feb. 2005), available at <http://www.state.nv.us/nucwaste/news2005/pdf/nvag050301doe.pdf> [hereinafter *Nevada Agency Memorandum*].

101. *Id.* (citing Nevada State Engineer's Ruling No. 4848). See http://water.nv.gov/Orders&Rulings/Rulings/rulings_results.cfm.

102. *Id.*; see also Nev. Rev. Stat. § 533.370(4).

Following issuance of the State Engineer's denial, the United States filed a legal challenge in United States District Court in Las Vegas based on federal preemption.¹⁰³ To date, there has been no determination on the merits, and the case remains pending.

C. Nevada's Challenge to DOE's Transportation Decision

DOE began working on a repository transportation plan in 1983. In January 2009, more than 25 years and three quarters of a billion dollars later, DOE issued what it characterized as a national high-level radioactive waste and spent nuclear fuel transportation plan for public comment.¹⁰⁴ Included in DOE's plan was the agency's decision to construct and operate a railroad within what is called the "Caliente corridor."¹⁰⁵ DOE estimated that costs for the transportation of HLNW and SNF will exceed \$2 billion dollars.¹⁰⁶ An additional element of the decision is to allow shipments of general freight on the rail line (the Shared-Use Option). The rail line, if constructed, would proceed more than 300 miles to Yucca Mountain from an interchange point near Caliente, in Lincoln County, Nevada. DOE's decisions rely upon several DOE environmental impact statements, including the Final Repository EIS, the Rail Corridor supplemental EIS, and the Rail Alignment EIS.¹⁰⁷

Nevada filed a petition in the U.S. Court of Appeals for the Ninth Circuit challenging DOE's decision to construct and operate a rail line to the site¹⁰⁸ as recorded in an October 2008 Record of Decision regarding DOE's Final EIS for

103. *U.S. v. Nevada*, 123 F. Supp. 2d 1209 (D. Nev. 2000), *vacated by* *U.S. v. Morros*, 268 F.3d 695 (9th Cir. 2001); Nevada Agency's Memorandum in Opposition to Motion to Lift Stay and to Grant Leave to File a Supplemental & Second Amended Complaint for Declaratory & Injunctive Relief, *United States v. Nevada*, No. CV-S-00-0268-RLH (LRL), <http://www.state.nv.us/nucwaste/policy.htm> (follow "State of Nevada Opposition Brief in DOE Water Case" hyperlink).

104. Department of Energy, Record of Decision and Floodplain Statement of Findings—Nevada Rail Alignment for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV, 73 Fed. Reg. 61,273 (Oct. 10, 2008). *See also* Press Release, U.S. Dep't of Energy, U.S. Department of Energy Seeks Public Comment on National Transportation Plan for the Proposed Repository at Yucca Mountain, Nevada (Jan. 16, 2009), http://www.ocrwm.doe.gov/info_library/newsroom/releases/011509.shtml.

105. *See* ROBIN SWEENEY, U.S. DEPT. OF ENERGY, THE RAIL ALIGNMENT ENVIRONMENTAL IMPACT STATEMENT: AN UPDATE (2005).

106. Comparative Cost Estimates Caliente Rail Corridor Summary Report, Nevada Rail Conceptual Design Document No. NRP-R-SYSW-ES-0004-0007-00141, <http://www.state.nv.us/nucwaste/news2008/pdf/nrp070603cost.pdf>.

107. U.S. DEP'T OF ENERGY, FINAL 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 (2002), http://www.ocrwm.doe.gov/feis_2/index.htm [hereinafter YUCCA FEIS]; U.S. DEP'T OF ENERGY, FINAL ENVIRONMENTAL IMPACT STATEMENT FOR A RAIL ALIGNMENT FOR THE CONSTRUCTION AND OPERATION OF A RAILROAD IN NEVADA TO A GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA, http://www.ocrwm.doe.gov/waste_management_background/SRCRA_EIS.shtml [hereinafter RAIL SEIS]. The RAIL SEIS encompasses both the Rail Corridor Supplemental EIS and the Rail Alignment EIS.

108. Petition for Review, *Nevada v. U.S. Dep't of Energy*, No. 09-71015 (9th Cir. Apr. 7, 2009).

Yucca Mountain.¹⁰⁹ Nevada contends that DOE's decisions fail to comply with applicable laws, including the National Environmental Policy Act (NEPA)¹¹⁰ and the NWPA.¹¹¹ Due to the deficiency of its underlying environmental review, DOE failed to analyze significant environmental impacts and mitigation of these impacts, and failed to make a lawful comparison between the project and alternatives, including the "no action" alternative.¹¹² For example, the environmental review underlying DOE's decision left fundamental ambiguities in the plan and profile information about the proposed Caliente rail alignment. These ambiguities make a meaningful assessment of the project's impacts and alternatives impossible.

NEPA compliance issues concerning transportation and DOE's Caliente corridor rail alignment plan are also pending in the NRC licensing proceeding.¹¹³ These issues are similarly being addressed by the Surface Transportation Board before which DOE has applied¹¹⁴ for a certificate of public convenience and necessity (PCN) to operate its proposed Caliente line through the Nevada counties of Lincoln, Nye, and Esmeralda.¹¹⁵ While recognizing the pendency of the NRC licensing proceedings, Nevada's Ninth Circuit challenge noted that Nevada filed the petition to protect its interests and ensure that its opportunity remains, if needed, to pursue a judicial remedy.¹¹⁶

In a related petition, California has also challenged DOE's same final determinations and environmental review.¹¹⁷ However, California's challenge is substantially narrower, focusing only on transportation issues within California. Both Nevada's and California's cases are pending.

V. NRC'S LICENSING PROCEEDING

Despite the absence of a final repository design and the equally glaring absence of an EPA radiation standard to guide NRC's proceeding, on June 3, 2008, DOE submitted a license application to NRC.¹¹⁸ Notwithstanding an array of

109. Department of Energy, Record of Decision and Floodplain Statement of Findings—Nevada Rail Alignment for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV, 73 Fed. Reg. 61,273 (Oct. 10, 2008).

110. National Environmental Policy Act of 1969, Pub. L. No. 91-190, 42 U.S.C. §§ 4321–68 (1970).

111. Petition for Review, *Nevada v. U.S. Dep't of Energy*, No. 09-71015 at 3 (9th Cir. Apr. 7, 2009).

112. *Id.*

113. In the Matter of U.S. Dep't of Energy, U.S. Nuclear Regulatory Comm'n, 63-001-HLW (May 11, 2009).

114. 49 U.S.C. § 10901 (authorizing construction and operation of railroad lines).

115. Audio tape: Public Meeting Concerning U.S. DOE—Rail Construction and Operation—Caliente Line in Lincoln, Nye, and Esmeralda Counties in Nevada, STB Finance Docket No. 35106, held by the U.S. Surface Transportation Board (Dec. 4, 2008), <http://www.stb.dot.gov/stb/audiomee.nsf> (follow "12/08/2008" hyperlink).

116. Petition for Review, *Nevada v. U.S. Dep't of Energy*, No. 09-71015 (9th Cir. Apr. 7, 2009).

117. Petition for Review, *California v. U.S. Dep't of Energy*, No. 09-71014 (9th Cir. Apr. 6, 2009).

118. U.S. DEP'T OF ENERGY, LICENSE APPLICATION FOR A HIGH-LEVEL WASTE GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, <http://www.nrc.gov/waster/hlw-disposal/yucca-lic-app.html>. See

substantive objections filed by Nevada, NRC staff accepted the application for docketing on September 8, 2008,¹¹⁹ and NRC published a hearing notice in the Federal Register on October 22, 2008.¹²⁰ The hearing notice required any prospective intervener to file a petition for leave to intervene within sixty days of the notice.¹²¹ On December 22, 2008, twelve potential parties filed timely petitions to intervene¹²² and two interested governments requested participation rights¹²³ in accordance with applicable federal regulation.¹²⁴ Three Construction Authorization Boards (CABs) were designated to preside over the contention admissibility phase of this proceeding.¹²⁵ On May 11, 2009, the CABs issued a Memorandum and Order admitting 8 parties, 2 governmental participants and 289 contentions for consideration in the proceeding.¹²⁶

NRC licensing is an adjudicatory proceeding¹²⁷ in which DOE, as the license applicant, will be called to defend its application in a trial-type forum where the State's team of licensing attorneys and technical experts will be afforded the opportunity to question and cross-examine DOE staff and scientists

also Press Release, U.S. Nuclear Regulatory Commission, NRC Receives DOE's License Application to Construct High-Level Nuclear Waste Repository at Yucca Mountain (Jun. 3, 2008), <http://www.nrc.gov/reading-rm/doc-collections/news/2008/08-106.html>.

119. U.S. Nuclear Regulatory Commission: Fact Sheet on Yucca Mountain [hereinafter Fact Sheet], <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-yucca-license-review.html>.

120. In the Matter of U.S. Dep't of Energy, Notice of Hearing and Opportunity To Petition for Leave To Intervene on an Application for Authority To Construct a Geologic Repository at a Geologic Repository Operations Area at Yucca Mountain, 73 Fed. Reg. 63,029 (Oct. 22, 2008).

121. 10 C.F.R. §§ 2.309(3)(i) to (ii).

122. This proceeding concerns Petitions to Intervene from (1) Caliente Hot Springs Resort LLC; (2) State of California; (3) Clark County, Nevada; (4) Churchill, Esmeralda, Lander and Mineral Counties, Nevada; (5) Inyo County, California; (6) Native Community Action Council; (7) State of Nevada; (8) Nuclear Energy Institute; (9) Nye County, Nevada; (10) Timbisha Shoshone Tribe; (11) Timbisha Shoshone Yucca Mountain Oversight Program Non-Profit; and (12) White Pine County, Nevada. See STATE OF NEVADA, YUCCA MOUNTAIN LICENSING PROCEEDING, <http://www.state.nv.us/nucwaste/licensing.htm> (last visited Feb. 14, 2010).

123. The "two interested governments" formal requests to participate: Eureka County, Nevada. See Eureka County, Nevada's Request to Participate as Interested Governmental Participant, In the Matter of U.S. Dep't of Energy, before the U.S. Nuclear Regulatory Comm'n, No. 63-001 (Dec. 22, 2008), available at http://www.state.nv.us/nucwaste/licensing/Contentions_Eureka.pdf; Lincoln County, Nevada's Corrected Request to Participate as Interested Governmental Participant, In the Matter of U.S. Dep't of Energy, before the U.S. Nuclear Regulatory Comm'n, No. 63-001 (Dec. 22, 2008), http://www.state.nv.us/nucwaste/licensing/Contentions_Lincoln.pdf.

124. 10 C.F.R. § 2.315(c).

125. U.S. Dep't of Energy, Establishment of Atomic Safety and Licensing Boards (ASLBs), 74 Fed. Reg. 4477 (Jan. 26, 2009). The Construction Authorization Boards were: BOARD CAB-01 ASLB No. 09-876-HLW, BOARD CAB-02 ASLB No. 09-877-HLW, and BOARD CAB-03 ASLB No. 09-878-HLW. *Id.* A "litigable contention" is a specific concern or issue that the party seeks to bring before the NRC in the proceeding.

126. Memo and Order, U.S. Dep't of Energy (High Level Waste Repository), Docket No. 63-001-HLW LBP-09-06, (May 11, 2009), <http://www.state.nv.us/nucwaste/licensing/nrc090511contentions.pdf>. Successful interveners included the states of Nevada and California, the Nuclear Energy Institute, the Nye, Clark, White Pine, Churchill, Esmeralda, Lander, and Mineral counties in Nevada, and Inyo County, California. Eureka and Lincoln counties in Nevada were granted the status of interested governmental participants. Since the May 11, 2009 Order, ten additional contentions have been admitted. Press Release, U.S. Nuclear Regulatory Comm'n, Atomic Safety & Licensing Board Admits Eight Parties, 299 Contentions in Yucca Mountain Proceeding (May 11, 2009), <http://www.nrc.gov/reading-rm/doc-collections/news/2009/09-083.html>.

127. Administrative Procedures Act, 5 U.S.C. §§ 501-554, 701-706 (2009).

with respect to evidence presented in support of the license application. Similarly, assuming that the NRC licensing proceeding continues, Nevada will be able to present its own data and information to challenge DOE's conclusions and to support alternative conclusions and findings. Preparing for and intervening in the NRC licensing proceeding has been and will continue to be a protracted, costly, and resource intensive process.

Under the NWPA, NRC has the responsibility to regulate geologic disposal of high level radioactive waste consistent with its determination of acceptable health and environmental impacts over thousands of years.¹²⁸ As part of its public health and safety analysis, NRC is responsible for reviewing DOE's license application for the proposed repository.¹²⁹ Because NRC deemed DOE's application acceptable for detailed review and docketed it, the NWPA directs the NRC to issue a decision to authorize construction in three years, with a possible extension to four years.¹³⁰

In an effort to provide transparency and efficient document sharing, NRC requires all participants in the Yucca Mountain proceeding to place their documents in electronic form on the NRC's electronic database known as the Licensing Support Network (LSN).¹³¹ The basic purpose of the LSN is to "[e]nabl[e] the comprehensive and early technical review of the millions of pages of relevant licensing material by the potential parties to the [licensing] proceeding, so as to permit the earlier submission of better focused contentions resulting in a substantial saving of time during the proceeding."¹³² The idea is to ensure that potential parties have timely access to DOE's documentary material sufficiently in advance of the NRC's formal licensing proceeding to permit the submission of well-focused and comprehensive contentions.¹³³

A. Construction Authorization Review

Nevada and Nye County, as the host state and county, automatically have standing in the NRC licensing proceeding, but each were required to submit at least one admissible challenge or contention in order to participate as parties in the proceeding. "A contention is an issue of law or fact . . . that alleges the license application or Yucca Mountain Environmental Impact Statement (as adopted by NRC) does not meet statutory or regulatory requirements."¹³⁴ "[I]n the case of the license application 'nonconformance would be contrary to providing reasonable assurance of adequate protection of the public health and safety.'"¹³⁵ In spite of the adversarial nature of the pre-licensing process and DOE's

128. 42 U.S.C. § 10141(b) to (f).

129. 42 U.S.C. § 10134(a) to (c).

130. 42 U.S.C. § 10134(d).

131. 10 C.F.R. pt. 2, subpt. J.

132. 54 Fed. Reg. 14,925, 14,926 (Apr. 14, 1989), codified at 10 C.F.R. pt. 2.

133. See 10 C.F.R. § 2.1009(b).

134. See STATE OF NEVADA, YUCCA MOUNTAIN LICENSING PROCEEDING, <http://www.state.nv.us/nucwaste/licensing.htm> (last visited Feb. 14, 2010).

135. *Id.* Also, 10 C.F.R. § 63 sets out the NRC's safety criteria. In particular, section 63.41(c) requires a finding that the issuance of a license will not constitute an unreasonable risk to the health and

unwillingness to reveal its documents, Nevada developed hundreds of contentions, which address, among other issues, the site's geologic unsuitability and the inevitable breakdown of manmade waste containers in the highly corrosive waters flowing through Yucca Mountain.¹³⁶

B. NRC Safety Review

With the docketing of the license application, NRC's technical staff is required to prepare a detailed, technical review.¹³⁷ The NRC staff is required to issue a Safety Evaluation Report (SER) containing its findings on the application and whether the proposed disposal facility will meet NRC regulations and protect public health and safety.¹³⁸ Since June 2008 when the license application was docketed, NRC review staff has made hundreds of requests¹³⁹ for additional information from DOE and has been frustrated¹⁴⁰ by an unprecedented lack of maturity in repository design features that are important to safety and waste isolation. Because of delays in obtaining required additional information from DOE on numerous issues associated with the license application, NRC staff now plans to issue its Safety Evaluation Report serially.¹⁴¹ The first volume dealing with post-closure matters scheduled for completion in September 2010.¹⁴² As a result, the CABs have decided to synchronize the timing of the formal hearings with the schedule for release of the various sections of the Safety Evaluation Report.¹⁴³

safety of the public. 10 C.F.R. § 63.41(c). The purpose of this subpart is to set out the performance objectives for post-closure performance of the geologic repository and other criteria that, if satisfied, support a finding of no unreasonable risk.

136. Nevada is entitled to request an NRC adjudicatory hearing and to be admitted as a full party to the proceeding pursuant to 10 C.F.R. § 2.309(d)(2)(iii). Nevada requested a formal adjudicatory hearing on each of its contentions in accordance with section 189(a)(1)(A) of the AEA of 1954, as amended, NWPA § 114(d), 5 U.S.C. §§ 554–58, and 10 C.F.R. pt. 2, subpts. C, G, and J.63.63(a). Pursuant to the Pre-License Application Presiding Officer Board's June 20, 2008, Memorandum and Order, Nevada drafted "single-issue" contentions, each raising a single safety, environmental (NEPA), or legal issue, each supported by a single set of related fact. See U.S. DEP'T OF ENERGY, HIGH-LEVEL WASTE REPOSITORY: PRE-APPLICATION MATTERS, ADVISORY PAPO BOARD, LBP-08-10, 67 NRC 450 (June 20, 2008), See also Keith Rogers, *Yucca Mountain: Nevada objects–229 Times*, LAS VEGAS REV. J., Dec. 20, 2008, available at <http://www.lvrj.com/news/36489114.html>.

137. 10 C.F.R. § 63.21 (2009).

138. 10 C.F.R. pt. 2 app. D (2009).

139. NRC, Yucca Mountain Application Requests for Additional Information (2009), <http://www.nrc.gov/waste/hlw-disposal/yucca-lic-app-rai.pdf>.

140. The sheer quantity of NRC staff's Requests for Additional Information combined with the lack of quality of DOE's responses are evidence both of the inadequacy of DOE's Yucca Mountain plan and the obvious frustration experienced by NRC staff in attempting to grapple with this project.

141. NRC Atomic Safety and Licensing Board, *NRC Staff Answer to the CAB's July 2, 2009 Order Concerning Scheduling*, Doc. No. 63-001 at 1, available at <http://www.state.nv.us/nucwaste/licensing/nrc090710cab.pdf>.

142. *Id.* at 2.

143. NRC, Atomic Licensing and Safety Boards, *CAB Case Management Order #2*, Doc. No. 63-001-HLW at 3, (Sept. 30, 2009), available at <http://www.state.nv.us/nucwaste/licensing/cab090930CaseManagementOrder2.pdf>.

C. Hearing

The proceedings before NRC will include full discovery and formal “on the record” adjudicatory hearings with cross-examination likely to last for several years. While the NWPA provides for a period of up to four years for the NRC to determine whether the repository should be granted a construction authorization,¹⁴⁴ the NWPA has no penalty or other regulatory consequence for failure to meet this statutory deadline. In fact, the DOE, without any consequence, missed by five years the requirement that it submit its license application ninety days after the President’s recommendation of the Yucca site.¹⁴⁵

With its team of eminent, international experts, Nevada plans to prosecute over 200 contentions relating to various procedural and substantive aspects of the license application. Nevada’s contentions address the site’s seismicity, volcanism, rapid groundwater infiltration, and the inability of DOE’s proposed containers to withstand the highly corrosive Yucca Mountain environment. The contentions also address virtually all aspects of DOE’s environmental impact statement for the project. If a construction authorization is actually granted for the repository and it survives appeal to the full NRC and other likely interim court challenges, DOE must still obtain a second authorization from NRC to actually emplace high-level waste and spent nuclear fuel in the repository.¹⁴⁶ This proceeding, too, will be subject to further legal challenge.

A recurring concern for Nevada is whether the NRC licensing proceeding is fair and objective. There is a disturbing history of inappropriate contacts by NRC staff and DOE in the project’s pre-licensing phase.¹⁴⁷ Early in the program, NRC adopted the view that it has a responsibility to assist DOE and assure that DOE is able to produce an acceptable license application for Yucca Mountain. Thus, DOE and NRC have interacted frequently over the years to assist DOE’s increasingly problem-plagued repository program. However, more troubling is that in actual NRC licensing proceedings, NRC staff assume the role of license advocate rather than neutral advisor to NRC. Among a host of other equity concerns, this advocacy may improperly bias the hearing in favor of DOE, the license applicant.

144. 42 U.S.C. § 10134.

145. Steve Tretreault, *Yucca Project Misses Deadline: Energy Officials Shrug off Filing License Application*, LAS VEGAS REV. J., Oct. 22, 2002, at 1B, available at http://www.reviewjournal.com/lvrj_home/2002 (follow “October 22, 2002” hyperlink; then follow “Yucca Project Misses Deadline” hyperlink).

146. 10 C.F.R. § 63.46.

147. See generally Letter from Robert R. Loux, Executive Director, State of Nevada Agency for Nuclear Projects, to Dale Klein, Chairman, U.S. Nuclear Regulatory Comm’n (Mar. 15, 2007), <http://www.state.nv.us/nucwaste/news2007/pdf/nv07031nrc.pdf>; Letter from Robert R. Loux, Executive Director, State of Nevada Agency for Nuclear Projects, to Karen Cyr, Office of General Counsel, U.S. Nuclear Regulatory Comm’n (Aug. 3, 2004), <http://www.state.nv.us/nucwaste/news2004/pdf/nv040803nrc.pdf>; Letter from Robert R. Loux, Executive Director, State of Nevada Agency for Nuclear Projects, to Nils J. Diaz, Chairman, U.S. Nuclear Regulatory Comm’n (June 4, 2004), <http://www.state.nv.us/nucwaster/news2004/pdf/nv040604diaz.pdf>; Martin G. Malsch, Remarks at the 16th Annual Regulatory Information Conference (Mar. 11, 2004), <http://www.state.nv.us/nucwaste/news2004/pdf/malsch040311ric.pdf>.

VI. CONCLUSION

In light of the serious flaws and uncertainties inherent in the Yucca Mountain program and in NRC's ability to legally and procedurally assure fairness in its licensing proceeding, the State of Nevada is preparing to fully participate in the NRC proceeding and for the inevitable litigation to follow. After over two decades of opposition, Nevada continues to believe that the Yucca Mountain project will eventually be abandoned and that the NRC licensing proceeding will be appropriately halted by a termination of the program *with prejudice*. Protection of public health and safety and the environment demand no other result. In the meantime, it is imperative that the State maintain its efforts despite the tremendous costs.

Within Nevada, in spite of pervasive public opinion against the project, there are calls from certain quarters that the State should abandon its opposition and begin to "negotiate" for monetary benefits. This is not a new idea. For years, nuclear industry lobbyists and Yucca Mountain supporters have characterized the project as inevitable and have urged Nevada's leadership to accept it and begin negotiations with the federal government for benefits in exchange for accepting the project. Not only is it a fiction that large monetary "benefits" are even available, but it is questionable whether Nevada's leadership can negotiate away the public health and safety of its citizens. Indeed, no amount of money can change the fact that Yucca Mountain is an unsafe repository site or compensate for people's lives, a safe environment, clean water, and the health and safety of future generations. Yucca Mountain is such a poor repository site, geologically speaking, that it would be irresponsible, even unconscionable, for any state leader to entertain the notion of accepting the facility in exchange for monetary or other benefits.

The Obama Administration created a Blue Ribbon Commission to consider the direction the country should take to address high-level nuclear waste management. If the Yucca Mountain project is considered a case study for future proposals, it can be said to offer a complete menu of what the federal government should *not* do. From the beginning of the search for a nuclear waste disposal solution more than two decades ago, Nevada required just one thing from the federal government: whatever site is ultimately chosen—be it in Nevada or anywhere else—as long as the material remains harmful, the site should be capable of isolating deadly radioactive material from people and the environment. The Yucca Mountain site fails this test abysmally. Whatever course of action is pursued in the future, the process must be fair and scientifically sound. It needs to consider the legitimate concerns of the host site and it needs a transparent public process which provides for meaningful dialogue among all competing interests in order to accommodate technical and policy concerns.

Geologist Allison Macfarlane,¹⁴⁸ a leading technical expert on nuclear waste disposal and recent appointee to President Obama's Blue Ribbon Commission, offers this wisdom as we move forward:

If the U.S. nuclear waste disposal program had been developed "correctly," it would probably seem closer to what was outlined in the original Nuclear Waste Policy Act Sites would have been initially selected based on their geologic merit. More detailed research would have been conducted at a subset of sites (two or three). These sites would need approval by the local community and state before any research could go on. With such a plan, the method of final site selection would be measured in a relative sense, by comparing the sites, instead of an absolute sense, with no relative context as is the case now.¹⁴⁹

148. Allison Macfarlane is a geologist at George Mason University. In an interview with *Technology Review's* David Talbot concerning the future of nuclear waste and its implications for the future of nuclear power, Macfarlane unequivocally states that Yucca Mountain is an unsuitable site primarily because of its oxidizing environment. David Talbot, *Life After Yucca Mountain*, *TECH. REVIEW*, July/Aug. 2009, at 22.

149. Allison M. Macfarlane, *Uncertainty, Models, and the Way Forward in Nuclear Waste Disposal*, in *UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION'S HIGH-LEVEL NUCLEAR WASTE* 405, (Rodney C. Ewing and Allison M. Macfarlane eds., 2006).