Nuclear Waste Disposal Crisis:

Fifty Years in the Making

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Abstract

America, in the years following World War II, exploited nuclear power for numerous means such as weapons production and commercial energy. Since those early years of the nuclear industry, scientists as well as the federal government understood the eventual need for some form of permanent storage for the nuclear waste generated by nuclear reactions. Yet over half a century later, at the beginning of the twenty-first century, America is still without any adequate means of permanently storing the ever-accumulating high-level radioactive waste. The reason for this present lack of storage and, in turn, the waste disposal storage crisis the US faces in the year 2000 can be traced back to two major factors. The first is negligence on the part of the federal government to develop an initial waste policy in the beginning stages of the nuclear industry. The second contributing factor is the decentralization of nuclear politics that began in the 1980s, resulting in the proliferation of players in the policy-making process.

Introduction

The fission of the atom accomplished in 1938 unleashed a tremendous energy potential. This discovery facilitated ideas of an entire world powered by the energy of a few nuclei. Although this vision of a nuclear-powered world has yet to come to pass, in the decades following the discovery, the US made widespread efforts to exploit nuclear energy. The idealized vision of nuclear power for Americans, however, faded quickly. In the last decades of the twentieth century, a barrage of controversy and public opposition has bombarded nuclear power. The debates that plagued nuclear power since the end of World War II are, at the beginning of the twenty-first century, no longer focused primarily on the safety and cost of the operational plants. The center of both public and government debates, since the early 1980s, gradually shifted to the issue of nuclear waste.

The current state of affairs regarding nuclear waste storage has been dubbed by some the "Nuclear Waste Disposal Crisis."[1] This crisis has come about after fifty years of nuclear technology. The question this study poses then, is why, after fifty years, is the US still without adequate storage for its increasing nuclear waste? In the analysis of this question, the proposed permanent repository at Yucca Mountain, Nevada is discussed. Through the examination of this possible storage site and numerous potential hindrances to the development of waste storage, it is evident that multiple factors are to blame for the present lack of storage. Although strict guidelines have necessitated lengthy examination of the site, the negligence, or lack of significant action on the part of the federal government in the early years of the nuclear industry resulted in the lack of an effective

initial nuclear waste policy. The major obstacle that has faced repository siting, construction, and eventual operation since the 1980s is the intense, ongoing confrontation between the public and the federal government. This proliferation of players in nuclear politics that began in the 1980s dealt the detrimental blow to nuclear waste policy that has left the issue yet to be resolved in the year 2000, fifty years after the first generation of nuclear waste.

History of the Nuclear Industry

In the early twentieth century, scientists and scholars throughout Europe and America conducted experiments on the seemingly impenetrable atom. In 1938, two scientists, Otto Hahn and Fritz Strassmann, working at the Kaiser Wilhelm Institute for Chemistry in Berlin, accomplished the feat of inducing the fission of the atom. Experiments and research on nuclear fission consumed much of the worldwide scientific community. By the end of 1939, scientists had published close to one hundred articles on fission, some of the research being attempts to achieve a self-sustaining chain reaction.[2] They continued to carry out experiments and share their knowledge in a sort of global network.

The scientists' global network of shared knowledge, unfortunately, did not endure beyond the decade of the 1930s. By 1940, most of the western world had plunged into World War II. Scientists who emigrated to America imposed self-censorship, prohibiting the sharing of scientific knowledge with scientists in enemy nations. These same scientists had long enjoyed the benefits of the previously open communication

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[1] David A. Lochbaum, Nuclear Waste Disposal Crisis (Tulsa, OK: Pennwell Publishing Company, 1996).

throughout the scientific community. The cessation of this open network had a deleterious effect on scientific progress. Yet as the political climate grew increasingly hostile, scientists knew the value of their research. They feared the potential misuse of their research and discoveries by enemy nations, especially Germany, and they understood that their silence was essential to the war effort. The refugee scientists in America, who were predominately from Germany, maintained secrecy in their work as they developed the most destructive form of this new energy source.

Scientists pondered the peacetime uses of atomic energy long before the end of World War II. The race to complete the bomb, however, dissuaded the government from dedicating any significant amount of scientific study to the subject until the waning months of 1944. In that year, the War Department began to formulate plans for the management of atomic technology after the war. Two lawyers from the War Department, Brigadier General Kenneth C. Royall and William L. Marbury, developed the idea of a War Department-run agency that regulated all operations involving atomic energy, both military and civilian. This plan called for continued military control over all atomic-related issues. In May 1945, President Truman established the Interim Committee, headed by Henry L. Stimson. Consisting of representatives from government, science, academia, and industry, the committee studied potential means for national and international regulation of the atom. In October 1945, Truman gave his support to the plan of the War Department that combined the ideas of both Royall and Marbury with those of the Interim Committee.[3]

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[2] Richard G. Hewlett, Oscar E. Anderson, A History of the United States Atomic Energy Commission: The New World, 1939-1946 (US Atomic Energy Commission), 11.
[3] Lochbaum, note 1, 1.

Using the War Department's plan as its foundation, Senator Edwin C. Johnson and Representative Andrew J. May sponsored what became the May-Johnson Bill in Congress. This bill proposed the creation of an agency within the War Department whose responsibility was the regulation of the atom in all applications: the Atomic Energy Commission (AEC). The Federation of Atomic Scientists and Representatives Chet Holifield and Melvin Price, among others, mounted great opposition to the proposal that all atomic research and experimentation remain in the hands of the military. In reaction to such opposition, Truman withdrew his support of the bill in November of 1945.[4]

The chairman of the recently established Senate Special Committee on Atomic Energy, Senator Brian McMahon, drafted the McMahon Bill, which incorporated the opinions of much of the scientific community. The bill established civilian control of atomic energy in the form of an Atomic Energy Commission that was separate from the military. The federal government, however, would not allow such civilian control without strict regulations. According to the bill, the federal government would maintain complete ownership of nuclear materials and facilities under the auspices of national security. The McMahon Bill also mandated that weapons research and development were to remain the top priorities of the AEC. After gaining Truman's support and introducing the bill into Congress in December 1945, the Senate Special Committee on Atomic Energy held hearings on the bill from January to April of 1946. During these hearings, the Committee made one major change in the bill. The Committee created a Military Liaison Committee, which received the authority to advise the AEC on all

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[4] Lochbaum, note 1, 1.

military-related applications of atomic energy. After the McMahon Bill passed in both the House and Senate, it became on August 1, 1946, with Truman's signature, the Atomic Energy Act of 1946. The purpose of the Act, as its provisions specified, was to provide:

> 1. A program of assisting and fostering private research and development to encourage maximum scientific progress;
>
> 2. A program for the control of scientific and technical information which will permit the dissemination of such information to encourage scientific progress, and for the sharing on a reciprocal basis of information concerning the practical industrial application of atomic energy as soon as effective and enforceable safeguards against its use for destructive purposes can be devised;
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> 3. A program of federally conducted research and development to assure the Government of adequate scientific and technical accomplishment;
>
> 4. A program for Government control of the production, ownership, and use of fissionable material to assure the common defense and security and to insure the broadest possible exploitation of the fields; and
>
> 5. A program of administration which will be consistent with the foregoing policies and with international arrangements made by the United States, and which will enable the Congress to be currently informed so as to take further legislative action as may hereafter be appropriate.[5]

As specified by the Act, five full-time commissioners appointed by the President headed the AEC. Truman appointed David E. Lilienthal of the Tennessee Valley Authority as the first chairman. The Atomic Energy Act of 1946 also established the Congressional Joint Committee on Atomic Energy (JCAE), whose responsibility was to oversee the AEC and atomic energy policies. Nine members from the Senate and nine members of the House made up the JCAE. On December 31, 1946 the AEC took control of the nation's atomic energy activities from General Leslie Groves' Manhattan Engineering District, which was previously responsible for all nuclear-related activities.

The arms race, in its early years, demanded an increase in uranium enrichment and

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[5] Lochbaum, note 1, 1-2.

plutonium production efforts to facilitate the rapidly expanding weapons program. Such activities occupied the AEC in its beginning years.[6]

In 1949 Congress found it appropriate to dedicate more research to the development of nuclear power reactors and created the Research Reactor Division within the AEC.[7] Shortly thereafter, in August of 1949, the Soviet Union detonated its first atomic bomb. The prior confidence that the United States had held in regards to its nuclear superiority vanished. The US government had the mistaken conception of the Soviet scientific community as far below the caliber of its own. Despite the protestations of scientists in America to this belief, the government had not expected Soviet success with an atomic bomb for several more years. The Soviet success and the threat it posed to American superiority led to the intensification of American efforts towards the development of the hydrogen bomb and the capability for thermonuclear warfare. The AEC heavily restricted its activities in nonmilitary power reactors to small-scale experimental reactor projects. Chairman David Lilienthal, who had been an ardent supporter of the development of nuclear technology in the private sector, resigned his position in the AEC in February 1950. He was unsatisfied with the AEC's limited program in developing nuclear technology for civilian applications.[8] In the June 1950 issue of *Collier's* magazine, Lilienthal declared that "no Soviet industrial monopoly is more completely owned by the state than the industrial atom in free-enterprise America."[9]

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[6] Lochbaum, note 1, 2-3.
[7] James J. Duderstadt, Chihiro Kikuchi, Nuclear Power: Technology on Trial (Ann Arbor, MI: University of Michigan Press, 1979), 45.
[8] Lochbaum, note 1, 3-4.
[9] George T. Mazuzan, J. Samuel Walker, Controlling the Atom: The Beginnings of Nuclear Regulation, 1946-1962 (Los Angeles: University of California Press, 1984), 4-5.

In December 1949, Walter Zinn, director of the Argonne National Laboratory, began construction of an experimental reactor, Experimental Breeder Reactor (EBR) No. 1, at the AEC's Idaho Falls facility. Zinn completed the reactor in April of 1951. In the early afternoon of December 20, 1951, EBR No. 1 successfully illuminated four light bulbs, using the first electricity from nuclear energy. Through this one accomplishment, author David Lochbaum claims, "the nuclear power industry was born." It seemed that although the AEC still gave top priority to weapons development, it was expanding its programs. On March 3, 1952, Gordon Dean, chairman of the AEC, stated that the objectives of the AEC were to increase the supply of fissionable material, develop better atomic weapons, including the hydrogen bomb, and develop nuclear power reactors. Unfortunately for the incipient nuclear power industry, however, the AEC gave priority to submarine reactors. The 1946 Atomic Energy Act prohibited private ownership of nuclear materials and facilities, thus denying the private sector access to nuclear power technology. The stated priority that the AEC gave to military projects, coupled with its denial of access to private industry, greatly inhibited the development of civilian nuclear power. [10]

On February 17, 1954, in an address to Congress, President Eisenhower called for fundamental changes in the Atomic Energy Act of 1946. He advocated changes that would encourage the peaceful and private development of nuclear technology. He laid out three objectives that an amendment to the Act should include: widened cooperation with US allies in atomic energy issues, improved practices for the control and

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[10] Lochbaum, note 1, 4.

dissemination of atomic energy information, and encouragement of broadened participation in peaceful nuclear energy development in the US.[11]

The 1946 Act had defined the responsibility of the AEC as primarily military in nature. All nonmilitary applications of nuclear technology were to remain subordinate to weapons development. After years of research, in 1952 the Mike shot created the first super explosion. Later on March 1, 1954, the AEC again successfully detonated the hydrogen bomb. As chairman of AEC, Lewis Strauss announced on March 31, 1954:

> The ability of the Commission to devote attention and fissionable material to peaceful requirements, peaceful needs, is always junior to the defense needs, by definition of the Act itself. The result of these tests has brought us very much nearer to the day of satisfaction of military requirements, put us within sight of them, so that we can see the ability to proceed aggressively with the peacetime development of power to an extent that we were not able to before the tests.[12]

Following Eisenhower's recommendations, the AEC proposed to the JCAE, in February 1954, an amendment to the 1946 Act that provided greater opportunities for private sector participation in nuclear technology development and use. Members of the JCAE then introduced the amendment into the House and Senate. After executive sessions and public hearings through May and June of 1954, a bill was drafted. This new bill was introduced into Congress and passed in August 1954. On August 30, 1954, President Eisenhower signed the bill into law as the Atomic Energy Act of 1954. The Act gave the AEC the new role of promoting the development of civilian nuclear applications as well as assigning it additional regulatory duties, such as creating radiation

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[11] Lochbaum, note 1, 5.

[12] Robert C. Williams, Philip L. Cantelon, (eds.) American Atom: A Documentary History of Nuclear Policies from the Discovery of Fission to the Present, 1939-1984, (Philadelphia: University of Pennsylvania Press, 1984), 112.

protection standards, and controlling domestic licensing of nuclear materials and facilities.[13]

In March 1954, the Duquesne Light Company and the AEC signed an agreement to work together to build the first commercial nuclear power plant in the US. The plant in Shippingport, Pennsylvania began generating electricity for public use in December 1957. As a means of promoting the nuclear reactor industry, the AEC, on January 10, 1955, presented the Power Demonstration Reactor Program (PDRP). The program offered utilities, which were willing to build and operate demonstration nuclear power plants, financial and other support. Utilities could choose the design of their reactors from seven different prototypes. Under the PDRP program, utilities built fourteen plants. These plants, as demonstration reactors, had limited life spans of just over two and a half years, but the program successfully aided the development of the nuclear power industry through the construction and testing of various reactor designs from multiple vendors.[14]

The development of nuclear power, however, remained extremely costly for independent utilities. Despite the AEC's promotional activities, no large-scale industrial development of nuclear power took place. Congress found it necessary to create further incentives to encourage private industry involvement. As one such incentive, Congress delegated the responsibility for the spent nuclear fuel to the federal government.[15] Throughout the period from 1953 to 1958, the AEC continued its efforts to increase private industry involvement in the nuclear field.[16]

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[13] Lochbaum, note 1, 7.
[14] Lochbaum, note 1, 7-8.
[15] Jon Christensen, "Nuclear Waste Storage: New Questions Plague Plan," Orange County Register, (28 Sept. 1999), 10.
[16] Duderstadt, Kikuchi, note 7, 46-47.

The 1954 Act opened the nuclear energy field to private interests by allowing them ownership of nuclear materials. In so doing, however, the Act raised the issue of company liability in the event of an accident. Prior to the 1954 Act, liability had not been an issue because the federal government owned all nuclear materials and facilities. Francis K. McCune, General Manager of the Atomic Products Division of the General Electric Company, in his testimony before the JCAE, spoke of the necessity for some form of liability insurance for utilities. On May 25, 1956 Senator Clinton P. Anderson, chairman of the JCAE, addressed this problem by proposing a bill that required every licensee of a nuclear facility to acquire private insurance against a reactor accident. The bill also protected designers, constructors, and suppliers of nuclear power plants against liability. Representative Melvin Price proposed a companion bill in the House. In March 1957, the AEC presented a report by the Brookhaven National Laboratory on the potential consequences of a nuclear accident. In an attempt to maintain its position as the promoter of private nuclear energy development, the AEC entitled the report, "A Study of Possible Consequences If Certain Assumed Accidents, Theoretically Possible but Highly Improbable, Were to Occur in Large Nuclear Power Plants." This report, along with hearings on the matter, provided sufficient evidence that the threat of liability in such an accident presented a significant obstacle to the development of the nuclear power industry. The President signed into law the Price-Anderson Act, as the amendment to the 1954 Act was called, on September 2, 1957. This new Act provided private industry with the most successful incentive. In accordance with the Act, each nuclear power plant was insured for five hundred and sixty million dollars against a reactor accident - sixty million

of private insurance and five hundred million of government insurance.[17] Such incentives proved effective, and by the end of the 1950s, private industry was taking an increasingly active role in nuclear reactor development.

On September 28, 1959, the AEC issued the Dresden Nuclear Power Station in Illinois an operating license, making it the first large-scale nuclear power plant built solely through private funding. On December 12, 1963, the Jersey Central Power and Light Company announced its plans to build a nuclear power plant based upon its status as "financially more attractive" than a fossil fuel power plant. The financial competitiveness of nuclear plants with coal-fired and oil-fired central power stations induced a wave of nuclear plant orders. Electric utilities proclaimed plans for one hundred and sixty-two nuclear power plants between 1965 and 1973.[18] Private industry found nuclear power so desirable that nuclear plants made up roughly one out of every two power plants built.[19] Projections for soaring power demands created a fear in utilities that they might not have the resources to meet the demand. Companies accordingly ordered plants with ever greater generating capacities.[20]

In light of the apparent contradiction of the AEC's duties as regulator and promoter of nuclear energy, the Energy Reorganization Act of 1974 was passed. The necessity for the Act, was explained by its primary author, Senator Abraham Ribicoff:

> The development of the nuclear power industry has been managed by the same agency responsible for regulating it. While this arrangement may have been necessary in the infancy of the atomic era after World War II, it is clearly not in the public interest to continue this special relationship now that industry is well on its way to becoming among the largest and most hazardous in the Nation. In fact,

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[17] Lochbaum, note 1, 8-9.
[18] Lochbaum, note 1, 9.
[19] Duderstadt, Kikuchi, note 7, 49-51.
[20] Lochbaum, note 1, 9.

> it is difficult now to determine... where the Commission ends and the industry begins.[21]

The Act of 1974, therefore, abolished the AEC and replaced it with the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC). The ERDA, which later became part of the Department of Energy (DOE), took on the responsibility of promoting nuclear power. The NRC's duties included regulating nuclear power plants and protecting public health and safety. The Joint Committee on Atomic Energy was also disbanded under this Act.

The nuclear power industry grew significantly during the 1970s as the plants ordered in the 1960s came into operation. At the beginning of the decade, nuclear power provided less of the total national energy than firewood.[22] By the end of the 1970s, nuclear power generated more electricity than oil. Although the decade of the 1970s marked the beginning of the boom years of the nuclear power industry, that same decade marked the beginning of its decline. In 1972, electric utility companies announced the first cancellations of nuclear power plant orders. The early projections for growth in energy consumption proved well beyond the actual figures. Instead of seeing the energy shortages they had anticipated, utilities faced a surplus of production capacity.[23] The capital costs for plant construction also still remained extremely high. The onset of the economic recession from 1973 to 1974 caused additional slowdowns and cancellations in the construction of nuclear plants as it became more difficult for companies to cover

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[21] Lochbaum, note 1, 10.
[22] Catherine Caufield, Multiple Exposures: Chronicles of the Radiation Age (New York: Harper Row Publishers, 1989), 151.
[23] Lochbaum, note 1, 10.

capital costs.[24] Cancellations of plant orders continued throughout the 1970s and into the 1980s. Despite such cancellations, the nuclear plants ordered in the early 1970s were constructed and began operating. By 1983, nuclear energy generated more power than natural gas. In 1984, nuclear power production beat out hydropower to become the second largest supplier of electricity in the United States, falling behind only coal.[25]

The favorable public opinion that had previously accompanied nuclear power in what historians refer to as America's Atomic or Nuclear Age proved of short duration. Fears about radiation, nuclear contamination, and nuclear explosions came to outweigh the enthusiasm for nuclear power. In 1974 a utility company placed the last order for the construction of a nuclear reactor in the United States.[26] In the twenty-five years following that order, members of the press declared nuclear power in America a "moribund" industry.[27] The number of functioning nuclear reactors declined as plants shut down because of bad publicity, high costs, aging equipment, and the resulting decline in public desire for nuclear energy as a major source of power. The end of the first half-century of nuclear power saw the remaining reactors run down and aging.[28] Despite this downturn in the nuclear power industry, at the end of 1994, one hundred and nine nuclear reactors still operated within the United States, providing twenty percent of the nation's electricity.[29]

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[24] Duderstadt, Kikuchi, note 7, 49-51.
[25] Lochbaum, note 1, 11.
[26] John R. Wilke, "Yankee Rowe: Aging Nuclear Plants Become A Hot Issue As Relicensings Near," Wall Street Journal (12 Sept. 1991): A1.
[27] Roger Milne, "US Goes For Home-Grown Small Reactors," New Scientist 1682 (16 Sept. 1989): 34.
[28] Wilke, note 27, A1.
[29] Lochbaum, note 1, 11.

History of Waste Storage Development

Most of the controversy surrounding nuclear power initially centered on the safety and cost of the reactors and the potential for catastrophic accidents. Over the last two decades of the twentieth century, the focus of both public and government debates gradually shifted to the issue of nuclear waste. Nuclear waste consists of both radioactive by-products of the energy-generating process, such as fission fragments and plutonium, and the spent fuel. What remains of the uranium fuel rods after the completion of the nuclear reaction makes up the spent fuel. Such waste is highly radioactive and it remains so for a very long time. Plutonium has a half-life of more than twenty thousand years. The existence of this waste, therefore, necessitated some type of storage site so that the waste would not present a danger to either the public or the environment. Although the public demanded that the government find such a way of handling the waste, many people feared the idea of a permanent long-term storage repository. Their fear arose from the potential that they saw for nuclear contamination of the environment. People also lacked faith in the ability of scientists to predict the geologic and climatic environment, which might ensure a secure repository, for at least ten thousand years into the future.

Yet the necessity for some means of handling the waste from nuclear reactions remained evident to scientists, the government, and the public. For the fifty years after the advent of nuclear energy, these groups struggled to find a solution to that question. But while the search for a permanent means of storage continued over the years, private industry and the government needed to devise and employ some form of temporary storage for their nuclear waste. As of December 1998, the US had generated 38,500 metric tons of spent fuel from commercial power plants. This waste is currently stored at

seventy-two power plant sites and one commercial storage site throughout thirty-three states. The Department of Energy (DOE) spent fuel generated from nuclear weapons production, research reactors, and nuclear-powered Navy ships and submarines is stored at three major sites in Idaho, South Carolina, and Washington.[30] The waste at the plant sites is stored in temporary water pools or tanks. Utilities initially employed this means of storage as a temporary method of storage, expecting the federal government to relieve them of the waste and relocate it to a permanent storage facility. The negligence of the federal government in accepting the waste from the independent utilities forced companies to expand the existing storage facilities at their plants. The waste that is stored in these pools has exceeded its anticipated duration to stay in these temporary sites.

Congress always knew that the need for permanent long-term storage existed. In 1954, when Congress passed the Atomic Energy Act, the government understood its responsibility to dispose of highly radioactive waste. It was in 1956 that the National Academy of Sciences recommended a geological repository for long-term storage of the highly radioactive wastes from nuclear reactors. The scientists suggested the examination of salt deposits and other rock types as possible repositories. In the early sixties the Atomic Energy Commission began investigating the buried salt deposits of the Salina Basin beneath Michigan and Ohio. Upon discovery of these studies, state and local officials forced the termination of the studies. In the early seventies, the Atomic Energy Commission announced that a salt mine in Lyons, Kansas was to be developed as a high-level radioactive waste repository. They reversed the decision after Kansas State

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[30] US Department of Energy, Viability Assessment of a Repository at Yucca Mountain: Overview (North Las Vegas, US Department of Energy, Office of Civilian Radioactive Waste Management, 1998), 4.

geologists discovered that abandoned oil and gas exploration boreholes riddled the site. In the late 1970s, the government continued its screening of potential sites for permanent repositories. The emphasis throughout this screening process remained on buried salt deposits and federal nuclear facility sites. In 1980, the Department of Energy, in an Environmental Impact Statement, selected deep geologic disposal as the preferred alternative for the permanent disposal of commercial high-level nuclear waste.

In response to the increasing demand for a long-term storage site by both the utilities and the general public, Congress began in the 1980s to more seriously address the issue of nuclear waste storage. Launching the waste into space, lodging it within polar ice sheets, and burying it beneath oceanic tectonic plates were among the solutions that people posed but which proved to be impractical.[31] Scientists investigated many other options as well. They included the results of these investigations in the 1980 *Final Environmental Impact Statement of Commercially Generated Radioactive Waste.* The scientists arrived at the conclusion that mined geological repositories presented the most promising means of waste disposal.

In 1982 Congress passed the Nuclear Waste Policy Act. This act regulated the disposal of two specific forms of nuclear waste: spent fuel and high-level radioactive waste. Following scientists' recommendations, it mandated that the Department of Energy create a waste-disposal system consisting of both a permanent geologic repository and the transportation systems necessary to transport the waste to be stored at the repository. The Act also required that the Department of Energy locate two sites, one in the western half of the United States and one in the eastern, as permanent repositories for

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[31] Jenifer Warren. "Monument to Atomic Age: Dump for Nuclear Waste," Los Angeles Times (19 Mar. 1989): 3.

civilian nuclear waste. Congress added the requirement of establishing two sites as a diplomatic and equitable solution to the problem of creating enough space necessary for future nuclear reactor waste. As part of the Act, Congress created the Nuclear Waste Fund that financed the waste-disposal system. The Fund generated its income from the generators and owners of the high-level radioactive waste and spent fuel that the repository would house.[32] Nuclear companies paid one-tenth of a cent per kilowatt hour of nuclear-generated commercial electricity.[33] The Act also required that the repositories be licensed by the Nuclear Regulatory Committee using environmental protection standards set by the Environmental Protection Agency (EPA).

The significance of this Act was its quest to foster a partnership between the federal government, states, and the affected public in siting repositories for the disposal of spent fuel and high-level radioactive wastes. It guaranteed state oversight of the federal program and provided a mechanism whereby a potential host state could disapprove of the ultimate siting decision if it believed that the decision was faulty. This disapproval by the state could be overridden by a majority vote in both houses of Congress. In this initial version of the Nuclear Waste Policy Act, passed in 1982, Congress set a deadline for the Department of Energy's acceptance of full responsibility and possession of the waste. The deadline mandated that the first site to be fully operational and accepting waste by 1998. It also required the second site to be completed by 2006. In order to achieve this goal, the Department of Energy carried out scientific studies of numerous sites throughout the United States.

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[32] "Nuclear Waste Policy Act and Amendments," in Department of Energy: Yucca Mountain Project [database online] (cited 10 Nov. 1999); available from http://www.ymp.gov/about/science/geninfo/nwpaa.htm

In the spring of 1983, the Department of Energy announced the selection of nine sites in six states as potential sites for the first repository. Seven of these sites were in salt deposits and the remaining two were located on western federal nuclear facility sites in buried volcanic rock deposits. The Department of Energy subsequently identified locations in seventeen states, principally in the eastern, southern, and northeastern sections of the country, for evaluation as possible sites for the second permanent repository. In 1984, the Department of Energy issued *Guidelines for the Recommendation of Sites*, which was required by the 1982 Act. The Department of Energy established a system of screening to three sites, from the known nine, for site characterization that assured that Yucca Mountain, Hanford, and one of the seven salt sites would become Candidate sites, unless a disqualifying condition was found prior to the selection of the three sites.

This approach was not required by the Act, but was rather, as Nevada officials claimed, an elaborate strategy built into the screening process, regarding the diversity of the sites, designed to assure selection of Yucca Mountain, Hanford, and a salt site for site characterization. Its was an attempt to preserve sites in the states perceived to be more vulnerable to Department of Energy pressures and to give a sense of objectivity to the more politically controversial selection of a salt site in one of the four possible states – Texas, Louisiana, Mississippi, and Utah. The state also argues that the DOE applied inconsistent guidelines in evaluating and comparing the sites to legitimize the political

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[33] Maura Dolan, "Three Locations Picked as Likely Nuclear Dump," Los Angeles Times, (29 May 1986), 4.

objective of retaining the two federal sites at Yucca Mountain and Hanford.[34] Following the issuance of the Guidelines, the Department of Energy released drafts of the Environmental Assessments for nomination of five sites, which include the tentative selection of three sites for characterization. Yucca Mountain, Hanford, and Deaf Smith County, Texas were the sites named.[35]

Early in the implementation of the program, the Department of Energy began using the siting issue for partisan political purposes and confirming the view that political strategy would guide the siting strategy. Energy Secretary Hodel further undermined confidence in the site screening process nationwide when, campaigning for Phil Gramm in Texas in September 1984, he said "...I don't believe that the nuclear waste repository is going to be built in a state where there is strong opposition from the people and where you have powerful political representatives in the nation's capitol taking that position with the President...Because there is a provision in the statute for a monitored retrievable storage site it means to me that the Congress will not insist that any State that doesn't want it would have to take it."[36]

In 1985 the President, as provided by the 1982 Act, determined that highly radioactive waste from nuclear weapons production would be disposed with commercial high-level waste.[37] In December of 1985, the Environmental Protection Agency ruled for management and disposal of high-level and transuranic wastes as had previously been

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[34] "Chronology of Key Political and Policy Developments Regarding the Yucca Mountain Repository Program," in State of Nevada: Nuclear Waste Project Office [database online] (cited 10 Nov. 1999); available from http://www.state.nv.us/yucca/state01.htm

[35] David F. Salisbury, "Arid Climate and Geology Bring DOE to One Nevada Crest," Christian Science Monitor, (27 June 1985), 3,6.

[36] Note 34.

[37] "Nuclear Waste Policy Dilemma – The First Fifty Years," in State of Nevada: Nuclear Waste Project Office [database online] (cited 10 Nov. 1999); available from http://www.state.nv.us/yucca/state01.htm

decided. After close of the public comment period, the Department of Energy held meetings with the Environmental Protection Agency staff, seeking to assure that the regulations would not result in any obvious failure to comply by the three tentative sites selected for characterization.

On January 16, 1986 the Department of Energy identified seven eastern states: Maine, New Hampshire, North Carolina, Georgia, Virginia, Minnesota, and Wisconsin as possible disposal sites.[38] A number of the sites retained were suspected at the time to be "political throw-aways" for the upcoming congressional elections. By May of 1986, the Department of Energy released final Environmental Assessments for five first repository sites and identified the three potential locations for the western repository, including Yucca Mountain, Nevada; Hanford, Washington; and Deaf Smith County in Texas. The Department of Energy used a recognized decision methodology to do a comparative evaluation of the sites, engaged the National Academy of Sciences to confirm that the methodology was properly applied, but specifically did not ask for an evaluation of whether the Department of Energy's results were consistent with the application, redefined the methodology to be a "decision aiding methodology," and retained the three earlier named tentative sites, inconsistent with the results of the analysis.[39]

Also in May of 1986, facing enormous opposition in the midwestern and eastern states and complaints from elected officials in the second repository states, Congress "postponed indefinitely" the final selection and construction of a storage facility in the east.[40] In doing so, the Secretary of Energy violated the regional equity intent of the 1982

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[38] Donald L. Rheem, "Choice of Finalists for A-Waste Site Stirs Up Controversy: Critics Point to Politics; Legal Challenges are Launched," Christian Science Monitor, (30 May 1986), 3-4.
[39] Note 34.
[40] Dolan, note 33, 4.

Nuclear Waste Policy Act. This left only the three Candidate first repository sites under consideration. According to the State of Nevada, this was a unilateral decision on the part of the Secretary of Energy to violate the requirements of the Nuclear Waste Policy Act and was clearly driven by partisan political objectives associated with the upcoming congressional elections. The Department of Energy did not ask Congress to amend the law prior to the announcement of this decision, for which the Department of Energy provided a number of debatable lines of reasoning.[41] In this same year, the Department of Energy proposed to Congress that an interim Monitored Retrievable Storage (MRS) facility for commercial waste be authorized for development at a site in Tennessee.[42]

In early 1987, with rising characterization cost projections, one billion dollars per site, and significant siting delays predicted, the House considered a siting moratorium and nuclear waste policy review. The Senate was considering sequential characterization of the three candidate sites.[43] But in June of 1987, the DOE submitted the high-level waste program Mission Plan Amendment to Congress containing the Secretary's decision to not pursue the second repository, as required by the 1982 Act. Based upon a technicality of the Nuclear Waste Policy Act, the Department of Energy could claim that Congress had ratified its second repository site selection decision if there was no Congressional action opposing the decision within thirty days of the submittal of the Mission Plan Amendment. This was the culmination of a process set in motion by the Department of Energy to serve both its partisan political goals and to relieve itself of a very troublesome and controversial second repository siting program. At this point the Department of Energy could concentrate its political and programmatic efforts on only three states

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[41] Note 34.
[42] Note 37.

which were effectively politically isolated because the other forty-seven states were safe from the potential burden of a high-level waste repository.[44]

Also in June of 1987, committees of jurisdiction in both the House and the Senate recognized that the Department of Energy was not making effective progress in the waste program. The House considered a moratorium in the siting program and a re-evaluation of the Department of Energy's implementation of the 1982 Act. The Senate considered a sequential site characterization process for the three Candidate sites. In a hearing of the Senate Energy and Natural Resources Committee, in which the Department of Energy project managers for the three Candidate sites discussed the potential suitability of the sites for repository development, the Yucca Mountain Project Manager, Don Vieth, stated, "it is not conceivable to me that we would discover [during site characterization] something of a major nature that would cause us to change our mind about it [Yucca Mountain suitability]."[45]

This statement was based on the Department of Energy's guidelines, the Nuclear Regulatory Commission's repository licensing rule, and the Environmental Protection Agency's environmental protection standards for repositories. Vieth said estimated releases of radionuclides from Yucca Mountain "may be five orders of magnitude below a very conservative Environmental Protection Agency standard." The other Department of Energy project managers were cautious and circumspect in assessing of the suitability of the Hanford and Deaf Smith sites. By so overstating its confidence in one of the three Candidate sites, the Department of Energy not only showed its support for the sequential approach, but further suggested to Congress its preference for a political decision

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[43] Note 37.
[44] Note 34.

regarding which site should receive priority attention. Nevada's political vulnerability in this process was obvious to all parties.[46]

According to the Nuclear Policy Act of 1982, the Department of Energy was to evaluate the three remaining western sites and choose a finalist as the sole recipient of the repository by 1989.[47] In late 1987, however, Congress "abruptly scrapped" the locations in Washington and Texas and narrowed scientific study only to Yucca Mountain, Nevada.[48] In December of 1987, Congress adopted the Nuclear Waste Policy Amendments Act which:

1. named Yucca Mountain as the only site to be characterized, and removed the other the other two sites from further consideration;

2. ended the screening process for a second repository and set further consideration of the need for a second repository for sometime between 2007 and 2010;

3. prohibited studies of repository sites in granite;

4. offered a financial benefits agreement to Nevada to permit site characterization and repository development at Yucca Mountain in exchange for Nevada's giving up its right to file a Notice of Disapproval with Congress if the site is found suitable;

5. offered an equivalent type of benefits agreement to candidate Monitored Retrievable Storage host selected by the Department of Energy;

6. established a linkage between siting and development of an Monitored Retrievable Storage and progress toward licensing and development of a repository at Yucca Mountain;

7. established the Office of Nuclear Waste Management Negotiator to seek states or Indian tribes willing to volunteer to host a repository or Monitored Retrievable Storage as an alternative to the Department of Energy siting

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[45] Note 34.
[46] Note 34.
[47] Cass Peterson, "The Ten Thousand-Year Decision: Nevada Mountain is Ground Zero for Nuclear Dump Controversy," Washington Post, (17 Feb. 1988), A1, 4.
[48] Warren, note 31, 3.

> process, but Yucca Mountain would be retained as an alternative in the Nuclear Regulatory Commission`s repository license consideration.[49]

In December of 1987, Congress redefined this indefinite period as a twenty-year postponement.[50] This Amendments Act came to be known by many politicians and much of the public as well as the "Screw Nevada Bill." By December of 1988, the Department of Energy filed its plan to sink test shafts as part of the site characterization process.[51] In 1989, the Secretary of Energy determined that the nuclear waste policy could not succeed in its present form and developed a new program strategy that called for waste acceptance beginning at a repository in 2003.[52] In his program reassessment report to Congress, the Secretary of the Department of Energy began a concerted effort that later influenced the Administration's proposed National Energy Strategy Act. According to Nevada officials and other critics, the Secretary sought to preempt Nevada's environmental regulatory authority as it applied to Yucca Mountain. The DOE received widespread criticism from the public and Congress for the slow progress of the waste storage program. Critics of the waste program believed that this move by the Secretary marked the initiation of the Department of Energy's political efforts to place the blame for the lack of progress at Yucca Mountain on the State of Nevada while shielding itself from charges of management inadequacies. Later the Department of Energy also placed the blame on Congress for failure to provide adequate funding. The Department of Energy then pursued an assault on the Nuclear Regulatory Commission and the Environmental Protection Agency for causing delays and cost escalations by being inflexible, overly

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[49] Note 34.
[50] Peter N. Spotts, "Compromise on Nuclear Waste: Nevada Gets the Short Straw in the Search for a Waste Site; Politics and Geology Played a Part," Christian Science Monitor, (22 Dec. 1987), 3-4.
[51] "US Files Plan to Test Nuclear Waste Site," New York Times, (29 Dec. 1988), A20.

stringent, and not sufficiently sensitive to the conditions of the Yucca Mountain site.[53] The nuclear industry, on the other hand, blames the negative public opinion in Nevada and the resistance to the siting process presented by Nevada politicians for the long delays that have plagued the Department of Energy in its waste disposal program.[54]

Further hindering the characterization process, the General Accounting Office, in performing quarterly audits of the DOE's program, found that as of January 1989 the Department of Energy had issued orders for contractors to cease work on eight separate occasions until the quality-assurance procedures could be strengthened.[55] Again, in October 1989, the testing phase was deferred when Nevada passed a law forbidding the dumping of any high-level nuclear waste within the state and refused to issue the environmental permits that were necessary to begin testing to the DOE.[56] On December 27th, 1989 Nevada's Attorney General Brian McKay filed suit in the United States Court of Appeals against the federal government, naming Energy Secretary James D. Watkins as the defendant. Nevada contended that it had the right to bar the use of the Yucca Mountain site as a permanent repository for nuclear waste. Ultimately, the court found in favor of the Department of Energy.[57] In support of this Department of Energy argument against the Nuclear Regulatory Commission and the Environmental Protection Agency, the National Academy of Sciences Board on Radioactive Waste Management determined in 1990 that regulations for licensing a repository needed to be less stringent and

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[52] Note 37.
[53] Note 34.
[54] Keith Schneider, "Nuclear Industry Plans Ads to Counter Critics," New York Times, (13 Nov. 1991), A18.
[55]Matthew L. Wald, "Work is Faltering on US Repository for Atomic Waste; Hurdles Include Rules: Energy Department, Used to Secrecy, Appears Hobbled by Safety Regulations," New York Times, (17 Jan. 1989), A1, B10.
[56] Thomas W. Lippman, "Nevada's Objections Stall Plan for Nuclear Waste Repository: Alternative Sites Lacking as Setbacks Mount," Washington Post, (3 Oct. 1989), A1, 7.

prescriptive. Yet the National Academy of Sciences also called for the Department of Energy to be more flexible in siting and licensing the repository.[58]

In April 1991, the General Accounting Office testified before the Senate that, even if the Department of Energy had received permits from Nevada earlier, it was not prepared to begin new site characterization at Yucca Mountain until March 1991. The General Accounting Office also reported that the Department of Energy itself was responsible for most of the delay in initiating new work since 1988. The Department of Energy responded that preemption of Nevada's authority was necessary "insurance" to prevent Nevada from obstructing the project in the future. In October 1991, the Department of Energy abandoned its earlier Exploratory Shaft Facility (ESF) design in favor of a new design for an underground Exploratory Studies Facility. The new Exploratory Studies Facility had a greater scale and emphasized construction to repository dimensions rather than conducting tests of site suitability. For these reasons, the Nuclear Waste Technical Review Board characterized the plan of the Department of Energy as being more one of beginning repository construction than one of collecting data that could give early indications of whether the site should be disqualified. In November 1991, the confidential document describing the nuclear industry's Nevada Initiative was revealed to the public. It explained the rationale and actions intended to overpower Nevada's opposition to the Yucca Mountain project. Included in the document was the statement that the nuclear industry had established a "political alliance" with the Department of Energy regarding the project. It also pointed out that project scientists were being trained to put the best face on the project and the safety of a

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[57] "Nevada Sues to Block Nuclear Waste Dump," New York Times, (28 Dec. 1989), A19.
[58] Note 37.

Yucca Mountain repository to the public in Nevada.[59] As another attempt to neutralize the opposition to the Yucca Mountain repository by Nevada residents, the nuclear industry in 1991 began a nine million dollar public relations and advertising campaign.[60]

In January 1992, the Department of Energy issued, in the form of a contractor report, an Early Site Suitability Evaluation for Yucca Mountain that found that there were no disqualifying factors present. Yet the report failed to evaluate the question of whether available information and data were sufficient to make judgements on the suitability or unsuitability of the site. Furthermore, in examining whether the potential emissions of Carbon-14 would meet the Environmental Protection Agency release standards, the report concluded that the standard was inappropriate. It did not express the doubts about compliance raised by the evaluation. The Department of Energy's site selection guidelines were "interpreted" in order to justify continuing the site characterization program at Yucca Mountain, the purpose of which was to provide the basis for a pro-forma suitability determination and then, more importantly, a license application to the Nuclear Regulatory Commission. The study, therefore, was executed in a manner that confirmed the continued assumption of the site's suitability.[61]

In March 1992, the Department of Energy testified to the Senate Energy and Natural Resources Committee that the overly stringent Nuclear Regulatory Commission and Environmental Protection Agency repository regulations were causing delay and greatly escalating costs in the Yucca Mountain program, implying that the program success depended upon relief either from the Nuclear Regulatory Commission and the Environmental Protection Agency or from Congress. This was the Department of

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[59] Note 34.
[60] Schneider, note 54, A18.

Energy's latest attempt to shift blame for ongoing delays and large cost escalations. Experienced nuclear industry analysts, while wanting to ease the way for the program, at the same time did not agree that the success depended upon regulatory revision, nor did the Nuclear Waste Technical Review Board.

Throughout 1991 and 1992, the Department of Energy applied considerable effort, both direct and indirect, to influence the Environmental Protection Agency's process of repromulgating its repository standards. The Department of Energy sought standards that better accommodated known or expected conditions, as well as uncertainties, regarding the Yucca Mountain site. The Department of Energy also wished to shape regulatory approaches to resolving problems related to the Yucca Mountain site's compliance. The Department of Energy even sought to enlist the support of the Nuclear Regulatory Commission, the National Academy of Sciences, and the Environmental Protection Agency Science Advisory Board.

When it became clear that regulatory relief satisfactory to the Department of Energy was not forthcoming from the Nuclear Regulatory Commission and the Environmental Protection Agency, Congress adopted in October, without hearing, Section 801 of the Energy Policy Act of 1992.[62] This section instructed the Environmental Protection Agency to establish new site-specific regulations for Yucca Mountain based on "reasonable" safety standards recommended by the National Academy of Sciences. It also instructed the Nuclear Regulatory Commission to conform its repository licensing requirements to these new standards which, based on the requirements of the Energy Policy Act, would be less stringent in their protection of

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[61] Note 34.
[62] Note 34.

health and safety.[63] Having failed in the familiar "sister agency" approach, the Department of Energy once again demonstrated its reliance on the political process to solve its current problems. The Department of Energy's operative principle was that if its desired program or the site couldn't meet the rules, rather than revising the program or questioning the merit of the site, political muscle should be applied to change the rules. The history of this program attests to both the short-term success and shortsightedness of this approach.[64]

In December 1992, the Secretary of Energy announced that the efforts of the Nuclear Waste Negotiator to provide a volunteer Monitored Retrievable Storage site had failed. He said a new strategy was needed to begin waste acceptance from the commercial reactors in 1998.[65] The Secretary's also announced that the Department of Energy had a new strategy for beginning waste acceptance that would meet the contractual obligation with the utilities. However, this strategy undermined the credibility of the Negotiator and the Department of Energy regarding a volunteer siting process. Further, by stating that the Department of Energy could establish Monitored Retrievable Storage on a Department of Energy defense nuclear facility or Department of Defense facility, or even at a licensed reactor site, the Department of Energy indicated it was ready to undertake a "forced siting" process, once again simply in order to meet its schedule.[66]

In January 1993, the Department of Energy began excavation of the pad and high wall (working face) for construction of the north portal (ramp entrance) to the

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[63] Note 37.
[64] Note 34.
[65] Note 37.
[66] Note 34.

underground Exploratory Studies Facility. This was to be constructed to specifications so that it could later be used as the waste emplacement entrance to the repository. The Nuclear Waste Technical Review Board disagreed; it believed that it was an unnecessary and imprudent expenditure of money and time to construct this entrance to repository specifications and scale for purposes of site characterization. This marked the beginning of the Exploratory Studies Facility and repository construction at Yucca Mountain, despite the Act's restriction of site characterization expenditures to those "necessary to provide data required for evaluation of the suitability of such site for an [Nuclear Regulatory Commission license] application..." The decision to begin construction also ignored the Section 801 mandate for new Environmental Protection Agency standards as well as revision of the Nuclear Regulatory Commission's repository licensing rules. As of that time, January 1993, there was no Environmental Protection Agency rule and the substance of the Nuclear Regulatory Commission's rule revision, due in three years, could not be known. Without known rules, construction was premature because a) it might have interfered with other yet to be known tests needed for site characterization; and b) repository specifications might have changed with the new Nuclear Regulatory Commission licensing rules.[67]

The Secretary's announcement of a new repository site characterization and development strategy, involving staged licensing by the Nuclear Regulatory Commission and early emplacement of waste represented a vast departure from the previous nuclear waste policy. It also required the Nuclear Regulatory Commission to significantly revise its regulatory approach. The Secretary's announcement overrode the statutory intent of objective scientific site evaluation to determine suitability to isolate waste and it also

subverted the Nuclear Regulatory Commission's licensing process. This may have been the boldest proposal yet by the Department of Energy to assure that Nevada was politically co-opted and Yucca Mountain was developed as a repository with the least possible intervention or regulatory oversight. The Department of Energy's initiative would not only require that Congress change its laws, but also demanded that the Nuclear Regulatory Commission compromise its regulatory approach and standards. Furthermore, it ignored the regulatory revision mandated just the past October, which the Department of Energy had said was so necessary to the program's success.[68]

In the winter of 1994, Senator Bennett Johnson of Louisiana introduced a bill into the Senate that would revamp the High-Level Waste Program by providing for interim storage at the Nevada Test Site. This was a new Program Approach that set the beginning of waste acceptance in 2010. This approach relied on the Department of Energy's development and distribution of Multi-Purpose Containers, for waste storage, transport, and possibly disposal, which would begin interim waste storage in 1998. It set out a schedule for site characterization, costing six billion dollars, which was to lead to a repository license application to the Nuclear Regulatory Commission in 2001. The new approach also deferred some site characterization work to a long repository performance confirmation period lasting up to a hundred years after initial waste emplacement. It weakened the radiation release standards for Yucca Mountain and accelerated the timetable for the Department of Energy to take the waste for storage. After being stalled in committee as the Republicans took control of the Senate, the bill was finally adopted.[69]

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[67] Note 34.
[68] Note 34.
[69] Note 37.

In 1995, HR1020 was introduced into the House of Representatives by Representative Fred Upton. The bill authorized the interim storage at the Nevada Test Site beginning in 1998. It continued the Yucca Mountain project, but at the lowest priority, behind the interim storage facility (ISF) and construction of a rail spur. HR1020 passed out of committee, but bogged down when it became known that the bill would exceed budget caps by a considerable amount, costing the taxpayer some four billion dollars over four years. The bill remained stalled in the House. Other bills called for stopping the waste program pending a comprehensive nuclear waste policy review, and other initiatives attempted to stop the repository program and provide only for interim storage. In August, the National Academy of Sciences panel released its recommendation for a new, risk-based, site-specific Environmental Protection Agency standard for Yucca Mountain. The Environmental Protection Agency began drafting new standards for Yucca Mountain which were expected to be issued in Proposed Rule form for public comment in mid- to late 1996. The Nuclear Regulatory Commission expected to issue a site-specific repository licensing rule for Yucca Mountain within one year after the Environmental Protection Agency standard was final.[70]

In the fall of 1995, Congress appropriated only about half of the money the Department of Energy said was necessary to implement the Program Approach, which resulted in the Department of Energy revising its plans for the program. The development of the Multi-Purpose Container was terminated, as were plans for interim storage. The Department of Energy developed a new schedule for the Yucca Mountain Project that included a "viability assessment" in late 1998 to be used by Congress to

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[70] Note 34.

decide whether the site's potential suitability, and the cost and the schedule to finish site characterization, license the repository, and operate it were all acceptable. If the program continued, the site suitability determination would come in 2001 with a license application submitted to the Nuclear Regulatory Commission in 2002. Repository operations would begin in 2010. The Department of Energy site suitability criteria would also be revised.

During that same fall of 1995, Senator Larry Craig introduced S1271, which mirrored some aspects of the Johnson legislation but set 1998 as a firm date for accepting waste at an interim storage facility at the Nevada Test Site. S1271 also set lower release standards for an interim storage facility and a repository, and it exempted the Department of Energy from all state and federal laws and regulation except S1271, the Atomic Energy Act, the Energy Policy Act of 1982, and those sections of NEPA deemed operative in S1271. The Craig bill quickly stalled in committee and President Clinton threatened to veto any legislation that named Nevada, or any other state, as an interim storage site before the location for a permanent facility was known.[71]

Towards the end of 1995, Senator Murkowski, Chair of the Senate Energy Committee, held a mark-up on S1271 and replaced the entire bill with a revised version. The revision kept the same designation, S1271, and many of the provisions of the original. It changed the date for the interim storage facility to commence operation to January 1999 and replaced the rail spur with an intermodal heavy haul system located in Caliente, Nevada. The bill allowed the Department of Energy to deal with Caliente and Lincoln County without any provision for involvement of the state or other counties. The bill also exempted the Department of Energy from state and federal laws and regulations

in the same way as S1271.[72] By April 1996, the bill passed out of committee and awaited floor action. The Congressional Budget Office estimated the cost of the bill at more than three billion dollars over four years, which posed a problem for meeting congressional budget targets. In addition, the President threatened to veto the measure if by Congress passed it.

In May 1996, the Department of Energy's new Program Plan was completed. Bills were still pending in Congress to develop an interim storage site at the Nevada Test Site in 1998 and the Department of Energy was doing generic planning for an interim site in the event such a bill was passed. Prospects for passage seemed small in that session. The Environmental Protection Agency also objected to the bills because they contained provisions that removed the Environmental Protection Agency's regulatory authority for the site and set a lax, unprecedented radiation protection standard for the site.

In July of 1996, with S1271 bogged down in the Senate, nuclear industry lobbyists applied pressure to Senate supporters to move the legislation before the end of the congressional session. The new Senate Majority Leader agreed to a parliamentary maneuver that allowed a new bill, S1936, to be introduced directly to the floor of the Senate, without committee action or debate. S1936 contained the essential interim storage and related provisions of S1271, but it also moved the date for acceptance of spent fuel at the interim facility from January 1999 to November 1999. The bill named the Nevada Test Site as the location of the interim storage facility, preempting state and local environmental, health, and safety laws, legislating a radiation exposure standard that permitted between four and twenty times higher doses of radiation from a Yucca

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[71] Note 34.

Mountain repository than that permitted anywhere else, and established interim storage, rather than geologic disposal, as the priority for the nation's nuclear waste program.[73] By the end of July, the Senate had passed the measure with a vote of sixty-three to seven.[74]

The opposition to both an interim storage facility and the Yucca Mountain repository has continued to grow throughout the last years of the 1990s. Again in April 1997 that the interim storage site came up for vote in the House.[75] Despite the Senate's approval of the interim site, the bill fell short of the number of votes necessary to override President Clinton's veto.[76] Throughout 1998 there were several questions about the viability and safety of the Yucca Mountain site, yet on December 18th the Department of Energy reported that it had found "no show stoppers" and the project was progressing.[77] Through 1999 and into 2000, the debate still raged as legislation was continually being revised and replaced and stalled, and the viability of the site was constantly challenged by the public and Nevada officials and championed by the Department of Energy. In the meantime, the Department of Energy has continued to construct the Exploratory Studies Facility at Yucca Mountain with the hope of eventually gaining the Nuclear Regulatory Commission's license as the permanent high-level waste repository.

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[72] "Senate Panel Approves Interim Site in Nevada for Nuclear Waste," Wall Street Journal, (14 Mar. 1996), B2.
[73] Note 34.
[74] James Bornemeier, "Senate Passes Bill to Create Nuclear Waste Dump," Los Angeles Times, (1 Aug. 1996), A3, 23.
[75] Matthew L. Wald, "Senate to Vote on Site to Store Nuclear Waste," New York Times, (15 Apr. 1997), A14.
[76] James Gerstenzang, "US Senate OKs Interim Nuclear Waste Site," Los Angeles Times, (16 Apr. 1997), A3.
[77] Matthew L. Wald, "Plan to Bury Nuclear Waste in Nevada Moves Forward," New York Times, (19 Dec. 1998), A12.

Reasons for Crisis

The question that still begs to be answered after decades of deliberation over nuclear waste storage, is why nothing has yet been accomplished. Why have we not come up with a solution? The bureaucratic process of the government is, indeed, a slow one. In the particular case of the nuclear waste storage problem, this slowness was aggravated by two important and conflicting factions in regards to nuclear politics that came into prominence in the 1980s. On the one hand, there was the continuing strong support of nuclear power within the confines of the federal government, especially the White House. One observer called the nuclear waste legislation enacted in the 1980s "a formal, legislative, statement of interests of the nuclear establishment" whose goal was to site, construct, and operate a permanent high-level waste facility as soon as possible, therefore accommodating the needs and desires of the nuclear industry. On the other hand, state and local governments became much more active participants in policy making. The majority of such activists from the state and local levels opposed federal efforts to site nuclear waste repositories. The Atomic Energy Commission had successfully preempted state action until the 1970s; however, since that time all issues related to the nuclear industry and especially the nuclear waste program have been characterized the by intense conflict between federal, state, and local officials. On account of this drawn out conflict, nuclear waste policy, like nuclear policy in general, has been plagued by cost overruns, missed deadlines, and intense political controversy.

The issue of nuclear waste storage was ostensibly not a major issue in the early years of the government-run atomic program. The concern of the Atomic Energy

Commission and other facets of the subgovernment was primarily focused on the scientific challenges of generating nuclear energy. They believed that nuclear waste not a complex problem but rather one that was essentially technical and would be relatively easy for scientists to solve. According to the technocrats in the Atomic Energy Commission, dealing with the waste issue simply required scientists to learn how to isolate the waste, select the appropriate location for a storage facility, and choose the best design for that facility. Surprisingly by the standards of the last decades of the twentieth century, the members of the AEC addressing nuclear waste did not harbor significant concern regarding issues of public safety or environmental risks. Adding to the AEC's misconception about the lack of attention demanded by waste, the first nuclear reactors were only just beginning to generate power, leading the AEC to assume that there was no pressing need for an immediate solution to the problem. As a reflection of the waste issue's low priority, the Atomic Energy Commission deferred indefinitely any action or major decision making relevant to nuclear waste disposal. This decision, which served the AEC's interests at the time, only succeeded in aggravating the problem in the long run. As a result of the initial lack of an effective nuclear waste policy, the issue became one of the antinuclear movement's strongest points of contention since the 1980s.

Despite growing opposition to nuclear power, the United States did not face a much larger scale war against the nuclear industry until after the accident at Three Mile Island. The accident and near catastrophe sent shock waves throughout the country. Up until that time, the states of Nevada, South Carolina, and Washington had been voluntarily housing most of the nation's low-level waste. Following the incident, however, each of the states announced that they were no longer willing accept shipments

of the nuclear waste from other states. In response to these actions, in 1980 Congress passed legislation called the Low-Level Radioactive Waste Act (LLWRA). This Act required states to accept the responsibility for the disposal of all the low-level waste generated within their own states. The law encouraged compacts between states, which would then select a single disposal site where all of the states in the compact could dispose of their low-level waste. If such compacts could not be formed that agreed upon a single site, each state would be forced to take responsibility for the storage of its own low-level waste.[78]

Although the Low-Level Radioactive Waste Act established a structure for the resolution of the low-level waste issue, the implementation problems of the program incited an intense widespread debate about nuclear waste. All of the states encountered fierce public opposition to the siting of a repository within their borders. The issue, therefore, that addressed which states the repositories would be constructed was burdened by significant controversy. Very few of the states were willing to even consider a waste storage facility within their own borders. As a result a majority of the states took every action available to them in order to ensure the selection of an alternate state. The states that generated the greatest amounts of waste, specifically Texas and New York, were looked upon as *persona non grata* in their regional compacts and unable to consider the option of shared disposal. The outcome of this game between the states of "nuclear keep away" was the proliferation of low-level waste sites throughout the country, all of which faced strong opposition. Supporters of nuclear power had hoped that the Low-Level Radioactive Waste Act would provide a solution to the nuclear waste problem. The

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[78] Robert J. Duffy, Nuclear Politics in America: A History and Theory of Government Regulation (Kansas: University Press of Kansas, 1997).

actual repercussions, however, only served to increase the arguments between states over nuclear waste and resulted in significant growth in publicity and public concern. By the mid-1980s, opinion surveys reported that the waste issue was one of the greatest concerns of the American public in regards to nuclear power.

On account of the negligence of the Atomic Energy Commission, it did not take any significant action relating to nuclear waste until the 1970s. Finally, the commission took the first serious step towards creating a comprehensive plan for the permanent storage of high-level nuclear waste. Initially, the AEC acted under the assumption that most of the spent reactor fuel would be reprocessed and recycled to be used again as reactor fuel and the remainder of the waste would be entombed underground at remote locations. After study of potential sites, the AEC selected its first of such remote locations in an abandoned salt mine in Lyons, Kansas. Much to its dismay, the AEC had to discard the site as its choice for a permanent geologic repository when scientific studies proved the site to be plagued by major flaws. Upon discovery of these flaws, the state of Kansas objected to the continuation of the project, and the Atomic Energy Commission was forced to search elsewhere for another potential repository site.

The task of selecting a new waste disposal site was transferred first to the Energy Research and Development Administration, and later to the Department of Energy after the federal government disbanded the Atomic Energy Commission. In 1976 the Energy Research and Development Administration began its search for a high-level repository. It eventually selected sites in thirty-six states for further consideration. The ERDA's made informal offers to work with each of the states in the study of the sites and

to cease consideration of any site should it prove to not sufficiently meet the state's concerns. Yet several of the states under consideration as potential sites expressed a lack of complete faith in the federal government and malaise in the absence of a formal role for the states in the selection process. In response to this lack of state participation, nearly two-thirds of the states passed laws regulating some aspect of nuclear waste disposal. As of 1979 nineteen states actually had imposed bans or moratoria on repository siting within their states. Such actions resulted in a stalemate of the policy. Much of the conflict focused on what role, if any, the public, including states and Indian tribes, ought to have in the process of siting a permanent waste disposal site. Most states demanded some form of guarantee that they would have representation in the process. Some states felt so opposed to the issue, they called for a veto right over the final decision of the federal government. President Carter, facing such contention over the waste issue, began an effort to develop a high-level waste policy that dictated a formal role for the states in the repository siting process. Despite Carter's nuclear waste policy task force contributions to bringing waste disposal and state participation to the forefront of congressional action, it was unsuccessful in its attempt to remedy the issue. In lieu of providing the states with veto rights, the task force recommended "consultation and concurrence" with the states. Understanding the necessity of legitimizing the final decision, Carter emphasized the mandate for complete public disclosure and participation in the site selection process.[79]

Meanwhile, Carter made another decision regarding nuclear power that further aggravated the situation. In 1977 he decided to bring an end to the commercial

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[79] Duffy, note 78.

reprocessing of spent nuclear reactor fuel. The result of this decision was that spent reactor fuel was now accumulating at a much greater rate in cooling ponds at reactor sites throughout the country. These cooling ponds, however, were not designed for the permanent storage of the waste, and most of these ponds or tanks had a capacity to hold no more than three years worth of spent fuel. Furthermore, states did not allow nuclear utilities to expand their on-site storage without state regulatory approval, which was by no means assured. By the late 1970s, many utilities faced pressing fears about not having enough storage capacity and encountering increasing on-site storage costs. The nuclear industry, therefore, turned to its supporters in the federal government to provide legislative relief, claiming that the survival of the nuclear industry depended upon a federal commitment on high-level waste.

After years of deliberation, Congress approved the Nuclear Waste Policy Act in 1982. The Nuclear Waste Policy Act established specifically defined procedures and set a schedule for the selection, construction, and operation of two permanent high-level waste repositories. According to the new law, the Department of Energy was required carry out an extensive nationwide search for potential sites, which upon selection, would then be evaluated using a demanding set of technical criteria and guidelines, included in which were strict environmental regulations. All of such studies and reviews conducted would the be subject to assessment and comment by the public through a hearing process. The Department of Energy would then to compile a list of potential sites from which the president was to choose two for further review and site characterization, one in the eastern United States and one in the west. The Act set an overly ambitious timetable that required the President to designate the first site by March 31, 1987 and the second by

July 1, 1989. The Nuclear Regulatory Commission would then have the responsibility of licensing the repositories.

As an attempt to foster public confidence in the selection process and promote the acceptance of the final decision, Congress mandated that the Department of Energy to work closely with the states throughout the selection process. The Act authorized the Department of Energy to enter into binding written agreements with states selected by the President as the potential repository sites regarding the screening and characterization studies. It was also the responsibility of the Department of Energy to provide money to the chosen states to enable them carry out their own site reviews and hire independent consultants to study the potential sites. Lastly, the law granted the chosen states the right to veto the Department of Energy's final selection. The caveat of this veto right, however, was that the veto could be overridden by a vote of both houses of Congress.[80]

The Act contained other key provisions that succeeded in transferring the legal and economic liabilities of high-level waste disposal from the industry, where they had previously resided, to the federal government. The timetable laid out stipulated that the Department of Energy was to begin its acceptance of the high-level commercial waste in 1998, the year that the first repository was scheduled to open. In order to finance siting process, construction and operation of these proposed repositories, the Nuclear Waste Policy Act established the Nuclear Waste Fund, which levied a user fee of 0.1 cent per kWh on the consumers of electricity from the country's nuclear utilities.

Despite the initial praise of the movement towards action on the nuclear

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[80] Duffy, note 78.

waste issue, the Nuclear Waste Policy Act was found, by all accounts, to have yet again failed to solve the problem. The implementation of the Act was a failure. Although the Department of Energy met the Act's 1983 deadline for issuing siting guidelines, it met strong contention at essentially every other stage of the selection process for the process to take much longer than the Act had anticipated. Each of the states that received the distressing news that they were selected as potential repository sites fiercely challenged the decision. A majority of these states claimed that the Department of Energy was moving far too quickly in the siting process. Despite such contention, by 1985 the Department of Energy presented the President with a narrowed list of only three potential sites in the states of Texas, Washington, and Nevada. As to be expected, the official and congressional delegates from each of the three states violently protested the decision, accusing the Department of Energy of serious problems in its technical analyses and site assessment procedures. Each of the states, joined by numerous local and national environmental and antinuclear groups, challenged the designation as possible repository sites in court. The Department of Energy made continued efforts to select a second potential repository site in the east but was equally as unsuccessful. The DOE designated seven eastern states as potential sites but none of the seven identified were willing to accept the permanent disposal site within their borders. By 1986 an extremely frustrated Department of Energy announced the suspension of its search for an eastern waste disposal site, in doing so, understandably enraged the western states.

Facing virtually open rebellion among the selected states, Congress attempted to repair the damage by amending the Nuclear Waste Policy Act. In December of 1987, Congress rejected the multiple site search process previously employed under

the initial Nuclear Waste Policy Act and instead designated Yucca Mountain, Nevada, as the single potential repository site to be characterized. The search for a second site in the east was permanently abandoned. This shift from a diplomatic siting process to the designation of a single site was a dramatic change in policy. Despite this, changes never actually came up for direct vote; rather, the amendment was adopted in conference as part of a budget reconciliation measure, having been added to the bill by Senator Bennett Johnston, a leading proponent of nuclear power. The passage of this amendment without the participation of Nevada state representative served to further fuel the opposition. Although the officials from the other previously potential states, such as Washington and Texas, were understandably relieved with the passage of what became known as the "Screw Nevada Bill," officials from Nevada were livid. "It's nuclear rape," argued Senator Richard Bryan.[81] Further angering Nevada and other repository opponents, Congress required that in order for Nevada to qualify for the stipulated federal money to conduct an independent characterization of the site, Nevada had to give up its veto rights. Such actions on the part of the federal government, as Michael Kraft suggests, presented Nevada with little if any incentive to cooperate with federal officials and had an understandably detrimental effect on the state's relationship with the federal government.[82]

In the subsequent years, officials from Nevada, joined by many national environmental groups including the Natural Resources Defense Council, the Sierra Club, and the Audobon Society, explored and employed every available means of blocking the siting of the waste repository at Yucca Mountain. As one of such attempts, Nevada,

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[81] Curt Suplee, "A Nuclear Problem Keeps Growing," Washington Post (31 Dec. 1995), 1.
[82] Duffy, note 78, 187.

under the auspices of concern over the risks of repository construction and the adequacy of the Department of Energy's site characterization plans, refused to grant the Department of Energy's applications for the environmental permits it needed in order to commence its site evaluation. This act of defiance by Nevada officials succeeded in at least temporarily stopping work on the project. Continuing such a course of action, in 1989 the Nevada legislature enacted a bill that banned any government agency from storing high-level waste within the state, effectively vetoing the repository. Upon its refusal to comply with the bill and to consider the veto an official action in light of the Nuclear Waste Policy Act, Nevada filed suit against the Department of Energy in federal court. In response the DOE to countersued Nevada, declaring the initial suit to be invalid. In 1990, the Ninth Circuit found in favor of the Department of Energy. Nevada retaliated by appealing to the Supreme Court, which ultimately upheld the Ninth Circuit's decision. Meanwhile, after two years of preliminary work and expenditures of nearly five hundred million dollars, the Department of Energy decided in1989 that it was abandoning the original repository plans on the premise that it lacked confidence in the technical quality of the proposal.[83]

This issue of nuclear waste disposal demonstrates the increasing proliferation of players in nuclear politics that began in the 1980s. The nationwide search for suitable nuclear waste disposal sites affected states and communities throughout the country and introduced multiple new actors to the policy-making arena, in the form of state and local governments and special interest groups. Whatever their motivations, whether in support or opposition to the proposed repository, these new actors brought different perspectives and goals to the debate. The majority of them were active in the opposition to the federal

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[83] Duffy, note 78.

government's efforts to site permanent nuclear waste storage facilities. With the state and local governments taking on increasingly potent roles in policy making, it became evident that the conflict over nuclear waste had moved well beyond the traditional confines of subgovernment politics.

While this opposition continued to grow, the nuclear waste debate also proved that support for nuclear power within the federal government remained strong. With the states successfully prohibiting the siting of a high-level nuclear waste repository, the industry worked to transfer the financial and legal risks of nuclear waste management from itself to the federal government. The outcome of such actions was the Nuclear Waste Policy Act, which also ensured that the final decision on repository siting remained in the hands of the federal government, where industry influence was more pronounced, rather than in those of the states. Under the Reagan administration the consolidation of power at the national level was carried out regardless of the administration's advocated preference for devolving power to the states. Evidently, nuclear power was an exception to Reagan's acclaimed policy of New Federalism.[84]

Much to its chagrin, the attempts of the federal government to benefit the nuclear utilities and their allies did more to delay the ultimate resolution of the waste problem than to expedite it. The overly ambitious timetable for repository siting and construction, set as part of the Nuclear Waste Policy Act, may have jeopardized the quality of the Department of Energy's site evaluation studies and preempted any meaningful state and public participation, which on account of the public opposition only served to hinder the process. As Michael Kraft notes, the utilities' need to quickly

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[84] Duffy, note 78.

resolve their on-site storage problems dictated the short deadlines more so than did the requirements of scientific study or by the need to build public trust into the selection process. The whole program would have been bettered by a more pragmatic and flexible time schedule that would have provided the Department of Energy with sufficiently more time to examine possible sites and to work in conjunction with the affected states and communities. Congress could have also benefited the program by approving the construction of a interim storage facility, which would have succeeded in relieving the pressure upon the utilities to move the stored high-level waste from reactor sites while at the same time permitting for further research of a permanent solution. Such an approach to the problem would have added credibility to the site evaluation studies and might have facilitated greater public acceptance of siting decisions. However, by attempting to find a quick solution to the waste disposal problem, Congress sacrificed the public trust that is necessary to the siting of a high-level nuclear waste storage facility.

The Department of Energy instead employed a technocratic approach to the implementation of the program, which merely further undermined public confidence in its competence and impartiality. As was the case for the Department of Energy's predecessor, the Atomic Energy Commission, the Energy Department was an overly optimistic agency whose purpose was to solve the proposed problem. The designated responsibility of the DOE when it was created was to promote nuclear power. Keeping that function in mind the DOE maintained the practice of de-emphasizing the potential risks of the waste program, a preference for working in a confidential manner without public interference or involvement. According to the DOE, the process of repository siting was, as the AEC once believed it was, a technical problem, a matter of finding the

appropriate site and technology. It presumed that not having the requisite expertise, the public could not be expected or desired to be a significant player in the siting process. That being the case, the Department of Energy made minimal efforts to involve the public in the process aside from public education programs that it created as a means to assuage public concerns through teaching citizens the "facts" about nuclear waste. Public opinion surveys suggested, however, that the opposition to the nuclear waste storage facility siting presented by the public was not on account of a scarcity or lack of knowledge, as the Department of Energy had presumed, but rather from the public's profound distrust or the source of the information, the DOE. According to one such survey, less than one in five urban Las Vegas residents believed the Department of Energy was "very trustworthy." A 1982 report by the Office of Technology Assessment concluded that "the greatest single obstacle that a successful waste management program must overcome is the severe erosion of public confidence in the Federal government."[85] In the end, it was the absence of public faith in the Department of Energy's ability to safely construct and operate a high-level nuclear waste facility that ensured that state and local officials would withhold their cooperation, which was essential to program success.[86]

In light of Energy Department's actions regarding the nuclear waste problem, it became quite evident that the DOE, like the Atomic Energy Commission before it, has failed to transform itself into an agency that was able to cooperatively work with the public in the more participatory era of regulatory politics that commenced during the

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[85] Us Office of Technology Assessment, "Managing Commercial High-Level Radioactive Wastes," (Washington, DC: Government Printing Office, 1982), 31.
[86] Duffy, note 78.

public lobby era of the 1980s. One of the characteristic traits of this new political era was greater citizen participation within the confines of policy making, including program implementation. The state and federal laws that have provided citizens with many administrative and legal means of challenging agency and government decisions has at least in part encouraged this participation. The policy-making environment has become a more populated and more complex arena, with a plethora of citizen groups and government officials from all levels vying to have their positions represented. The difficulty of siting a nuclear waste disposal site in this environment could not be exaggerated.

The inadequacy of resolution to the high-level nuclear waste issue continues to plague the nuclear industry's future. Despite Congress' selection of Yucca Mountain as the sole site for characterization as the permanent high-level nuclear waste repository in1987, the project is years behind schedule, billions over budget, and deadlocked in political stalemate. In the words of Thomas P. Grumbly, the Department of Energy's assistant secretary for environmental management, "To even describe this as a coherent program right now is really a problem."[87] The Department of Energy has spent over four billion dollars studying the site, and has yet to determine whether the site could meet the Environmental Protection Agency guidelines, which mandate that high-level repositories isolate the radioactivity for at least ten thousand years, twice the span of recorded history. With the many questionable aspects of Yucca Mountain including earthquakes, groundwater seepage, and the effects of high temperatures on the surrounding rock, several scientists harbor serious doubts about the safety of the site. By even the most optimistic accounts, should the site eventually be considered acceptable, the earliest date

for the opening and operation of the site would not be until 2010, twelve years after the Nuclear Waste Policy Act's initial 1998 deadline. Should the repository be constructed as planned it would still be below capacity to house the estimated 93,000 tons of spent fuel that will have built up by 2033.[88]

Nevada opposition to the permanent repository has intensified in response to recent congressional attempts to expedite the construction of the storage facility at Yucca Mountain. Congressional Republicans in reaction to the lack of progress on the project introduced legislation mandating the Department of Energy to begin construction of a repository at Yucca Mountain. Additionally, the bill would enable the Department of Energy to create and interim storage facility at Yucca Mountain regardless of the eventual determination of the suitability of the site as a permanent repository location. Violent debate centered on this proposed legislation. Nevada officials argued that the legislation was yet another move to force acceptance of the repository upon the state. Nevada's two senators in reaction to the proposed legislation took the unusual step of filibustering a defense appropriations bill, stalling it on the floor for several weeks. In the end, the proposal failed to pass and become law, at least in part because of a threatened White House veto. The legislation, however, did succeed in revitalizing the nuclear waste controversy.

The nuclear power industry, frustrated by the Department of Energy's failure to site a permanent high-level repository and desperately in need in some form of storage relief, has argued that interim storage legislation is essential to its survival. The situation that the utilities faced was that, in the absence of a permanent repository, spent reactor

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[87] Suplee, note 79, 1.
[88] Duffy, note 78.

fuel continued to accumulate at nuclear plants across the country, raising concerns about safety and cost. By the end of the twentieth century, United States nuclear plants have produced thirty thousand tons of spent fuel rods, the majority of which is stored in on-site in cooling ponds. These ponds were never designed as permanent storage facilities and most do not have the capacity to accommodate the large amounts of nuclear waste that has been generated. Upon reaching their storage capacity, as several have, the pools are packed into steel casks and kept above ground in concrete igloos. In the majority of the cases the utilities are required to get state regulatory approval in order to increase their on-site storage capacities. In the face of the intense public opposition that has surrounded the nuclear waste issue, it does not appear favorable that states will readily permit the expansion of such facilities. The more likely scenario is a proliferation of disputes over nuclear waste, such as that which was seen in response to the Low-Level Radioactive Waste Act, as utilities seek approval of new on-site storage plans.

As the nuclear waste program stands at the current stalemate, there is significant indication that the states are equally as displeased with the situation as is the nuclear industry with the failure to locate a permanent storage facility. Both factions, in response to concerns over fairness and cost, are attempting to force the Department of Energy to accept the responsibility for the waste as the Nuclear Waste Policy of 1982 stipulated. The opening and operation of the repository is still decades away, despite the fact that consumers of nuclear power have already paid nearly twelve billion dollars into the Nuclear Waste Fund. Many of the states and nuclear utilities have asked for the Department of Energy to return their money. Michigan's attorney general, in response to the situation, said that forcing consumers to pay for the site and not building one was,

"nothing more than a high-level swindle... perpetuated by our own federal government." In a continuation of the contention over the funds, a group of energy authorities from twenty states in 1994 sued the Department of Energy in federal court, claiming that the Nuclear Waste Policy Act mandated that the federal government was to accept full responsibility, including physical possession of high-level nuclear waste in 1998. Energy Secretary Hazel O'Leary, in an attempt to counter the states' argument, contended that the 1982 law required the federal government to assume responsibility of the high-level waste only upon completion of the permanent repository. The D.C. Circuit Court found for the states, saying that the DOE's claims were inconsistent with the 1982 law, but that facing the lack of either a temporary or permanent storage facility, there was no feasible means for the Department of Energy to accept such responsibility at that time. It can only be concluded, therefore, that the nuclear waste issue, remaining unresolved, will further damage the nuclear industry and the Department of Energy well into the coming years.[89]

Conclusion

Relatively speaking, the nuclear industry is a young one in America. Despite this short life span, the issue of nuclear waste has managed to instigate one of the most heated and controversial debates of twentieth century US politics. The lack of agreeable nuclear waste storage is indeed a crisis. Without a solution the problem will only continue to intensify, as resulted following the Atomic Energy Commission's initial disregard of the waste issue in the early days of the nuclear industry. The public

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[89] Duffy, note 78.

opposition to the current project at Yucca Mountain cannot be ignored. Since the proliferation of players in nuclear politics that began in the 1980s, the public, in the form of special interest groups and state and local governments, has taken an increasingly participatory role in the waste storage development process. This new prominent force in the decision making process has succeeded in delaying the program, extending the development stage well beyond the initial time frame laid out in the Nuclear Waste Policy Act of 1982.

This crisis is, in the year 2000, without an equitable solution. After studying this issue for the past year and coming to understand multiple sides of the controversy, I would not even attempt to propose a solution on which all parties could agree. The issue, for contenders on all sides, is virtually black and white. As it stands now, there is no possibility of a win-win resolution. For one side to win, the other must lose and because of the strong passions with which all are fighting, neither side is ready or willing to give up.

The field of study for nuclear related issues is quite broad. There is much to be studied with regards to the industry itself, such as the origins of the negative public opinion, and the decline of the industry. One topic specifically related to nuclear waste storage that would be of great interest for further study is the motivations of the federal government, especially the Department of Energy in the development of waste storage. Was the site selection process based only on fair scientific evaluations as the Department of Energy contends or was the Yucca Mountain site intentionally selected on account of Nevada's lack of political clout and its location on federally owned land? Research

answering this question would be invaluable in fully understanding the nuclear waste storage issue that has plagued this country for the last half of the twentieth century.

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