Beyond Yucca Mountain: Split Liability Drives Action for Interim Nuclear Waste Storage

Amy L. Sypula
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INTRODUCTION

After fifteen years and six billion dollars, the United States still lacks a viable long-term solution to the mounting levels of high-level nuclear waste scattered across the nation in 68 sites. The Nuclear Waste Policy Act of 1982 ("NWPA") and its 1987 Amendments have driven regulators to approve Yucca Mountain, Nevada, for burial of the 37,000 metric tons of nuclear waste in need of a final resting place. In the NWPA, Congress set January 31, 1998 as the deadline by which the Department of Energy ("DOE") was to dispose of the utilities' nuclear waste. However, litigation challenges, scientific uncertainty, and political stalemates have all contributed to extensive delays. At present, the best case scenario for when Yucca Mountain can accept the waste is in the year 2010.3

Correctly anticipating DOE’s inability to meet the 1998 deadline, Congress and the utilities both tried to position themselves for the unfortunate consequences. Congress attempted to mitigate the situation through the passage of various bills that mandate shipping the waste through 34 states to get it to an

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3. US DOE, Viability Assessment at 3 (cited in note 1).
interim storage site near Yucca Mountain. But the Administration feared the creation of a de facto permanent site above ground. Scientists did not want to be rushed into a decision with the potential for such grave consequences. To add to the opposition, the public protested what became known as “Mobile Chernobyl bills.” After three failed attempts to ensure a veto-proof majority, the House of the 106th Congress has been forced to introduce a fourth version of their replacement to the NWPA.

Utilities, on the other hand, dealt with this delay through alternative means: the civil litigation system. In Indiana Michigan Power Co v Department of Energy (“Indiana Michigan”), utilities and state commissions sought review of the Department of Energy’s (“DOE”) final interpretation, declaring itself free from any obligation to dispose of high-level radioactive waste in the absence of an operational permanent or interim repository. Rejecting the DOE’s statutory construction, the D.C. Circuit found that DOE’s obligation to dispose of the utilities’ waste by January 31, 1998 was not conditioned on the existence of a repository or other facility. This holding prevents the DOE from excusing itself from liability despite Yucca Mountain’s 1998 inoperational status. This same decision left the title to the waste with the utilities and created a form of shared liability.

Such a shared liability may be just what is needed to spark some action in the near term nuclear waste dilemma. Both the utilities and the DOE have been so focused upon the approval process for Yucca Mountain, they have been unable to reach an agreement on the more immediate problem of what to do with the waste for the next 11 years during which Yucca will not be available. Although both sides have a vested interest in the success of a permanent repository at Yucca Mountain, their conflicting motivations have prevented any consensus from forming to solve the immediate problem of interim storage. The nuclear power industry perceives Yucca’s approval as imperative not only to their future success, but also to their very existence. Similarly, the DOE wants Yucca to succeed to improve their poor track record concerning hazardous waste treatment and justify the time and money invested in the site. While both sides are united in their determination to safely dispose of waste at Yucca Mountain, this determination has simultaneously impeded progress on interim plans for the nuclear waste. The DOE has scheduled a definitive decision to be available on Yucca’s feasibility by 2001. Regardless of whether Yucca Mountain is then chosen to host all of the nation’s nuclear waste, there are over 30,000 tons of spent nuclear

4. HR 1020, 104th Cong, 1st Sess (Feb 23, 1995); S 1271, 104th Cong, 2d Sess (Sept 25, 1995); S 1936, 104th Cong, 2d Sess (Jul 10, 1995); HR 1270, 105th Cong, 1st Sess (Apr 10, 1997); S 104, 105th Cong, 1st Sess (Jan 21, 1997).
5. HR 45, 106th Cong, 1st Sess (Jan 6, 1999).
6. 88 F3d 1272, 1274 (DC Cir 1996).
7. Id at 1277.
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fuel that need to be dealt with until 2010, its earliest availability. This Comment will argue that the Court's decision in Indiana Michigan has provided both sides with the prompting necessary to find solutions to the interim nuclear waste problem.

This Comment consists of five Parts. Part One explores the background of the nation's nuclear waste policy and Yucca Mountain. Part Two examines some of the reasons for the continual delays in constructing a permanent repository at Yucca Mountain as the precursors to the Indiana Michigan suit. Part Three sets forth an analysis of case law dealing with the DOE's liability for not meeting the January 1998 deadline. Part Four considers the impact that these legal holdings will have on the near-term nuclear waste dilemma. Specifically, the liability for disposal as distinct from taking title to the spent fuel, the corresponding financial ramifications, and incentives for near-term action will be addressed. Part Five concludes with an evaluation of potential remedies that will provide near-term solutions. By shifting the expectations of the parties and balancing the liability between DOE and the utilities, the D.C. Circuit may have provided the needed impetus to break the current stalemate. Instead of a Yucca Mountain-focused approach to nuclear policy, the parties may realize that compromise and alternative strategies are also necessary to provide assurance to the industry, the DOE, and the public that the nuclear waste will be safely contained in the short-term as well.

I. BACKGROUND OF NUCLEAR WASTE AND YUCCA MOUNTAIN

The United States currently has 105 operating nuclear power plants that store waste at 68 sites. They supply over 20 percent of our nation's electric power, second only to coal. Nuclear power has been championed as a "cleaner" energy source in comparison to burning fossil fuels, which emit harmful pollutants into the atmosphere. However, the challenges associated with its "unclean" high-level nuclear waste or spent nuclear fuel have been underestimated. The nuclear industry and the government have long been contemplating strategies for the safe treatment of nuclear waste including reprocessing, vitrification, closed-system reactors, and underground burial. What was not foreseen, however, was the extent of difficulty associated with the siting and construction of such a nuclear waste facility, which has resulted in our current inability to handle its long-term disposal.

Ninety-nine percent of high-level waste from commercial nuclear power plants is simply spent nuclear fuel (SNF) that has released its energy through fission. This energy is used to boil water into steam, which drives a turbine-

generator to produce electricity. The fuel that runs nuclear power plants is made up of small uranium pellets or MOX (a mixture of uranium and plutonium). These are placed inside long metal fuel rods. These rods are grouped together into fuel assemblies, which are placed inside the reactor.

Certain changes take place in the fuel during the fission process. Most of the fragments of the fission—the pieces left over after the atom has split—are radioactive. Over time, the uranium and plutonium are burned up and these trapped fission fragments reduce the efficiency of the chain reaction. Therefore, about every 18 months, the old fuel assemblies, having already released their energy, are removed and replenished with fresh fuel.\(^\text{13}\)

After it is removed from the reactor, used fuel is stored at nuclear plant sites in steel-lined, concrete vaults filled with water. The water cools the used fuel and acts as a shield to protect workers from radiation. The radioactive waste remains locked inside the uranium pellets, which are still encased in the metal fuel rods.\(^\text{14}\) This form of storage only provides a temporary solution, however, since the effective life span of the pools is much less than the 10,000 to 100,000 years that some of the wastes remain radioactive. Another factor which limits the feasibility of short term solutions is the sheer amount of waste generated by a typical nuclear power plant: about 30 tons of used fuel each year.\(^\text{15}\) To provide a better sense of this volume, the used fuel produced by all of America's nuclear power plants since the first one started operating over 30 years ago would cover an area the size of a football field about fifteen feet deep.\(^\text{16}\)

In response to the growing number of spent fuel rods that are piling up at the individual reactors, Congress passed the Nuclear Waste Policy Act of 1982.\(^\text{17}\) It requires the DOE to site, construct, and operate a deep geological repository for the disposal of high-level nuclear waste.\(^\text{18}\) In doing so, the government provided a large subsidy to the nuclear energy industry. This incentive allowed the utilities to gain all of the financial benefits of nuclear power while avoiding most of the long-term costs. As amended in 1987, the NWPA provides that Yucca Mountain, Nevada is the sole area to be evaluated as a potential site for the first permanent waste dump.\(^\text{19}\) Located in a dry climate 100 miles north of Las Vegas, this permanent repository would consist of a series of tunnels to be drilled deep into a geologic structure, with each tunnel containing bore holes into which waste containers will be placed. “If approved, the site will consist of approximately 150 miles of service and storage tunnels 1,400 feet below Yucca Moun-
tain." The waste will be taken to the site and reloaded into storage containers. From there, it will be placed inside another container for transport down into the tunnels. Locomotives will pull the containers into the tunnels, and robots will monitor the site for 100 years. "The containers, made of corrosion-resistant stainless steel and designed to shield radiation from the environment for 1000 years, would provide an extra, engineered barrier to augment the geologic barrier. After the containers are placed into individual bore holes, the holes would be sealed with a liner and closed at the surface."

In the NWPA, Congress created a comprehensive scheme for the interim storage and permanent disposal of high-level radioactive waste generated by civilian nuclear power plants. NWPA establishes that, in return for a payment of fees by the utilities, DOE will construct a repository for the SNF, with the utilities who generate the waste bearing the primary responsibility for interim storage until DOE accepts the SNF "in accordance with the provisions of this chapter." The NWPA does this by requiring that the utilities enter into standard contracts with DOE for the disposal of the waste. According to Section 302(a)(5) of the statute, the contracts shall provide that the Secretary take title to and dispose of the waste, beginning not later than January 31, 1998. The final standard contract adopted by DOE, following notice and comment, states that:

\[\text{the services to be provided by DOE under this contract shall begin, after commencement of facility operations, not later than January 31, 1998 and shall continue until such time as all SNF ... from the civilian nuclear power reactors specified ... has been disposed of}\]

This statutory and contractual commitment is the source of the current controversy.

II. REASONS FOR THE DELAY OF YUCCA MOUNTAIN

As legal, scientific, and political issues erupted, it became clear that DOE would not meet the 1998 deadline. Although these issues may not prove to be deal breakers in other contexts, the high stakes of the nuclear waste dilemma allow for little bargaining room. This repository at Yucca will influence the health and safety of the public at large, the reelection campaigns of members of Congress, and the nuclear industry as a whole. No one wants to be accountable for any disasters that may stem from the construction of a permanent repository. Though scientists claim the risks are small, opponents of Yucca Mountain successfully prey on the fears of both the public and government officials. As a result, Yucca Mountain is still in its characterization phase. While many factors

22. 42 USC § 10131(a)(4)-(5).
23. 42 USC § 10222(a)(5).
contributed to this delay, the three most influential were legal challenges, scientific uncertainty, and political gridlock.

A. LITIGATION

By consistently litigating various issues surrounding Yucca Mountain, Nevada has substantially impeded the government's efforts to construct a permanent repository. Expressing a typical "NIMBY (Not In My Backyard)" reaction to the possibility of being forced to become a dumping ground for all of the nation's nuclear waste, the state of Nevada has utilized the litigation process to challenge the government at every stage.

Provisions in the NWPA initially sparked federalism concerns about the states' lack of autonomy in decisions related to the nuclear waste repository. Although many states resent the importation of wastes into their borders, there is little they can do about it. The Supreme Court has consistently held that waste is an item of interstate commerce and that, under the Commerce Clause of the U.S. Constitution, the states may not ban or tax either its export or import. Attempts have been made to give states a limited right to regulate the interstate flow of municipal solid waste, but so far none have been enacted into state law.

Since Congress' decision to target Yucca Mountain as the sole site under consideration, Nevada has seized its at least six opportunities to challenge the government's decision-making process. Nevada can challenge (1) DOE's siting guidelines; (2) DOE's Environmental Impact Statement; (3) DOE's decision to recommend Yucca Mountain to the President; (4) NRC's technical requirements and criteria for licensing; (5) NRC's decision to issue DOE a construction authorization for a repository; and (6) EPA's independent radiation standard. Although the government has not yet reached step three, Nevada has already found ample opportunity for delaying the process, bombarding the Ninth Circuit with challenges to various aspects of the NWPA plan.

Nevada first began its attack by raising federalism concerns in State of Nevada v Watkins (I), where the Court rejected various challenges to the 1987 NWPA amendments including state sovereignty and 10th Amendment arguments. This decision sparked controversy and has been the topic of academic review for its 10th Amendment implications.

Nevada then objected to Yucca Mountain being designated as the sole site for a permanent repository feasibility study. In State of Nevada v Watkins (II), the Court dismissed Nevada's petition for review of DOE's site recommendation guidelines for lack of subject matter jurisdiction. In State of Nevada v Watkins (III), the Ninth Circuit later held that Nevada's challenge to the DOE's envi-
environmental assessment of Yucca Mountain was moot due to statutory amendments. This trilogy of cases is only representative of the various suits brought by Nevada.

In 1989, Nevada also objected to the Bureau of Land Management’s issuance of right-of-way authorization to the DOE for characterization studies of the land. However, in *State of Nevada v Burford*, the U.S. District Court dismissed Nevada’s complaint for failing to demonstrate actual injury, lack of ripeness, and failure to state a claim upon which relief could be granted.

The latest battles have surrounded funding. In *Loux v Herrington*, the Court found that Nevada was entitled to funding of studies it conducted at Yucca Mountain prior to site characterization. But the courts did not extend this funding for review of DOE’s studies. After DOE declined to provide Nevada with funds to review, monitor, and evaluate the DOE’s site characterization, the court in *State of Nevada v U.S. Department of Energy* held for the DOE in denying Nevada’s petition for review. By restricting the availability of resources for review, Nevada took another blow to their litigation attacks.

Despite these legal losses, a 1995 challenge suggests that Nevada is not likely to retreat from using litigation as a stalling tactic. In *State of Nevada v O’Leary*, the Ninth Circuit affirmed a District Court opinion that denied Nevada the opportunity to perpetuate testimony of scientists regarding the proposed site of Yucca Mountain. These depositions were to be used “to obtain the information for use in future agency and judicial proceedings at which Nevada contemplates it will challenge various anticipated decisions, approving the site, by the Department of Energy..., the Nuclear Regulatory Commission, and the Environmental Protection Agency.” Not only has this litigation contributed to the delays, but the mobilization of environmentally conscious organizations has fueled the flames of this battle.

**B. SCIENTIFIC UNCERTAINTY**

The second cause of delay at Yucca Mountain involves the complexity of determining its scientific repercussions. Three sets of guidelines, developed by the DOE, NRC, and the EPA respectively, govern the viability of Yucca Mountain. The NWPA requires the Secretary of Energy to develop guidelines which “specify factors that qualify or disqualify any site from development as a repository, including...hydrology, geophysics,...proximity to water supplies.” In

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30. Yet another is *County of Esmeralda v US Department of Energy*, 925 F2d 1216, 1221 (9th Cir 1991) where the court vacated DOE’s decision not to designate two Nevada counties as units of local government affected by the project at Yucca Mountain.
32. *Loux v Herrington*, 777 F2d 529, 536 (9th Cir 1985).
34. *State of Nevada v O’Leary*, 65 F3d 932, 933 (9th Cir 1995).
35. Id.
36. 42 USC § 10132(a).
accordance with this statutory requirement, the DOE issued the required set of comprehensive guidelines in 1984 after a lengthy public rulemaking process. But in 1996, the DOE issued a Notice of Proposed Rulemaking seeking public comments on a major revision to the siting guidelines that would replace the specific guidelines with two very generalized ones: (1) that the repository shall allow for containment of waste in accordance with the EPA standards and NRC regulations after closure; and (2) that the repository shall perform in accordance with EPA standards established specifically for Yucca Mountain and the NRC regulations during construction, operation, and closure. Not only do these proposals appear to contradict the requirements in the NWPA that factors be specified and imply that Yucca may not be feasible under the current guidelines, but the EPA standards have yet to be developed.

If scientists cannot support their conclusions with a high degree of certainty, the DOE will not be able to recommend Yucca Mountain to the President. DOE’s past reputation for site mismanagement is too tainted to risk an uninformed conclusion. The high stakes of such a determination have contributed to the delay. There are many areas where scientists have been unable to support a definitive prognosis on the feasibility of a Yucca repository. Scientists have to deal with disagreements between previous assumptions and among others in the scientific community, a lack of standards with which to compare their findings, and an inability to predict with certainty so far into the future. After fifteen years, they will only provide that “Yucca Mountain remains a promising site” and make no further affirmation as to its viability as the repository location. The NWPA’s statement of purpose is to “[e]stablish a schedule . . . that will provide [a] reasonable assurance that the public and [the] environment will be adequately protected from the hazards posed” by radioactive waste in a repository. Without such “reasonable assurance” (DOE’s standard), there will be continued delay in the construction of the repository.

To better understand the scientists’ dilemmas, it is important to realize that the spent fuel will remain radioactive for 10,000 to 100,000 years. As time goes by, the amount of radioactivity decreases. The rate of decrease is measured by what are known as half-lives. After one half-life, half the original number of atoms remain, after two half-lives, only a quarter of the unstable atoms are left, and so on. The range of half-lives is large, (with Uranium-238 needing as much

40. 42 USC § 10131(b)(1).
41. US DOE, Viability Assessment at 36 (cited in note 1).
as 4.5 billion years to cover one half-life period\(^4\)), and it is this range, not the quantity of decaying particles that is most crucial in determining the danger of their radioactivity.\(^4\)

The time required for the radioactive elements to become harmless differs tremendously, depending on the particular isotope involved. Until then, radioactive waste can be dangerous if it gets into the air, drinking water, or food. One way this could happen would be if groundwater somehow entered the repository, dissolved some of the waste, and carried it to the surface or the water table. If radioactive elements make their way into Yucca Mountain's water table, which moves laterally under the adjacent valley, there could be far-reaching health effects. Scientists, extrapolating thousands of years into the future, have targeted the Amargosa Valley and the Franklin Lake Playa or Alkali Flat as the areas first effected.\(^4\) There, wells are tapped for irrigation used for alfalfa, which in turn feeds cows that deliver 30,000 gallons of milk to Los Angeles per day.\(^4\) Scientists believe that water is the most likely vector by which radioactive material could be released from the repository.\(^7\)

Instead of providing clarification and a convergence of scientific opinion, recent findings indicate that previous assumptions may no longer be substantiated by the physical evidence. The first area of scientific uncertainty concerns the chances that radioactive elements will reach the water supply. Engineers intend to build the repository with man-made barriers including solid casks and drip-shields to isolate the waste. But they are also counting on natural geologic barriers to augment these in case some of the radioactive elements defy the human barriers. For instance, Yucca Mountain was originally chosen in part for its dry, barren climate. The minimal amount of rainfall to this region helps decrease the amount of water that can flow through the repository and pick up contaminants on the way down to the water table. However, the U.S. Geological Survey, which had initially identified the site with positive endorsements, recently expressed uncertainty about relying on the current modeling without a more extensive analysis of the impact of climate change on Yucca’s feasibility.\(^4\) And this is only one area of scientific conflict. Two larger battles have been fought over the water table and the rate of water migration within Yucca Mountain.

A second reason scientists and engineers chose Yucca Mountain was its deep water table, which makes it possible to put a repository some 1000 feet under-

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44. Dr. Jim Connell, Lecture 2: Nuclear Stability and Radioactivity (cited in note 42).
ground and still have it be about 800 feet above the water table. But conflicts arose among scientists surrounding the possibility that the water table could rise.

The first fears were apparent in a 1989 DOE report which concluded that groundwater had risen well above the level of the proposed site several times in the geologically recent past—anywhere from 10,000 to 100,000 years ago—and is likely to rise again in the future. A panel of the National Research Council disputed these claims. "Geologic evidence suggests that groundwater has never risen to the level proposed for the repository; the largest rise may have been a little over 100 feet in 10 million years." Furthermore, "no mechanism known to the panel appeared capable of raising the water table anywhere near the 900 to 1000 feet necessary to reach the proposed repository level." They further stated that "the site of a proposed repository for high-level radioactive waste from the nation's nuclear power plants is not at risk of groundwater infiltration."

A third supposed advantage of Yucca Mountain is the slow travel time of water through the unsaturated zone (the area above the water table). The Office of Civilian Radioactive Waste Management believes there is relatively little and slow movement of water. Federal scientists debate with state scientists about the rate of migration at Yucca Mountain. Nevada state scientists fear that groundwater travel time from the repository to the water table is less than 1,000 years instead of the many thousands of years that DOE believes. This theory was recently supported by discoveries of Chlorine-36 ("Cl-36"), 600 feet below ground. Left over from nuclear weapons testing in the atmosphere, the high levels underground at Yucca substantiate the theory that Yucca Mountain's rock pores are extremely fractured. The fact that precipitation infiltrated the rock and carried the Cl-36 that deep in less than 50 years may legitimate concerns about the speed at which radioactive elements can migrate through Yucca Mountain to the water table.

DOE scientists counter, however, that even with fast groundwater movement, such movement would quickly dilute any radioactivity in the water table. Furthermore, if the facility is built at Yucca Mountain, engineers can use the telltale

50. Id (citing National Research Council, Ground Water at Yucca Mountain: How High Can It Rise? Panel on Coupled Hydrologic/Tectonic/Hydrothermal Systems at Yucca Mountain (1992)).
51. Id.
54. Mike Richard, Nuclear Energy Institute, Science Working To Ensure A Safe Place For Used Nuclear Fuel 4 (e-mail sent to Senator Simon's office) (June 18, 1996).
Cl-36 marker to avoid faults in the rock, thus using natural drainage features to channel water away from the repository.\textsuperscript{56}

An additional cause of delay is the conflict between Congressional requirements and the scientists’ capabilities. The uncertainty of Yucca Mountain’s geologic characteristics combine with unrealistic timelines and standards to contribute to the delay of the permanent repository. The incredible lifespans of the radioactive elements make it impossible to ensure that the repository will contain them until they are safe. Yet the NWPA actually requires scientists to guarantee that the storage casks will retain the wastes for 100 years, an equally difficult task.\textsuperscript{57} Such unrealistic expectations have contributed to the repository’s fifteen-year delay.

Inaction is only compounded by a lack of coordination among agencies. For instance, the U.S. Environmental Protection Agency (EPA) is responsible for setting the basic standards needed to obtain a license, including the allotted amount of radioactivity that can be released. DOE estimates that “the repository will release 8,000 curies over 10,000 years, which is just a fraction of the 7.5 million curies naturally occurring on land.”\textsuperscript{58} But there is considerable debate about the proposed 100-millirem release standard for radioactivity. This is only one-third of the 360 millirems that the average American receives per year from natural sources. The 100 millirems would be equivalent to getting two and a half full sets of dental x-rays in a year.\textsuperscript{59} The Health Physics Society has stated that below 10,000 millirems, “health effects are either too small to be observed or are nonexistent.”\textsuperscript{60}

Another comparison can be made with a substance like radon, found in homes, which accounts for about 200 millirem/year.\textsuperscript{61} Bernard Cohen notes that radon “gives the average American a thousand times as much radiation as he or she can expect to get from nuclear power, including projected accidents, radioactive wastes, and everything else.”\textsuperscript{62} Yet there is very little concern expressed about its risks, suggesting the existence of a motivational distortion. Perhaps this is yet another example of the public’s attempt to reduce cognitive dissonance. Thinking that they are not, in their daily lives, exposing themselves to the risk of radon, causes them to see its risks as lower than they really are.\textsuperscript{63}

Not only is there disagreement as to the proper amount of radiation release, but the government is changing the rules as the game is played instead of acknowledging Yucca’s limitations. By 1992, it was clear that the Yucca Mountain

\textsuperscript{56} Mike Richard, Science Working To Ensure A Safe Place at 4. (cited in note 54).
\textsuperscript{57} Mark Holt, Civilian Nuclear Spent Fuel Temporary Storage Options, CRS Report for Congress (Cong Reserv Ser, Apr 22, 1996).
\textsuperscript{58} Letter from Senator J. Bennet Johnston, Ranking Democrat, to Carol Browner, Administrator of the EPA, May 23, 1996 at 2.
\textsuperscript{59} Fredreka Schouten, Rough Road For Nuclear Waste, Gannett News Service (Apr 15, 1997).
\textsuperscript{60} Health Physics Society, Radiation Risk in Perspective (Jan 1996).
\textsuperscript{61} From Letter from J. Bennet Johnston to Carol Browner at 2 (cited in note 58).
The site could not meet limits the EPA had set for the release of carbon-14. Instead of disqualifying the site, DOE launched an effort to convince EPA that its standard should be relaxed. While the releases would violate the standard, they reasoned, the resultant individual dose would be negligible. When EPA declined to modify the standard, Congress interceded in 1992 with the Energy Policy Act, directing EPA to write a new standard specifically for the Yucca Mountain site. This standard was to be one that limited doses to individuals instead of the long-term population risk. The EPA is to retain the National Academy of Sciences to formulate a recommendation for a new standard that “shall prescribe the maximum annual effective dose equivalent for individual members of the public from releases to the accessible environment from radioactive materials stored or disposed of in the repository.” Congress further directed the NRC to revise its repository licensing rule, as necessary, to be consistent with the new EPA standard. Ironically, though no new standard for a Yucca Mountain repository has been promulgated to date, the scientists are still expected to make predictions about the viability of the site.

These sorts of scientific disagreements, unrealistic timelines, and lack of coordination among agencies have been major contributors to the delay at Yucca Mountain. Energy Secretary Bill Richardson said that predictions would be stated in probabilities. “That’s all one can offer,” he said. “I don’t think in science one can offer certainty.” Perhaps not certainty, but when the stakes are this high, society should be concerned about the margin of error.

C. POLITICAL GRIDLOCK

If the scientists have yet to reach a consensus with regards to reasonable assurance, it is unrealistic to expect the public to feel secure. External influences, like the media, provide the underlying basis of people’s risk perception. Even though people are exposed to high risks every day due to common activities, surveys show that they are more worried about the catastrophic incidents that have less chance of occurring. Slovic, Fischhoff, and Lichtenstein’s survey on members of the League of Women Voters (LOWV) and college students showed that “nuclear power had the lowest fatality estimate and the highest perceived risk for both LOWV members and [college] students.”

67. Id.
Research on behavioral decision-making also suggests that people make judgments about probability on the basis of heuristic devices. People tend to think that risks are more serious when an incident is readily called to mind or “available,” biasing people’s assessments of nuclear risk in light of dominant images like Chernobyl. Even if the risks of devastation surrounding Yucca Mountain are small (the chance of a new volcanic center forming and disrupting a potential repository at Yucca Mountain in the next 10,000 years is about one chance in 70 million per year), the severity of the risk (a volcano erupting and spreading radioactive waste into the air) takes precedent in most people’s risk calculations. Such systematic errors may lead to a lack of trust in politicians who support Yucca Mountain without any hesitancy, and in turn affect the ways that Congressmen vote. Torn between their constituents and the nuclear lobbyists, the efforts to provide an interim solution to the nuclear waste problem has only resulted in more gridlock.

In response to DOE’s apparent inability to dispose of the waste by 1998 via a permanent repository, Congress realized that there must be an interim solution to deal with the waste until the feasibility of Yucca Mountain could be determined. The solution most actively pursued has been proposals for an interim site at Yucca Mountain. In fact, replacements of the NWPA that mandate construction of an interim site at Yucca Mountain have been proposed five times by both the Senate and the House.

In December of 1995, momentum was building for passage of major revisions to the NWPA, H.R. 1020 and S. 1271, both of which mandated interim construction by January 31. The action came at a time when the DOE program to characterize a repository site at Yucca was experiencing large budget cuts as proponents and opponents alike pointed to the high costs and limited progress of the repository program. Both bills would further reduce funding for the repository site by shifting priority toward building an interim storage site for spent nuclear fuel adjacent to Yucca and toward preparing the infrastructure necessary to allow shipments to begin in 1998. With a 60,000 ton capacity and 100 year renewable license, it would be easy for such a site to become a de facto permanent solution. These nuclear waste bills eventually were forced to take a back seat to budget wranglings, government shutdowns, and Nevada’s filibuster attempts.

73. HR 1020, 104th Cong, 1st Sess (Feb 23, 1995); S 1271, 104th Cong, 2d Sess (Sept 25, 1995); S 1936, 104th Cong, 2d Sess (Jul 10, 1995); HR 1270, 105th Cong, 1st Sess (Apr 10, 1997); S 104, 105th Cong, 1st Sess (Jan 21, 1997).
75. Id.
But on July 31, 1997, the Senate passed S. 1936, a bill identical to the defeated S. 1271, to amend the Nuclear Waste Policy Act of 1982 by a vote of 63-37.\textsuperscript{76} The week before, a filibuster by the Nevadan senators was defeated by a 65-34 vote. Both of these tallies fell short of the 67 votes needed to override a promised presidential veto. House leaders had earlier indicated that it would not take up its version of the bill, H.R. 1020, unless the Senate version passed with a veto-proof majority. When that did not occur, the bill was effectively dead and was not considered further in the 104th Congress.

But supporters of S. 1936 would not be silenced so easily. On April 7, 1997, the 105th Congress again reintroduced S. 1936 as S. 104. Although nearly identical to the previous bills, Senator Murkowski (R-AK), a primary supporter of the bill, did try to appease some of the opponents. He added provisions that had the transportation routes avoid populated areas, gave the EPA back its authority on radiation releases, and had DOE draft an Environmental Impact Statement (EIS) for the interim site. He even extended the time that the President could halt construction of the interim site until March of 1999 and delayed the opening until 2003. If the Yucca site were not deemed suitable, however, the President would only have 18 months to select an alternative site. This led to an onslaught of amendments by the congressmen from the states listed as alternatives, “barring the President from even considering locations in Washington state, South Carolina and Tennessee that are among the most likely alternatives.”\textsuperscript{77} Although advocates of the bill won in the House on a 307-120 vote, the Senate again fell two shy of a veto-proof margin in the Senate.\textsuperscript{78} But their persistence had narrowed the gap by two votes.

The 106th Congress will try yet again. On January 6, 1999, Representatives Fred Upton (R-MI) and Edolphus Towns (D-NY) introduced H.R. 45 to amend the NWPA. Its companion bill in the Senate, S. 608, soon followed.\textsuperscript{79} It is uncertain if recent changes in Congressional dynamics or the DOE’s recent issuance of a Viability Assessment will affect the viability of another approach at mandating interim storage. Although not definitive in support of Yucca, it may provide enough scientific assurance to overcome the Administration’s veto of interim storage.

In addition to these Yucca specific details, another factor that may substantially influence the Yucca Mountain plan is the Waste Isolation Pilot Project (WIPP), the first underground permanent repository for transuranic wastes. On March 26, 1999, the federal government sent its first shipment from Los Alamos.


\textsuperscript{77} Jonathan Weisman, Waste Site Bill Passes Senate, Remains Vulnerable to Veto, 55, 16 Cong Quarterly Weekly Rep 902-903 (Apr 19, 1997).

\textsuperscript{78} Congress Daily, Waste Bill Supporters See Momentum; Nevadans Defiant, (Jan 13, 1999).

\textsuperscript{79} Mark Holt and Zachary Davis, Nuclear Energy Policy, CRS Issue Brief at CRS-88090 (Cong Research Serv April 21, 1999) (cited in note 10).
National Laboratory to the site near Carlsbad, New Mexico.\textsuperscript{80} WIPP is different from Yucca in areas such as classification of wastes (transuranic wastes encompass a mixture of items like plutonium-contaminated rolls and clothing),\textsuperscript{81} geology of the repository (WIPP is placed in salt beds), and jurisdiction of the site (the state has jurisdiction over mixed wastes while the federal government retains it over high level wastes).\textsuperscript{82} Yet the similarities of public opposition, legal battles, scientific uncertainty, and a 25-year delay are enough to closely track the future developments at WIPP as influencing the future of Yucca.

III. ANALYSIS OF RELEVANT CASE LAW

A. INDIANA-MICHIGAN

In 1993, various utilities and state agencies' concern over DOE's ability to meet the 1998 deadline prompted them to ask the Department how it would go about performing its responsibilities. The Department, apparently anticipating its inability to take the waste by the deadline, took the position in its 1995 Final Interpretation of Nuclear Waste Acceptance Issues, that it "does not have an unconditional statutory or contractual obligation to accept high level waste and spent nuclear fuel beginning January 31, 1998 in the absence of a repository or interim storage facility constructed under the [NWPA]."\textsuperscript{83} DOE's argument relied on responses to the public comment period, provisions of the NWPA, its legislative history, and the Standard Contract.\textsuperscript{84} The statutory focal point of this argument is Section 302. In it, the NWPA states:

(5) Contracts entered into under this section shall provide that—

(A) following commencement of operation of a repository, the Secretary shall take title to the high-level radioactive waste or spent nuclear fuel involved as expeditiously as practicable upon the request of the generator or owner of such waste or spent fuel; and

(B) in 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.\textsuperscript{85}

In support of the position that they were not obligated to dispose of waste absent the operation of a repository, the DOE claims that Section 302(a)(5)(A) and 302(a)(5)(B) must be read not only together, but also in the context of the entire

\textsuperscript{81} Carla Crowder, \textit{Activists Try to Halt Nuke Waste}, Denver Rocky Mountain News (Mar 25, 1999).
\textsuperscript{82} \textit{State of New Mexico v Richardson}, 39 F Supp 2d 48 (D DC 1999).
\textsuperscript{83} 60 Fed Reg 21793-94.
\textsuperscript{84} Id.
\textsuperscript{85} 42 USC § 10222(a).
As such, the condition of a repository attached to the take title provision of (A) was meant to extend to the disposal provision of (B). DOE also argues that other clauses of the NWPA suggest that they are not obligated to dispose of the waste until the commencement of a repository. First, "Section 302(a)(1) of the Act, which authorizes the Secretary to enter in contracts with utilities 'for the acceptance of title, subsequent transportation, and disposal of...(SNF)' indicates that the duty to accept title and the mandate to dispose are part of a sequential process: The Act contemplates that 'taking title' is a predicate to 'disposal.' Second, each statutory condition of the NWPA for operation of a repository (including the viability of Yucca Mountain, recommendation to the President, and the licensing by the NRC) "represents a Congressionally-created contingency that could prevent or delay construction and operation of a repository." Given these contingencies, the DOE argues that Congress could not have intended an unconditional obligation on the DOE.

To further support its argument for a conditional obligation, the DOE then cites to legislative history. In describing his reasons for substituting the previous date of December 31, 1996 of Section 302(a)(5) to the present date of January 31, 1998, the primary sponsor, Senator James McClure stated:

Under the substitute amendment, there was some concern that, in directing the Secretary to take title to and dispose of such wastes no later than December 31, 1996, we might not be giving the Secretary enough flexibility to tailor his schedule for accepting such wastes to the availability of a repository. This amendment simply directs the Secretary to take title to such wastes as expeditiously as practicable, upon the request of the generator of those wastes, after the commencement of repository operation [emphasis added].

In addition to denying an unconditional statutory obligation, the DOE also denies an unconditional contractual obligation to dispose of the waste. The crucial clause of the Contract states that "acceptance of title by DOE...and disposal of such SNF...establishes the fees to be paid...The services to be provided by DOE under this contract shall begin, after commencement of facility operations, not later than January 31, 1998." The contract defines a DOE facility as "a facility for the purpose of disposing...or such other facility(ies) to which spent nuclear fuel...may be shipped by DOE prior to its transportation to a disposal facility," meaning that either the permanent Yucca Mountain repository or an interim repository triggers the DOE's service obligations. Without either of these facilities, the DOE argues that their disposal obligation does not commence.

Using these arguments, the DOE supported its statement that it did not have an unconditional statutory or contractual obligation to accept high level waste or

86. 60 Fed Reg at 21795.
87. Id.
88. Id.
89. Id at 21796 (citing 128 Cong Rec S 15657) (Dec 20, 1982).
90. 10 CFR § 961.11.
91. Id.
spent fuel beginning January 31, 1998 in the absence of a repository. Disqualifying the only two relevant statutory provisions, the Department also took the position that “it lacks statutory authority under the Act to provide interim storage.” Even if it did have an unconditional obligation under the statute, they claim that the Delays Clause of the Standard Contract would provide an administrative remedy for their failure to satisfy an obligation under the statute.

But the utilities were just as determined as the DOE to absolve themselves from the headaches of the nuclear waste. In Indiana Michigan, utilities and state commissions who had paid fees pursuant to the NWPA sought review of DOE’s order rejecting an unconditional disposal obligation.

Alternatively, petitioners contended that the NWPA and the Standard Contract do impose an unconditional obligation on the DOE to begin disposing of the spent fuel by January 31, 1998 regardless of the absence of a facility. In determining whether the legal obligation of DOE to accept SNF by January 31, 1998 was conditioned on the presence of an operational repository or interim storage facility, the Court held for the utilities in finding that DOE’s obligation to dispose of the waste was not conditioned on the existence of a repository or other facility. Although this holding imposes a disposal liability on DOE that they had previously denied, it does not impose a concurrent liability to take title, leaving that responsibility with the utilities. Furthermore, the court declined to rule on the applicable remedy before the DOE actually breached their duty, providing little ammunition for the utilities in their struggle for an interim storage facility off-site.

In reviewing this agency interpretation, the D.C. Circuit followed the two-step statutory analysis established in Chevron U.S.A. Inc. v Natural Resources Defense Council, Inc. which asks (1) whether Congress has directly spoken to the precise question at issue, and (2) if not, whether the agency’s answer is based on a permissible construction of the statute. The Court found that Congress had spoken unambiguously through expressed intent as to this issue, and that the DOE had violated this intent in its Final Order.

The Court bases its decision on a rejection of the DOE’s theory of interdependence between the subsections (A) and (B) of NWPA’s section 302(a)(5). Instead, they interpreted each of the subsections as imposing two distinct liabilities in response to two separate triggers:

DOE’s duty under subsection (A) to take title to the SNF is linked to the commencement of repository operations and is triggered when a generator or owner of SNF makes a request to DOE. DOE’s duty under subsection (B) to

92. 60 Fed Reg 21794.
93. 60 Fed Reg at 21794, 21797.
94. Id at 21797.
95. Indiana Michigan, 88 F3d at 1273 (cited in note 6).
96. Id at 1275.
97. Id at 1276-77.
98. Id at 1274 (citing Chevron USA, Inc v Natural Resources Defense Council, Inc, 467 US 837, 842-3, (1984)).
dispose of the SNF is conditioned on the payment of fees by the owner and is triggered, at the latest, by the arrival of January 31, 1998.\textsuperscript{99}

Therefore, although the utilities have taken steps to trigger both of the obligations (requested the DOE to take title and paid fees), their commencement is conditioned on different events. Whereas the court interpreted the disposal obligation as conditioned upon only the January 31, 1998 date, they view the title obligation as being conditioned on the commencement of a repository. Therefore, the DOE is only liable for not disposing of the waste.

Viewed in isolation, the court's statutory interpretation is valid. If Congress had intended for the repository condition to extend to both the take title and disposal liability, they would have placed the conditional clause in an all-inclusive position before it delineated the two obligations into different subsections instead of only within section 302(a)(5). The court's semantic argument is also convincing. DOE argued that the meaning of "to dispose of" (not defined in the NWPA) in section 302(a)(5)(B) is simply a grammatical form of "disposal" (defined in the NWPA as "the emplacement in a repository of...spent nuclear fuel...with no foreseeable intent of recovery").\textsuperscript{100} Therefore, Congress intended section 302(a)(5)(B), which speaks to the obligation to dispose, to be conditioned on a repository. The Court rejected this interpretation based on the belief that when an agency does not specify the definition, the common term definition of "dispose of" is to be used, which does not condition a repository.\textsuperscript{101} Additionally, the Court held that the DOE had previously acknowledged a distinction in the two terms themselves, and that the Standard Contract also uses the commencement of "facility operations" instead of only a permanent repository as the precondition for disposal. Given the court's determination above, even an interpretation of "disposal" instead of "dispose of" would not be enough to absolve DOE of the liability in light of the January 31, 1999 trigger.\textsuperscript{102}

When viewed in context of the whole statute, however, there is some indication that the purpose of the statute points toward a reading of the two subsections together. DOE produced evidence of the sequential nature of the subsections. They cited "section 302(a)(1), which describes the Standard Contract as 'for the acceptance of title, subsequent transportation, and disposal of such waste or spent fuel.'"\textsuperscript{103} To further complicate matters, the Standard Contract notes that "DOE shall have the right to dispose as it sees fit of any SNF and/or HLW to which it has taken title," implying a sequential order.\textsuperscript{104} Additionally, the NWPA states that "if the Secretary takes title to any such [radioactive] material, the Secretary shall enter into the appropriate financial arrangements described in subsection (A) or (B) of section 10222 of this title for the disposal of such mate-

\textsuperscript{99} Id at 1276 (cited in note 6).
\textsuperscript{100} Id at 1275 (citing 42 USC § 10101(9)).
\textsuperscript{101} Id at 1275 (citing McNally v United States, 483 US 350, 358-359 (1987)).
\textsuperscript{102} Id at 1275.
\textsuperscript{103} Id at 1276.
\textsuperscript{104} 10 CFR § 961.11.
This if/then clause suggests that if the Secretary does not take title to the waste, then it should not enter into contracts for disposal.

The court's contractual justification for the independent provision is also weak. It determined that the separation of the take title obligation from the disposal obligation in the Standard Contract supports an interpretation of independence. In fact, the Standard Contract does speak to the take title obligation and the disposal obligation in the same article. Article II provides that "acceptance of title by DOE...and disposal of such SNF...establishes the fees to be paid...The services to be provided by DOE under this contract shall begin, after commencement of facility operations, not later than January 31, 1998" (emphasis added). If the "services" here refers to taking title and disposing of the waste as listed above, the Contract does in fact place the requirements in the same place in the Standard Contract. Granted, the Contract later addresses more specifics about the meanings and obligations of DOE's take title requirements. But there is no mention there of the trigger for the obligation to take title. Those conditions are only set forth in Article II, referring to both the take title provision and the disposal provision. Therefore, perhaps both title and disposal were intended to be conditioned on a repository.

In making this distinction between the take title and disposal obligations, the court's holding in Indiana Michigan results in split liability between the utilities and the DOE. In holding DOE liable for the disposal, the court is simultaneously absolving the DOE from liability for not taking title to the waste. The DOE argues that it is inconsistent to believe that Congress would intend for one party to have ownership of the SNF while another party would have physical control over it. But the court points to the Nuclear Regulatory Commission as an example of an agency that "recognizes a distinction between ownership of nuclear materials and the right to possess or use the materials." Until a facility is operational, the title for the waste is therefore left with the utilities. But the mere passing of January 31, 1998 triggered DOE's obligation to dispose of the waste.

In summary, the Court took special care in Indiana-Michigan to emphasize the reciprocal nature of the obligations: DOE's duty to dispose of the SNF in a timely manner is "in return for" the payment of fees into the Nuclear Waste Fund. The court held that DOE's obligation to meet the 1998 deadline is "without qualification or condition," and identified DOE's duty to "perform its part of the contractual bargain." But the court left the specific remedy unresolved, noting it was premature to determine the appropriate remedy since DOE had not yet defaulted on its obligation. The court therefore remanded the matter to DOE for "further proceedings consistent with" their opinion.

105. 42 USC § 10194(d).
106. 10 CFR § 961.11.
107. Indiana Michigan, 88 F3d at 1276 (cited in note 6).
108. Id.
109. Id (citing 42 USC § 10222(a)(5)(B)).
110. Id at 1276, 1273.
111. Id at 1277.
sought rehearing of that decision nor petitioned the Supreme Court for further review.

B. NORTHERN STATES POWER COMPANY I AND II

After the D.C. Circuit issued its decision in *Indiana Michigan*, the DOE still informed the utilities and the states that it would be unable to comply with the statutory deadline that the court had just reaffirmed. In late 1996, the utilities and the states initiated discussions with DOE and asked about the procedure and schedule that the Department would follow to comply with the court's decision. DOE responded to the utilities by announcing that it “will be unable to begin acceptance of spent nuclear fuel for disposal in a repository or interim storage facility by January 31, 1998.”112 The Department recognized that the delay would affect “large number[s]” of contract holders, but nonetheless expressed “uncertainty as to when DOE will be able to begin spent fuel acceptance.”113 The letter ended by cordially inviting “the views of all contract holders on how the delay can best be accommodated.”114 In a similar letter to the states, DOE wrote that it “understands that states are concerned about the Department's delay,” that the delay may result in “hardship” to contract holders, and expressed its willingness “to consider amendments to individual contracts that would mitigate the impacts of the delay particular contract holders will experience in the acceptance of their spent fuel,” admitting that the Yucca Mountain facility will not be operational until the year 2010.115

One year to the day before DOE’s obligation was to begin, the utilities and state agencies responded to DOE’s defiance. In *Northern States Power Company v United States Department of Energy* (“Northern I”) the utilities and state agencies separately petitioned for a writ of mandamus, seeking to compel DOE to comply with *Indiana Michigan* and begin disposal of the nuclear materials by January 31, 1998.116 Petitioners also requested that their payments to the Nuclear Waste Fund be placed in escrow unless and until DOE meets its obligations to dispose of SNF, and asked that the Court prohibit DOE from taking any punitive action toward those who suspend payments to the Fund.117

Four months after this was filed, DOE responded to comments submitted by contract holders regarding the anticipated delay. The Department began by recognizing that “Section 302 [of the NWPA] specifies that the contracts shall provide for the Department to begin to dispose of spent fuel not later than January 31, 1998.”118 DOE then expressed its belief that “the Standard Contract adopted by the Department pursuant to Section 302 and entered into by the contract

113. Id.
114. Id.
115. Id at 757-58.
116. Id at 754.
117. Id at 757.
118. Id at 754, 756.
holders specifies the available remedies in the event the Department is unable to meet the January 31, 1998 date."119 Under Article IX of the contract, the Department asserted, the Department was "not obligated to provide a financial remedy for the delay," because the delay, in the Department's estimation, was an "avoidable delay."120

In Northern I, the court first denied the utilities' request for a writ of mandamus forcing DOE to start disposal.121 Even though the utilities have a clear right to relief, "the Standard Contract between DOE and the utilities provides a potentially adequate remedy," precluding mandamus.122 The Contract provides that "[i]f a party's delay is avoidable, the charges and schedules in the contract must be equitably adjusted to reflect additional costs incurred by the other party."123 Although specifically speaking to avoidable delays, the court found that it was enough for the contract to "provide a scheme for dealing with delayed performance."124

This decision was wise for many reasons. First, the court is not in a position to rush the science needed to determine the feasibility of storing nuclear waste. Since Yucca Mountain is far from operational, the DOE would have to construct an interim repository to meet this suggested mandamus. Not only would this cause competition for funding and other resources, that in turn could slow repository development to the point of an indefinite "interim" facility, but there is also little incentive to finish the permanent repository within a reasonable timeframe, if at all. The operation of the interim repository will trigger the transfer of title to the government, providing the nuclear industry with little short-term interest in the completion of Yucca Mountain.

Although "centralized" storage at an interim site near Yucca is touted as preferable to the current scattering of SNF, "centralized" is a long-term concept. In the short-term, moving the waste from the 72 facilities really only involves an increase to 73 facilities that have SNF—not a decrease to one. The true centralized storage would only occur about 20 years after the last nuclear plants are decommissioned (the time it takes for the waste to cool before shipments can occur). The Nuclear Waste Technical Review Board also notes that a premature storage siting decision is likely to cause a real or perceived prejudicing of the repository's site-suitability evaluation.125

The Court goes on, however, to issue a writ of mandamus precluding DOE from advancing any construction of the Standard Contract that would excuse its delinquency on the ground that it has not yet established a repository or interim storage.126 In doing so, this Court rejected the DOE's recycling of "the argu-

119. Id.
120. Id.
121. Id at 759.
122. Id at 754.
123. 10 CFR § 961.11.
ments rejected by this court in Indiana Michigan” and thus their avoidable delay defense. This defense was based on the Standard Contract, defining an avoidable delay as one caused by “circumstances within the reasonable control” of the delinquent party. Agreeably, such a defense would unjustly allow the DOE to excuse itself from the costs of a delay caused by their own actions, allowing “the Executive Brach to void an unequivocal obligation imposed by Congress.”

Then in Northern States Power Company v United States Department of Energy (“Northern II”), other utilities advanced identical suits against the DOE with the addition of a request for a bar on DOE from using the Nuclear Waste Fund for damages. The Court “express[ed] no opinion on the legality of the DOE’s using utility or ratepayer-supplied monies to pay costs or damages.” It also reaffirmed that the statute does not require performance, and denied the utilities’ request to order DOE to dispose of the fuel. The Supreme Court has denied DOE review of this decision, leaving the DOE and utilities to negotiate damages amongst themselves.

IV. IMPACTS OF SPLIT LIABILITY ON THE INTERIM STRATEGIES FOR HANDLING THE NUCLEAR WASTE

By rejecting both DOE’s statutory construction and its avoidability defense, the D.C. Circuit has made it clear that DOE cannot escape their responsibility for meeting the 1998 deadline by relying on the inoperation of a permanent repository. But by affirming the unconditional obligation to dispose of the waste, the court in Indiana Michigan seems to affirm the conditional obligation of taking title. This split decision has shifted the expectations of both the DOE and the utilities, creating dual incentives to both (1) reevaluate their respective liabilities and responsibilities and (2) cooperate towards limiting these liabilities. Whereas there was previously only focus on the long-term goal of definitively approving Yucca Mountain, both parties may now start to realize that they need to look beyond Yucca Mountain in order to implement some near-term strategies for dealing with the waste. Instead of viewing interim action as a necessary loss for the actuality of Yucca Mountain, it can be viewed as a necessary step towards limiting their liability.

This split liability has shifted the expectations of the parties. As evidenced by their formal interpretation and requests for comments, it is clear the DOE hoped to avoid all liability for the SNF after 1998 due to the absence of a repository. By enforcing an unconditional obligation on DOE to dispose of the waste, the D.C. Circuit has prompted them to take action to limit their liability by fo-
cusing on a short-term solution. Similarly, the utilities were hoping that all of their wastes would be taken off their hands in title and in possession by January 31, 1998. By realizing that they still retain title until a repository or interim site is available, the Court has reaffirmed their obligation to ensure safekeeping of the waste. This shift has forced both the utilities and the DOE to reevaluate their respective liabilities and responsibilities.

A. DOE's Liabilities

The Indiana Michigan court's textual distinction between the take title and disposal requirements may create practical problems of interpretation, and surely leaves some open questions concerning DOE's liability. Attempts to reconcile the statutory intent with the court's interpretation of the relevant provision may provide some confusion concerning DOE's obligation to dispose of the waste. Both the NWPA and the Standard Contract define disposal as "the emplacement in a repository of high-level radioactive waste, spent nuclear fuel, or other highly radioactive waste with no foreseeable intent of recovery." But if one follows the court's interpretation of "dispose of" in the relevant clause, this implies the DOE's obligation may only be "to get rid of; throw away; discard" instead of emplace in a repository. Clearly, emplacement in a permanent repository would absolve DOE of its liability, but does this "common understanding" definition of "dispose of" lessen the standard needed to meet this obligation? For instance, using the court's interpretation, DOE might have the option of merely moving the waste to another utility's site. This is contrary to the statutory definition of "disposal," where the DOE is limited to emplacement in a permanent repository.

Another area of uncertainty is DOE's financial liability. The nuclear industry had argued that "the DOE would be liable for some $50 billion or more in damages, including full reimbursement of the Nuclear Waste Fund with interest, damages, and so forth." By the end of 1998, 11 utility companies had filed lawsuits in the Court of Federal Claims seeking damages ranging from $70 million to $1.5 billion. The rulings initially exposed DOE to extensive damages. Since October 30, 1999, the U.S. Court of Federal Claims has ruled in three separate cases that DOE is financially responsible for its failure to remove used nuclear fuel by January 1998. In Yankee Atomic Electric Company v United States, ("Yankee") the utility brought suit against the DOE for breach of contract for disposal of spent nuclear fuel and high-level radioactive waste. In response to DOE's motion to dismiss, the Court held that the utility's claim was not converted from a breach of contract into a claim "arising under" the contract subject

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134. Id; 10 CFR § 961.11
135. Indiana Michigan, 88 F3d at 1275 (cited in note 6).
to administrative procedures. They based this decision on an analysis of the completeness of relief available under the specific provision of the contract. If a party is able to get the same relief on a claim arising under the contract as a breach of contract, it is converted to a claim arising under. The utilities did win summary judgment, however, on the contract liability for DOE. Two similar suits have been filed in the Federal Court of Claims, Connecticut Yankee Atomic Power Company v United States, 139 Maine Yankee Atomic Power Company v United States, 140 both of which bring taxpayers one step closer to footing a bill of as much as $56 billion to cover DOE’s default.141

But the most recent Federal Claims case takes the opposite position. Granting the DOE’s motion to dismiss, the court in Northern States Power Company v United States held that the utility must first use the DOE’s administrative process for equitable adjustment in fees before seeking damages in Claims Court.142 The court rejected the utility’s arguments that (1) the contract only applied to delays that arise after performance has begun; (2) the magnitude of the delay warrants a cardinal change or a constructive suspension; and (3) that the DOE’s ability to increase fees in response to any damages would result in the utilities funding their own equitable adjustment, surely a situation that does not qualify as the “complete relief” needed to mandate the use of administrative procedures.143 The court’s interpretation of which claims “arise under” the contract and thus mandate administrative procedures differs from both Northern Power’s argument and the court’s interpretation in Yankee. Where the latter relies on a completeness theory, the court here states that:

the only consideration that counts is whether the parties’ contract contains language that addresses the specific contingency to which the claim relates and specifies the adjustment that is to be provided in the event liability is established. Where these twin considerations exist, the claim “arises under” the contract.144

Utilities that may have been anxious to file similar claims against the DOE after their fellow utilities’ successes may be having second thoughts after this latest defeat.

Even if DOE is able to postpone its damages, exactly how they plan to pay remains another open issue. Although the court in Northern States II has not barred DOE from using the Nuclear Waste Fund, the DOE itself seems to be hesitant. It reads the NWPA to earmark that money for waste related operations, not damages. The Act specifies that the Secretary may make expenditures from the Waste Fund only for administrative and operational purposes having a direct bearing upon radioactive waste disposal activities, not on “the construction or expansion of any facility unless such construction or expansion is expressly

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143. Id at *9-*14.
144. Id at *13.
authorized by this or subsequent legislation.\textsuperscript{145} Even if there were statutory authority, the extent of their liability would wipe out the Fund and any money with which to eventually build a permanent repository. Secretary Richardson estimates that the $8.5 billion potential liability from this first wave of suits alone is more than the $20 million needed to complete Yucca Mountain.\textsuperscript{146} The sooner an interim solution is provided, the better for the taxpayers. The DOE needs to make some effort to curtail their liability, since it is also uncertain how they will pay for their current damages.

B. UTILITIES' LIABILITIES

While evaluating their near-term strategies for dealing with the DOE's delay, the utilities need to take the responsibility associated with title of the waste into consideration. The NWPA states that “[d]elivery, and acceptance by the Secretary, of any high-level radioactive waste or spent nuclear fuel for a repository constructed under this part shall constitute a transfer to the Secretary of title to such waste or spent fuel.”\textsuperscript{147} Without the obligation to take title to the waste, the DOE is under no duty to accept it. The NWPA also notes that “the generators and owners of high-level radioactive waste and spent nuclear fuel have the primary responsibility to provide for, and the responsibility to pay the costs of the interim storage of such waste and spent fuel until such waste and spent fuel is accepted by the Secretary of Energy” (emphasis added).\textsuperscript{148} The utilities thought this duty would be shifted to the DOE upon the January 1998 deadline. The court's split liability plan, however, leaves the title with the utilities. Therefore, the utilities are still responsible for providing for and paying the costs of interim storage of such waste. Given the DOE's current liability for damages, however, the utilities may be able to recoup their costs that occur after January 31, 1998.

Retaining title to the waste also attaches liability for accidents associated with it. In a suit involving a contractor who breached his duty to remove and dispose of spent nuclear fuel, the court noted that “[t]he significance of having DOE take title to the spent fuel is that the contracting party can thereby rid itself of any further financial responsibility in connection therewith, and particularly of risks associated with the operation of the government repository.”\textsuperscript{149} The utilities currently retain all of these responsibilities as well, and will take precautions to prevent eruptions of such liabilities.

These precautions may be taken to an extreme, however, resulting in a moral hazard. This can occur if DOE's damages for the delay entail paying for the near-term strategy of the utilities' choice. If industry is overly protected by the

\textsuperscript{145} 42 USC § 10222(d).
\textsuperscript{147} 42 USC § 10143.
\textsuperscript{148} 42 USC § 10131(a)(5).
\textsuperscript{149} Florida Power and Light Co. v Westinghouse Electric Corp, 597 F Supp 1456, 1459-60 (ED Va 1984).
DOE, the utilities may have an incentive to overcompensate and spare no expense—even to the point of “gold-plating”. So long as they justify their option as the safest one possible, they may be able to simultaneously cover their liabilities while making DOE pay more, perhaps resulting in an economic waste. This may be avoided by allowing the DOE to provide input on the choice of remediation with the NRC serving as the necessary objective reviewer.

C. OTHER ALTERNATIVE SCENARIOS

After analyzing three other possible outcomes to this dilemma, the current split, even with its problems, can be viewed as the best alternative to facilitate attempts at near-term strategies for the waste. First, the court could have ruled for DOE on both title and disposal. To do so, however, would provide unjustified special treatment to the government while eroding the trust of private players of government contracts. The utilities relied on the DOE’s promise, and the Court should enforce that. This position has been substantiated with the Supreme Court ruling, U.S. v Winstar, which ruled for a failed thrift company which suffered losses after the government broke its promise of favorable regulatory treatment during the Savings and Loan crisis. Although the government is providing Yucca Mountain as a large subsidy for the utilities, they are also benefiting from fees generated by the utilities, the potential positive reputational effects, and the certainty of retaining uniform safety standards and oversight of the nation's waste. Even this generous a commitment, however, may not justify full absolution for delays.

A second option would have been to rule for the utilities on both title and disposal. In that scenario, however, each of the individual utility sites could be instantaneously converted into mini-DOE sites with no incentive on the utilities to take precautions with the waste. Any and all liabilities fall on the DOE, and the utilities might have been able to demand that the waste be immediately removed from their sites. The potential for safety problems is enhanced during transitional stages, especially in this case where there is no available interim or permanent repository ready to retain the waste.

A third alternative would have been to split the liability in the other direction: holding DOE liable for not taking title, but delaying imposition of a disposal obligation until a repository is operational. It is more likely that the courts may have mandated DOE to actually take title to the waste in this scenario. This could set the stage for another unfavorable situation where the utilities are still responsible for providing for and paying for the costs of interim storage, but the DOE is liable for any accidents that result. Utilities’ efforts to minimize costs may result in enhanced threats to safety and needless financial strain on the DOE.

Therefore, by leaving title with the utilities, but holding DOE liable for their disposal obligation, the D.C. Circuit’s current decision has placed the proper incentives on the two parties to ensure a safe, near-term treatment of the excess waste.

wastes. Both parties are persuaded to sacrifice their political positions about Yucca Mountain for the sake of near-term action. DOE can instead focus on ending its liability through an interim solution and the utilities are still provided with an incentive to ensure the safety of the measures.

V. OPTIONS FOR NEAR-TERM ACTION

This split liability has also created incentives for both parties to cooperate towards limiting these liabilities. But since the courts have provided little guidance in specifying how the remedies would work, continued negotiation will occur. Aside from citing the Standard Contract as providing "adequate equitable remedies," open issues focus on what remedies are available?, who will decide which remedy is chosen?, and what criteria should be used to select the proper remedy? The Claims Court in Northern States Power Company attempted to fill in the blanks left open by the court in Indiana Michigan. This is the first court determination of the remedies that an operating nuclear power plant can expect in the waste-storage impasse. After their holding, the utilities are now forced to negotiate with DOE to change waste storage fees.

Four other basic remedy alternatives exist which can be broken down into two categories: off-site and on-site. Off-site solutions focus on the construction of an interim dry-cask storage aboveground. In addition to specific problems, these off-site storage solutions involve additional transportation concerns not associated with on-site strategies. In Northern States I, the court refused to mandate that DOE establish an interim storage site. If DOE's liability can only be ended by emplacement in an interim or permanent repository, DOE may have an incentive to pursue these offsite options. However, successful operational status of an interim facility will also trigger DOE's obligation to take title to the waste.

The decisive issue within off-site storage focuses on whether this would be at Yucca Mountain or some other location. The utilities will probably continue to push for off-site solutions in order to get the problem off of their land. Additionally, some pro-nuke groups believe that even a relatively small storage facility might provide an important demonstration of DOE's waste management system and help overcome institutional barriers to a permanent repository.

Unless the latest legislative proposals prove more successful, an interim site at Yucca Mountain faces the steepest opposition. On behalf of the Clinton Administration, Secretary Richardson has again opposed Congress' most recent push for interim storage, H.R. 45, citing both (1) the costs of construction and transport that detract from the 20 million still needed to complete Yucca Mountain and (2) the lack of relief for DOE's current liability. Fortunately, the Viability Assessment was not enough to outweigh the Administration's concerns. Senator Thompson has noted, however, that, "It seems often that when we

152. Statement of Bill Richardson (cited in note 146).
agree with a decision, it is based on scientific evidence, and when we disagree, it is based on politics." Only time will tell whether it is science or politics that ultimately guides the decisions surrounding Yucca Mountain.

In addition to the de facto concerns mentioned previously, NWPA currently does not allow for the siting of an "interim" facility until approval has been granted for a permanent site. This is to ensure that a "temporary" site does not become a de facto permanent one. Furthermore, the interim site cannot be located in the same state as the permanent facility, a provision demanded by Nevadans angry at being host state for a permanent repository. Such a violation of NWPA's original ethical principles would only heighten the opposition and stall the efforts for a permanent repository.

A second off-site alternative is to build an interim site at another location. For instance, a consortium of eight nuclear power companies have contracted with the Skull Valley Band of the Goshute Indian Tribe to store more than 10.4 million spent fuel rods on the Goshute Reservation in Utah. This temporary storage facility has been strongly contested by Utah governor, Mike Leavitt. Expressing NIMBY concerns similar to the state of Nevada, Governor Leavitt has undergone a series of aggressive tactics designed to prevent this flow of waste into his state. Not only is he attempting to swap state and federal lands, but even requested designations for wilderness in order to create a virtual island that is impenetrable to shipments. This type of response, in addition to environmental justice problems, and incompatibilities between the geology of the offender's site and the scientific qualifications for interim storage, demonstrate the low probability of this alternative.

Given the bureaucracy of the government, even if an interim site could be agreed upon, it would take time before it is operational. Therefore, provided that the government receive a curtailment of its liability, it is most likely that DOE will be paying for an on-site remedy. On-site solutions include (1) the expansion of storage in the cooling ponds through re-racking; or (2) constructing additional dry cask storage for those rods which have already cooled. Still undecided, however, is whether the DOE would provide these services or pay monetary damages so that the utilities can do it themselves.

Re-racking involves both technical and legal obstacles. By re-racking without expanding the physical capacity of the pools, the spent fuel rods are invariably moved closer together. In Potomac Alliance v United State Nuclear Regulatory Commission, the NRC approved re-racking of rods from 21 inches apart to 14 inches apart. Although space-saving, this solution can increase the risk of accidents. Mary Olsen of the Nuclear Information Resource Service warns of the criticality

154. 42 USC § 10155(a)(2).
157. Potomac Alliance v United State Nuclear Regulatory Commission, 682 F2d 1030, 1033 n7 (DC Cir 1982).
in fuel pools that is more likely as the rods get closer.\textsuperscript{158} She alludes to a miscalculation in the Millstone plant in Connecticut that brought it close to criticality.\textsuperscript{159}

Varied state laws and NRC regulations can also present a problem. States such as Michigan and Wisconsin have passed laws that limit the ability of a utility to expand on site.\textsuperscript{160} The utilities would also have to get the proposal past the NRC's licensing requirements. The NRC is currently considering issuance of an amendment to the Union Electric Company for operation of its nuclear power plant in Missouri. In deciding, the NRC looks at the alternatives available to the utility and the environmental impacts of each. In January of 1999, the NRC allowed reracking of the spent fuel pools to increase their storage capacity to 2642 fuel assemblies which would maintain the plant's capacity to accommodate the plant's needs until 2024.\textsuperscript{161} But not all utilities are this fortunate.

The second on-site solution is to construct a dry cask storage system. Since this is costlier and requires a more extensive regulatory maze, utilities instead opt to re-rack in their pools if they can. Only eight states currently have 10 utilities with dry rack storage.\textsuperscript{162} Yet some utilities, like ComEd, say it will start running out of alternative storage space in 2001.\textsuperscript{163} This will lead to a complicated timing dance between on-site expansion, Yucca Mountain feasibility, and limits on utilities' cooling pools capacity.

After analyzing these alternatives, expansion of on-site storage appears to have the best fit with the available criteria. The NWPA finds that "persons owning civilian nuclear power reactors have the primary responsibility for providing interim storage...by maximizing, to the extent practical, the effective use of existing storage facilities at the site...and by adding on new on-site storage capacity in a timely manner where practical."\textsuperscript{164} Therefore, within the range of safety, pools should be re-racked to provide more room for waste. But many sites have already re-racked to increase storage at least once before.\textsuperscript{165} For those that for some reason prevented from re-racking, the next best alternative would be construction of on-site dry storage. It provides the same benefits as off-site interim storage without the transportation concerns. The NWPA clearly indicates that "[i]n selecting methods of providing storage capacity...the Secretary shall consider the timeliness of the availability of each such method and shall seek to minimize the transportation of spent nuclear fuel, the public

\textsuperscript{158} Francis and Joanna Macy, \textit{The Politics of Nuclear Waste—An Interview with Mary Olsen} (Spring 1994) \<http://www.nonukes.org/106polnu.htm>.  
\textsuperscript{159} Id.  
\textsuperscript{160} Utah Department of Environmental Quality, \textit{Opposition to High Level Nuclear Waste Storage} (visited Jan 20, 1999) \<http://www.eq.state.ut.us/HLW_FACT.HTM>.  
\textsuperscript{161} 64 Fed Reg 2687.  
\textsuperscript{162} Statement of Bill Richardson (cited in note 146); Nuclear Regulatory Commission, \textit{NRC Dry Spent Fuel Storage Licenses}, \<http://www.nrc.gov/OPA/drycask/appendh.htm> (visited Apr 17, 1999).  
\textsuperscript{163} Basil Talbott, \textit{ComEd Races Clock Over Waste Facility}, Chi Sun-Times (Oct 8, 1997).  
\textsuperscript{164} 42 USC § 10151(a)(l).  
\textsuperscript{165} Potomac Alliance, 682 F2d at 1033 n6 (cited in note 157).
minimize the transportation of spent nuclear fuel, the public health and safety impacts, and the costs.\textsuperscript{166}

In following this statutory mandate, on April 12, 1999, Secretary Richardson proposed an offer to voluntarily take title to the waste in exchange for the termination of the utilities' litigation and claims.\textsuperscript{167} This new turn of events simultaneously demonstrates the flexibility of DOE's efforts to mitigate the problem and their determination not to transport the waste until the permanent destination is determined. The decisions in \textit{Indiana Michigan} and its successors that refused to mandate disposal provided the DOE with this bargaining power in subsequent negotiations. Although there is a broad range of variations on such a settlement which involve allocating liability, financial, and operational responsibilities, the Secretary noted that "the cost of taking title appears to be minimal compared to the potential cost of damages."\textsuperscript{168} This additional offer by the DOE to take title to the waste and pay for the costs associated with on site storage just may be enough to convince the utilities to accept the continual presence of the waste on their individual sites.

\section*{CONCLUSION}

Many people doubt the actual feasibility of Yucca Mountain as a permanent solution to the nation's nuclear waste problems. But even those who are confident in its eventual operation cannot deny that eleven years of uncertainty remain. The costs of such uncertainty not only harm the nuclear industry and increase the rate of early shutdowns, but also breed fear and discontent in the public at large. Despite general agreement on the need to mitigate the problems that Yucca Mountain's inoperation has caused, both the utilities and the DOE are finding it hard to look beyond long-term disposal at Yucca towards the more pressing dilemma of interim storage.

The D.C. Circuit's decisions have provided the needed incentive for the DOE and the industry to deal with the realities of the nuclear waste situation. Perhaps by placing both DOE and the utilities at risk by sharing the liability for title and disposal, \textit{Indiana-Michigan} may provide some leverage for them to make a compromise. Before, an interim solution was seen as a failure for both DOE and the utilities. For DOE, interim solutions signaled a failure to provide tangible benefits to justify the large investment in Yucca Mountain and enhance their reputation by solving the nuclear waste problem. For the utilities, interim solutions signal failure to overcome the growing obstacles to the future of the nuclear power industry. Now that the Court has intervened, it can be used as a type of scapegoat—providing the needed impetus for an interim solution without allowing either side to claim a complete victory or failure. Once a safe and viable interim solution can be negotiated between the utilities and the DOE, the nation's

\textsuperscript{166} 42 USC § 10155(a)(3).
\textsuperscript{167}  Statement of Bill Richardson (cited in note 146).
\textsuperscript{168}  Id.
time, money, and other resources can be fully devoted to an accurate determination of a long-term solution to nuclear waste.