

Restructuring the U.S. Nuclear Waste Management Program: An Environmental Opportunity for Change?*

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ABSTRACT

This paper utilizes John Kingdon's 1984 policy analytic approach to examine nuclear waste policy in the United States over the last three decades. The authors demonstrate that Kingdon's premise concerning the merging of three process streams - the problem stream, the political stream, and the policy stream – took place when major changes in U.S. management of high-level radioactive waste and spent nuclear fuel occurred in 1982 and 1987. By tracing these mergers of process streams, the policy changes accompanying them, and the impacts of certain focusing events (the Three Mile Island and Chernobyl nuclear reactor accidents), the authors suggest that yet another policy window has opened recently that allows a new opportunity for restructuring the U.S. nuclear waste management program. The authors show that these three streams have once again converged, with events beginning in 2008 to 2010, coupled with a focusing event, the Fukushima Daiichi nuclear reactor accident of March 11, 2011. This new policy window has created an opportunity to move beyond the current Yucca Mountain stalemate by adopting a consent-based approach to site selection for nuclear waste facilities and other major program changes recommended by the Blue Ribbon Commission (BRC) on America's Nuclear Future in 2012. The final element of the paper examines legislation currently being considered in the U.S. Senate, S. 1240, the Nuclear Waste Administration Act of 2013. S. 1240 would implement key changes recommended by the BRC that are needed to avoid past policy failures. The authors discuss amendments that would extend consent-based site selection to all potential host states, and additional provisions that would enhance the safety and security of nuclear waste shipments.

INTRODUCTION

The nation's efforts to consider and adopt new approaches to nuclear waste management have been gridlocked with few new initiatives until recently. Since the passage of the Nuclear Waste Policy Amendments Act (NWPAA) in 1987, the efforts of the U.S. Department of Energy (DOE) to develop a geologic repository for spent nuclear fuel (SNF) and high-level radioactive waste (HLW) at Yucca Mountain have been adamantly opposed by the State of Nevada and, increasingly, by various regional associations. The authors of this paper demonstrate that, with the election of President Obama in 2008

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and Senator Reid of Nevada becoming the U.S. Senate Majority Leader in 2007, a policy window allowing a new direction for the nation's management of nuclear waste began to develop. The possibility of a new direction in the program is clearly visible in the recommendations of the Blue Ribbon Commission (BRC) on America's Nuclear Future Final Report issued in January 2012 (BRC, 2012). Yet, as Mushkatel demonstrated in his research, a clear consensus among the states, regional associations, and federal agencies including the U.S. Department of Energy had already emerged on many key and critical issues prior to the issuance of the BRC recommendations (Mushkatel, 2013).

This paper analyzes the emergent opportunity for a new direction in the nation's nuclear waste program. Utilizing John Kingdon's conceptual framework (Kingdon, 1995) to guide the analysis, the authors conclude that a policy window may have opened providing an opportunity for new policy direction. The new policy direction, it is suggested has been enhanced by the Fukushima Daiichi nuclear accident, in Kingdon's terms a focusing event. Past nuclear waste management programs and policy changes have been preceded by merging process streams similar to those currently observed and accompanied by similar focusing events, resulting in what Kingdon calls policy windows - opportunities for major program changes. Finally, the analysis discusses the current efforts in the U.S. Senate to enact comprehensive legislation (S. 1240) that would implement the most significant recommendations of the BRC Final Report.

THE CONCEPTUAL MODEL

Since it was first published in 1984, and re-issued in 1995, John Kingdon's seminal work on how policy is formulated and attains a place on the formal agenda of government has been utilized to better understand public policy development across a wide spectrum of policy types. The focus here is on how nuclear waste policy has attained a place on the agenda that in the past successfully resulted in policy development. Kingdon postulated that the entire federal government is organized anarchy "...in which preferences and technological solutions are problematic and participation is fluid" (Kingdon, 1995:86). Kingdon examines why some problems become the focus of government action and others do not. He does so by adapting Cohen-March and Olsen's garbage can model of organizational behavior (Cohen, March and Olsen, 1972). Kingdon suggests that problems are most likely to become agenda items or issues when three process streams intersect or merge. These three streams are the problem stream, the policy stream and the political stream. In this discussion, Kingdon's work constitutes a conceptual framework of how problems become a part of the agenda and are acted upon. Importantly, Kingdon's conceptual framework can be used to describe the basic organization of the processes involved in agenda setting and policy formation across a wide number of different areas but still remain useful in distinguishing and organizing our thoughts and insights about a policy area. For this reason perhaps,

Kingdon's basic conceptual framework has been used widely with some 1400 plus studies citing his work across a voluminous number of different specific policy areas. Yet, while the fundamental concept of streams that merge remains constant across these studies in understanding how items gain agenda status, the specifics of what each element of the conceptual model contains (specific variables) and how they specifically relate to each other, varies by what it is that is being studied. The conceptual model is often the focus of formative research endeavors facilitating the organization of material and information from a number of different sources, and it guides the research in an area as a model is developed that is often then used in summative research (Hedrick, Bickman & Rog, 1993). Kingdon's work is so widely used because it organizes, or allows the researchers to organize information in a particularly area to make it more understandable in examining why or why not ideas become a part of the agenda of government. Once this information is organized using this conceptual framework, then more specific relationships may be specified among variables.

Kingdon, suggests that the three streams, problem, policy and political streams must merge or couple for an idea to become a policy. The problem stream entails identifying and elevating an issue as being important enough to gain the attention of policy makers. This problem identification element is critical. Without the attention of policy makers, the item will not be placed on the agenda of government. In this context, a variety of conditions are considered important characteristics of a problem if it is to gain this attention. For example, a problem must be viewed as being tractable – that is, solvable - to gain a place on the agenda because policy makers will not waste their time on problems that cannot be solved by their action. Yet, as Kingdon notes, "There is a difference between a condition and a problem" (1995:109), and conditions become problems when there emerges the belief that something should be done about them. However, such belief is insufficient if the problem is viewed as intractable, or if there are other competing definitions of the problem. Many problems fade from view for a variety of reasons including the erroneous belief that legislation has adequately addressed them. Alternatively, problems can be assisted onto the agenda by focusing events including crisis or disaster that simply overwhelm other factors because the implications of not acting are so dire.

The policy stream is composed of policy communities or attentive groups that produce alternatives and proposals for solving the issue/problem. These groups produce policy proposals for serious consideration and are often most successful when the proposal is technically feasible, compatible with the decision makers' values, reasonable in cost and appealing to the public (Coffman, 2007). Kingdon compares the policy environment to "primeval soup" where many ideas and alternatives circulate around and are combined with other ideas while some fade completely. The policy community composed of the experts

generating and considering these ideas is highly fragmented reflective of our policy system. Often advocates of specific proposals, or policy entrepreneurs invest their own resources for specific policy proposals. The study of such entrepreneurs is beyond the scope of this paper but sometimes such policy entrepreneurs play a critical role in advocating and obtaining a place on the agenda for a particular policy solution to a problem. Kingdon notes that in the policy stream the merit of ideas are suppose to provide the power to obtain agenda status. However, this is often not the case as sometimes an idea is counter to the prevailing ideology or wisdom of the day (1995:125). For example, the State of Nevada's position on many facets of Yucca Mountain and the nation's radioactive waste disposal plans can be viewed as going against the prevailing ideology or policy wisdom during the first two periods of time examined below. Indeed, Nevada's efforts to prevent the siting at Yucca Mountain often focused on the technical infeasibility of elements of the policy and are often why ideas fail during implementation.

Finally, the political stream is composed of changes in public opinion, interest group receptivity, and/or administrative changes. Often such changes are reflected or manifested in changes of elected officials resulting in senior leadership changes in the administration. These political changes provide the possibility of a problem or issue rising in importance and gaining the attention of these officials, and others fading from sight until a later time. The Obama elections resulted in shelving some nuclear waste policies that had been the focus of U.S. efforts for over 50 years and charting new directions in this policy area as a result of these political changes (discussed below). With elections we also discover a new mood may emerge or new priorities that cause policy discontinuities in one area as a new consensus emerges in another. The political stream cuts across policies and problems and as Kingdon suggests is independent of these other streams. Yet, sometimes because of timing, a focusing event or other factors a policy window may open that results in these streams coupling with startling impacts on agendas. Often, Kingdon suggests, a problem may become a part of the agenda leading to new policy or new directions for policy, when a focusing event occurs. These focusing events are often crises or disasters (Kingdon, 1995:94). While we demonstrate in this paper that nuclear waste management policy shifts have been closely associated with such crises and disasters, they are not always required nor are they sufficient by themselves. Indeed, as Kingdon notes:

Crisis, disasters, symbols and other focusing events only rarely carry a subject to policy agenda prominence by themselves. They need to be accompanied by something else. We have already made the point, first that they reinforce some preexisting perception of problem, focus attention on a problem that was already "in the back of people's minds." (Kingdon, 1995:98).

When these three streams converge, perhaps aided by a focusing event, the *opportunity* for a new agenda item and new policy direction exists. Policy advocates or policy entrepreneurs closely watch for the

openings of policy windows or opportunities. As Kingdon suggests, at any one time there are multiple alternative problem solutions that are floating around and being discussed as potential solutions to a problem. Advocates of these various solutions monitor opportunities to attach their particular solution to a problem. Hence, when the opportunity presents itself (when a policy window opens) either with the occurrence of a focusing event or not, advocates/entrepreneurs must be prepared to attach their particular solution to a proposal for solving a problem (Kingdon, 1995:88,165). Such opportunities for attaching an advocate's particular solution to a problem may be the change of an administration (a change in the political stream). However, such opportunities for action on given initiatives stay open for only short periods of time and then close. These policy windows open and close in areas depending on various events, such as the occurrence of a focusing event, change in public opinion concerning the salience of an issue and changes in administration. Importantly, Kingdon believes that despite the shortness of time associated with such opportunities, most major changes in public policy result from the occurrence of such policy windows (Kingdon, 1995:166).

Policy windows and opportunities close for a number of potential reasons according to Kingdon. Importantly for our consideration, policy windows close because the focusing event may pass from the scene or become less salient. Additionally, the change in the administration and personnel that helped to create the policy opportunity may change again. Hence, the opportunity presented by the administration and the key administrative personnel dissipates over time as the administration disappoints some of its supporters and as key personnel leave an administration (Kingdon, 1995:168-169). There are other conditions that also will result in the closure of a policy window. Participants in the policy process may feel they have addressed a problem by enacting some legislation or by some administrative procedure that has been adopted. In fact, such action may not have adequately addressed the problem but the action results in the closing of this particular opportunity. Alternatively, efforts to address the problem may simply fail to achieve success despite considerable investment of time and resources, so an administration's attention turns elsewhere (Kingdon, 1995:169). When there is a failure to act after an opportunity presents itself, another opportunity may not occur for considerable time. The possibility that proponents of nuclear waste policy change currently have such an opportunity, but that the window is closing, is a compelling reason for this paper. While Kingdon's analytic framework has limitations such as the lack of an explanation of the agenda setting policy process in causal terms, it nonetheless does provide a conceptual overview for understanding past and current nuclear waste management policy.

The body of this paper applies Kingdon's terminology or framework to not only the past development of nuclear waste management policies, but also the near term future of policy in this area. In this context, we

believe the publication of the BRC Final Report represented the convergence of these three streams and that, in 2012, the likelihood of breaking out of our currently deadlocked nuclear waste management policy seemed probable. As will be seen, there was a growing consensus that the problems surrounding nuclear waste management were tractable and important as evidenced first by the publication of the National Academy of Science transportation report in 2006, and six years later the BRC Report (NAS, Committee on Transportation of Radioactive Waste, 2006). While focusing events may not be required for policy change, we identify such events we believe are closely associated with past change in nuclear waste policy. Hence, by 2012 there was a new definition of the problem of managing spent nuclear fuel and high-level radioactive waste in a comprehensive program that did not exclusively focus on Yucca Mountain as the sole solution. Acceptance of the new problem definition, support for other emerging alternatives among key stakeholder groups and shifting political acceptance for these other alternatives among the administrative and political leaders all suggest a newly opened policy window of opportunity.

A NATIONAL COMPROMISE: THE NUCLEAR WASTE POLICY ACT OF 1982

Some of the key policy developments and a focusing event leading to passage of the Nuclear Waste Policy Act (NWPA) of 1982 are listed in Table 1. Space does not permit discussion of how each of these events contributed to what one contemporary observer called “a national compromise,” the passage of the NWPA of 1982, however some specific discussion of the NWPA and these events is needed to place this historic Act in context.

Table 1. Nuclear Waste Disposal Policy Timeline, 1957 - 1982

1957	NAS, The Disposal of Radioactive Waste on Land
1959-1972	Atomic Energy Commission (AEC) Project Salt Vault and Lyons, Kansas
1974	Energy Reorganization Act (AEC replaced by ERDA and NRC)
1976	Energy Research & Development Administration Studies Repository Sites in 36 States
1976	Federal Elections (Carter elected President)
1977	Department of Energy (DOE) Created
1979	Interagency Review Group (IRG) Report
1979	Three Mile Island Accident (March 28, 1979)
1980	President Carter’s Policy Statement (Feb. 12, 1980)
1980	GEIS on Commercially Generated Radioactive Waste
1980	Federal Elections (Reagan elected President, Republican Senate)
1981	President Reagan’s Policy Statement (Oct. 8, 1981)
1982	Nuclear Waste Policy Act (Passed Dec. 20, 1982; Signed Jan. 7, 1983)

The NWPA of 1982 was an extraordinary policy accomplishment more than twenty-five years in the making. Its enactment was only possible because of compromises made between anti-nuclear and pro-nuclear forces, between Eastern and Western states and organizations of states, and between proponents of strong Federal government action and proponents of states' rights. The NWPA also represented a compromise on nuclear waste management options, incorporating near-term action on spent nuclear fuel storage and longer term action on geologic disposal, while straddling the highly controversial issue of reprocessing spent nuclear fuel (Walker, 2009; Carter, 1987; Fitzgerald & McCabe, 1998; Halstead, et al., 1988; Cotton 2006; Carter, 2006). Congressman Morris "Mo" Udall of Arizona, the Act's key legislative manager in the House of Representatives, called it "a delicate fabric of agreements." (Alley & Alley, 2013:190)

Regarding geologic repositories, the NWPA established four key components of national nuclear waste policy. First, the Act established a definite schedule for "the siting, construction, and operation of repositories that will provide a reasonable assurance that the public and the environment will be adequately protected from the hazards posed by" SNF and HLW. [Sec. 111(b)(1)] The Act directed DOE to select three candidate sites for the first repository by January 1, 1985, and five candidate sites for the second repository by July 1, 1989. [Sec. 112(b)] From these sites, DOE was to recommend one site for the first repository by March 31, 1987 and another for the second repository by March 31, 1990. [Sec. 114(a)] The Act further set deadlines for DOE to submit a license application to the NRC, and for NRC to approve or disapprove DOE's license application. [Sec. 114(b)]

Second, the Act established "the Federal responsibility, and a definite Federal policy, for the disposal" of SNF and HLW. [Sec. 111(b)(2)] The Act directed DOE to enter into contracts with the nuclear utilities requiring DOE to "take title" to SNF and HLW, following commencement of repository operations, and to begin disposing of SNF and HLW "not later than January 31, 1998." [Sec. 302 (a)(5)]

Third, the Act defined "the relationship between the Federal Government and the State governments with respect to the disposal of" SNF and HLW. [Sec. 111(b)(3)] The Act provided a specified role for State governments in the DOE repository siting process, including a provision that would allow a State government to veto a DOE repository site recommendation by filing a "notice of disapproval." The state veto could be overturned by a vote in both houses of Congress approving a "resolution of repository siting approval." [Sec. 115]

Fourth, the Act established “a Nuclear Waste Fund, composed of payments made by the generators and owners of such waste and spent fuel, that will ensure that the costs of carrying out activities relating to the disposal of such waste and spent fuel will be borne by the persons responsible for generating such waste and spent fuel.” [Sec. 111(b)(4)]

Overall, the provisions of the NWPA set forth a detailed blueprint for managing the nation’s high-level nuclear waste program. In doing so, the Act included numerous reporting and approval requirements that ensured accountability to Congress. The Act required Senate approval of the Director of the new DOE Office of Civilian Radioactive Waste Management (OCRWM). The Act required the OCRWM Director to report to Congress annually, and at every significant milestone in program implementation. Most importantly, the OCRWM budget was to be included in the budget of the U.S. Department of Energy, and expenditures from the Waste Fund were subject to the congressional appropriations process.

Writing in Science in 1986, journalist Eliot Marshall described how “Congress put together a national compromise, the Nuclear Waste Policy Act:

All the states agreed to give up some autonomy to support a single comprehensive system for disposing of spent reactor fuel. About 15,000 metric tons of old fuel sit in utility company storage areas. Space is getting tight, and the utilities are eager to get rid of the aging and increasingly vulnerable fuel containers. They would also like to lower storage costs. DOE [the U.S. Department of Energy] was assigned to search the country for the best geological formation in which to bury the waste. In a series of reviews, DOE was to narrow its choices for a western site from nine to five, then to three finalists. It was to follow the same course east of the Mississippi, starting with 12 and narrowing to three sites. When detailed local studies on these finalists were complete, the President was to choose one site in the West to hold 70,000 metric tons of waste. Several years later, he would choose a second site in the East. The two-site requirement was essential. Without it, westerners were not inclined to take any waste from the East, where most nuclear waste is generated (Marshall, 1986).

When the NWPA was passed by Congress, the ideas of geologic disposal and federal responsibility for waste disposal had been debated for a quarter century. A policy window that closely fits the model described by Kingdon evolved beginning in the 1960s and the 1970s, with three streams (problem, political, and policy) converging between the mid-1970s and the early 1980s, culminating in the NWPA of 1982. Without question, this national policy compromise was assisted by the focusing event of the Three Mile Island reactor accident on March 28, 1979 (Friedman, 2011). This accident, and the media attention it received, almost in itself required key actors in the political and policy streams to re-examine the problem definition and understanding of nuclear power and the nuclear waste issue. Yet, as can be seen in Table 1, even prior to the focusing event, key actions were already underway, including a newly established U.S. Department of Energy as part of an effort to consolidate the policy and administrative

mechanisms of government for dealing with nuclear issues. In short, all the elements of Kingdon’s analytic model were in play as the NWPA emerged as the national compromise for managing nuclear waste.

THE POLITICAL BURIAL OF THE NUCLEAR WASTE POLICY ACT

Some of the key policy developments and focusing events leading up to the amendment of the NWPA in 1987 are listed in Table 2 below. Once again space does not permit an in-depth discussion of how each of these events contributed to what one contemporary observer called “the political burial” of the “national compromise” embodied in the NWPA. However, some discussion of these developments and events is necessary for an understanding of why the resulting political and policy deadlock has been so incorrigible even as the problems appear more tractable.

Table 2. Nuclear Waste Disposal Policy Timeline, 1983 - 1987

1983	NRC Repository Technical Criteria 10 CFR 60
1983	DOE Draft Regional Reports for Crystalline Repository Project
1984	DOE Repository Siting Guidelines 10 CFR 960
1984	DOE Draft EAs for Potentially Acceptable Sites for First Repository
1985	DOE Proposes Oak Ridge TN MRS (April 25, 1985)
1985	DOE AMFM Panel and Defense Commingling Reports
1986	Draft Area Recommendation Report for Second Repository (Jan. 16, 1986)
1986	Space Shuttle Challenger Disaster (Jan. 28, 1986)
1986	DOE Public Meetings in Second Repository States (Feb. 1986)
1986	Chernobyl Reactor Accident (April 26, 1986)
1986	DOE Public Meetings in Second Repository States (Feb.-May 1986)
1986	DOE Selection of First Repository Sites - NV, TX, WA (May 28, 1986)
1986	DOE Suspension of Second Repository Program (May 28, 1986)
1986	Proposed Federal Legislation to Delay or Amend NWPA
1986	Federal and State Elections
1987	Nuclear Waste Policy Amendments Act (Passed Dec. 21, 1987; Signed Dec. 22, 1987)

DOE and the U.S. Nuclear Regulatory Commission (NRC) began implementing the NWPA in early 1983. By the end of 1984, DOE had tentatively identified three previously studied sites – Yucca Mountain in Nevada, Deaf Smith County in Texas, and Hanford in Washington – as potential candidate sites for the first repository, and identified study areas for the Crystalline Repository Project, to be evaluated for the second repository, in 17 states in the North Central, Northeastern, and Southeastern regions. DOE was

also evaluating sites in Tennessee for an interim storage facility, called the Monitored Retrievable Storage (MRS) facility, but this effort was not publically announced until April 1985. In January 1986, DOE was preparing to designate three candidate sites for the first repository; identify twelve potentially acceptable sites for the second repository and eight back-up sites; and proceed with plans for an MRS facility at Oak Ridge, TN. DOE was also developing plans for a national transportation system for spent nuclear fuel and high-level radioactive waste.

Political opposition to DOE's siting efforts grew in intensity as the scheduled NWSA program decision dates approached in early 1986. Tennessee and other states filed lawsuits against DOE. The controversy was heightened by preparations for the upcoming November 1986 elections, with state and congressional races of national importance in a number of NWSA-affected states, and the beginning of campaign planning for the 1988 presidential elections. The space shuttle *Challenger* disaster on January 28, 1986, and the Chernobyl nuclear reactor accident in the Soviet Union on April 29, 1986, both became contributing events, widely reported in the media in ways which challenged public confidence in science and technology generally, and in nuclear technology specifically. Thousands of angry people attended DOE meetings in Maine, New Hampshire, North Carolina, and Wisconsin. Altogether more than 18,000 people attended DOE briefings and hearings in fifteen states between January and April 1986, and DOE received more than 60,000 mostly-negative comments on the second repository area recommendation reports (Halstead, et. al., 1998).

Political opposition was particularly intense in New England where, on January 16, 1986, DOE identified two potential sites in Maine and one in New Hampshire. Eliot Marshall gave this account a few months after the events took place:

Although the process of choosing an eastern site had received little attention until then, as one activist said, "When they finally put the pins in the map, the intensity of the response took everyone by surprise." ... The Governor of Maine, Joseph Brennan (D), who had said little on the subject, suddenly found himself at the head of a furious local protest. He came out strongly against DOE's selections. The Governor of the granite state of New Hampshire, engineer John Sununu (R), described by press secretary Frank Haley as "not one who acts on emotion," traveled to Washington in January to argue his case "strictly on the facts." Sununu argued that a second repository was not needed and that, in any case, the granite in New Hampshire is too porous. ... Logs obtained by [Massachusetts Congressman Ed] Markey show that DOE's nuclear waste officials had 32 meetings or phone conversations with distraught eastern senators, congressmen, governors, and their staffs between 15 January and 28 May 1986.

A small campaign orchestrated by Cooper Brown, an attorney at the firm of Baron & Budd in Washington, D.C., illustrates how some of these protests made an impact. A group in Sebago Lakes, Maine, known as Citizens Against Nuclear Trash (CANT) hired Brown in February. After consulting with Brown, CANT chairperson Bonnie Titcomb and other members of the group

arranged to meet Vice President George Bush on 22 April when he was in Maine for a fund raiser. Bush met with them, listened, and invited them to see his staff in Washington. ...

According to Brown, if DOE had persisted with its plans for Maine and New Hampshire, "it would have been very difficult for any Republican candidate associated with this Administration [to win] in the upcoming presidential primaries. The Bush people saw the handwriting on the wall, and saw that something had to be done."

Brown continued: "I pointed out to [vice-presidential aide Lehman] Li that we were looking for help from the White House to go to DOE and point out that they were off center." He asked Li to persuade the DOE to "suspend the process and go back and start all over." Brown said it would be politically difficult to rescue Maine and New Hampshire alone, so he suggested to Li that it "would make more political sense if DOE would drop the whole second round [of eastern site selection]." ... Two weeks after the Maine citizens visited Li in Washington, [Secretary of Energy John] Herrington announced that he would "indefinitely postpone" work on an eastern site. ...

Herrington insists that he did not change the waste program to suit the Vice President's plans for 1988 or the needs of Republican candidates running in the East this fall. Politics played no part in it, he told the House Interior Committee on 31 July. "It was a managerial decision made in the Department," Herrington said, aimed at saving money (Marshall, 1986).

Energy Secretary Herrington's May 28, 1986 announcement suspended the second repository effort and proceeded with consideration of sites in Nevada, Texas and Washington for the first repository. The selection of Hanford over two sites with higher technical rankings – Richton Dome in Mississippi and Davis Canyon, Utah – further fueled the perception that DOE's siting process was driven by political science rather than earth science. Over the next 18 months, there were a number of legislative proposals to restructure the program, including a bill supported by many Eastern and Midwestern congressmen that would have imposed a temporary moratorium on site-specific work to allow a blue ribbon commission to assess the situation and recommend new legislation to fix the program. Unlike the congressional deliberations in 1982, there was no last minute national compromise. On December 21, 1987, Congress passed the Nuclear Waste Policy Amendments Act (NWPAA) as part of the budget reconciliation conference report (H.R. 3545), and the NWPAA was signed into law the next day.

The NWPAA directed DOE to characterize only one site, Yucca Mountain, for development as a geologic repository. All work on second repository sites was terminated, with DOE directed to report back in 20 years on the need for a second repository. DOE's Oak Ridge MRS siting proposal was also nullified. As journalist Foster Church observed, "science hit political reality. Faced with pressure from four Eastern states where U.S. Senate seats held by Republicans were threatened--they were Georgia, New Hampshire, North Carolina and Wisconsin--the Reagan administration postponed indefinitely the search for an Eastern site. One year later, in 1987, Congress scrapped the scientific processes of the 1982 law for the other site as well. It picked a Western site based on pure politics" (Church, 1990).

Church described the process blow-by-blow:

For U.S. Representative James Bilbray of Nevada, the cold truth came in a whispered acknowledgment outside a congressional committee room in December 1987. ... A Senate-House conference committee was about to convene to take up a massive budget bill. Included among its many provisions were amendments to the 1982 Nuclear Waste Policy Act. Three states, Nevada, Texas and Washington, were under consideration for the nuclear waste dump. All three had lobbied furiously against being chosen. The version approved by the Senate came close to excluding any state but Nevada from consideration, but it did not designate Nevada by name. ...

But he knew something was up when a conference committee member pulled him aside before the committee session began. "Listen," the man murmured. "I hope you understand what is going on here. There are three sites under review--Texas, Nevada and Washington. And the speaker [of the House, Jim Wright] is a Texan and the majority leader [Tom Foley] is a Washingtonian." He noted the weak status of the small Nevada delegation. Three of the four were in their first terms. Furthermore, none served on the conference committee. "I hope you understand," he concluded. "It is not going to Washington. And it is not going to Texas." It was a lesson in power politics that Bilbray would not soon forget.

With a speed that surprised even Senate conferees, the House conferees proposed accepting most of the Senate language and taking it a step further. The Nevada site would be chosen by name, and the other two potential sites that had been recommended by the U.S. Department of Energy, Deaf Smith County, Texas, and the Hanford Site in Washington, would be dropped. Bilbray stalked from the room. "Nevada was treated very shabbily, and our delegation was treated very shabbily," he recalls bitterly. "I resent it to this day." Even Representative Al Swift, a Washington Democrat who served on the conference committee and whose state was protected by the choice of Nevada, recoiled from the naked power play. "What you are watching is an exercise in pure politics," he told a reporter when the committee adjourned. "I am participating in a nonscientific process--sticking it to Nevada. This is as bad a case as I have seen in 10 years" in Congress (Church, 1990).

Two decades later, former Congressman Bilbray retold the story at a University of Nevada Las Vegas roundtable discussion on Yucca Mountain. He related going into a room with Majority Leader Tom Foley and Speaker Jim Wright and being told Yucca Mountain was it. "I left the room and a friend asked me what happened. I told him that Nevada had just been screwed." Thus the unofficial name of the NWPAA as the "Screw Nevada Bill" was born (Dilger, et al., 2008).

The NWPAA altered the national compromise of 1982, especially the regional equity understanding between Eastern and Western political forces. Applying Kingdon's model, the problem stream – the need for a national solution to the nuclear waste problem – remained essentially unchanged and the problem definition was unaltered. But the political and policy streams now faced major new obstacles: intense resentment and irreconcilable opposition by Nevada political leaders; the loss of trust and credibility in DOE by many important stakeholders; permanent skepticism about the technical safety case for geologic

disposal at Yucca Mountain; and widespread concerns about disproportionate adverse transportation impacts by Western States, Indian tribes, and nongovernmental organizations.

Over time, the problem stream would become a barrier to new direction as various stakeholders attempted to alter the lack of trust and credibility surrounding the science espoused by various administrations. The *Challenger* disaster and the Chernobyl accident, coinciding with key DOE decision dates in January-February and April-May 1986, served as focusing events, undermining public confidence in government and science at the very time that the public demanded technical policy solutions from political leaders. The political stream responded to the need for action with a defective policy redirection, resulting in a nuclear waste program deadlocked for the next quarter century.

GRIDLOCK AT YUCCA MOUNTAIN AND THE CURRENT POLICY WINDOW

At the 26th anniversary of the NWPPA, there is no repository at Yucca Mountain, there is no final repository design, there is no final waste package design, there is no license to construct a repository, and there is no rail line to transport SNF and HLW to the repository, should one be constructed. Despite DOE expenditures of about \$14.5 billion dollars (2008 dollars), there is no useful infrastructure at the site. A vital question is why has the project made so little progress. What are the sources of its collapse? As the program has failed to make progress, the urban area nearest the repository has grown dramatically, as has Nevada's political clout in Washington. The political aspects of the program that once made the selection of Yucca Mountain as the sole repository candidate site seem so desirable, have now changed in such a way that successful implementation of the program may be impossible.

The BRC Final Report summed up the national nuclear waste policy situation in January 2012:

The Obama Administration's decision to halt work on a repository at Yucca Mountain in Nevada is but the latest indicator of a policy that has been troubled for decades and has now all but completely broken down. The approach laid out under the 1987 Amendments to the Nuclear Waste Policy Act (NWPA)—which tied the entire U.S. high level waste management program to the fate of the Yucca Mountain site—has not worked to produce a timely solution for dealing with the nation's most hazardous radioactive materials. The United States has traveled nearly 25 years down the current path only to come to a point where continuing to rely on the same approach seems destined to bring further controversy, litigation, and protracted delay (BRC, 2012:vi).

Some of the key policy acts and political changes, as well as the focusing event associated with the current policy window are listed below in Table 3. Once again, space does not permit a detailed discussion of how each of the events resulted in contributing to either the long-term gridlock the program entered following the passage of the NWPA, or alternatively the current policy window that we associate with the BRC Final Report in 2012. However, it is important that some discussion of these linkages be provided.

Table 3. Nuclear Waste Disposal Policy Timeline, 1988 - 2013

1989	DOE Site Characterization Plan for Yucca Mountain
1992	Energy Policy Act of 1992
1995	NAS Technical Basis for Yucca Mountain Standards
1996	Federal Legislative Efforts to Site Interim Storage Facility in Nevada
1999	DOE Draft EIS for Yucca Mountain
2001	EPA Standard for Yucca Mountain (40 CFR 197)
2001	NRC Licensing Regulations for Yucca Mountain (10 CFR 63)
2001	DOE Suitability Criteria for Yucca Mountain (10 CFR 963)
2002	DOE Final EIS for Yucca Mountain and DOE Site Recommendation
2002	Presidential Site Recommendation, Nevada Veto, and Congressional Override Vote
2002	State of Nevada Lawsuits
2004	Federal Court (CADC) Vacates EPA 10,000-Year Standard
2006	Federal Elections (NV Senator Reid becomes Majority Leader)
2008	DOE Submits Yucca Mountain License Application to NRC including Final Supplemental EIS
2008	Federal Elections (Obama elected, Reid remains Senate Majority Leader)
2009	NRC Construction Authorization Boards Order Admitting Parties and Contentions
2010	DOE Motion to Withdraw Yucca Mountain License Application
2010	Blue Ribbon Commission (BRC) on America's Nuclear Future Appointed by President Obama
2010	Federal and State Elections (NV Sen. Reid Re-elected, Sandoval elected NV Governor)
2011	Continuing Resolution eliminates new appropriations for Yucca Mountain
2011	Fukushima Daiichi Reactor Accident in Japan
2011	NRC Suspends Yucca Mountain Licensing Proceeding
2011	Litigation to Restart Licensing Proceeding (Aiken County – 1)
2012	Final BRC Report
2012	Federal Elections (Obama re-elected, Reid remains Senate Majority Leader)
2013	S. 1240 Nuclear Waste Administration Act of 2013 Introduced
2013	Federal Court orders NRC to restart Yucca Mountain Licensing Proceeding
2013	NRC issues Order to restart Yucca Mountain Licensing Proceeding

DOE began dismantling the Yucca Mountain program in 2010, and requested no new funding for Fiscal Year 2011. DOE has not requested, nor has Congress appropriated, any additional funds for Yucca Mountain over the past three fiscal years. Between Fiscal Years 1983 and 2007, DOE spend about \$14.5 billion (2008 dollars) on the Yucca Mountain repository project. The primary infrastructure existing at the site consists of 5.1 miles of exploratory tunnels, which cannot be used in and of themselves for waste storage or related functions. Under the 2008 proposed repository plan for 70,000 metric tons of SNF and HLW, DOE would need to construct another 42 miles of tunnels and emplacement drifts, for a total of about 47 miles. DOE estimates that an additional \$82.5 billion (2008 dollars) would be required for construction and operation, for a total life-cycle cost of about \$97 billion (2008 dollars) (U.S. Government Accountability Office, 2011; DOE, OCRWM, 2008; DOE, 2013).

The State of Nevada's opposition to the Yucca Mountain project remains unchanged. Shortly after publication of the BRC Final Report in 2012, Nevada Governor Brian Sandoval advised the Secretary of Energy "that Nevada wholeheartedly supports the recommendations of the BRC and believes that the consent-based approach represents the best chance for ultimately solving the nation's nuclear waste management problem. However, Nevada will not consent to an interim storage facility or repository being considered in the state" (Sandoval, 2012).

In August 2013, the U.S. Court of Appeals for the District of Columbia Circuit (CADC) ordered NRC to resume the Yucca Mountain licensing proceeding [Aiken County et al, Case #11-1271]. The 2-1 decision by the CADC acknowledged that NRC did not have sufficient funds to complete the legally mandated proceeding. Chief Judge Garland stated in his dissent that ordering NRC to proceed without sufficient resources would be "a useless thing" (CADC, 2013). In November 2013, NRC issued an order directing NRC staff to restart the non-adjudicatory portion of the licensing proceeding, acknowledging the probable insufficiency of available funds (NRC, 2013). In January 2014 NRC reported that the non-adjudicatory tasks, particularly preparation of the multi-volume Safety Evaluation Report (SER), would take approximately 12 months and expend about \$9.6 million of the approximately \$13 million available to NRC from previously appropriated funds. (NRC, 2014) The lack of funds seems likely to prevent the hearings phase and completion of the full legally-mandated NRC process. New and continuing lawsuits may impact the licensing proceeding. DOE has not yet formally notified NRC how it will participate in the proceeding. As of March 2014, the NRC Yucca Mountain licensing proceeding faces an uncertain future.

Before suspending the proceeding in 2010, NRC had admitted more than 200 technical safety and environmental challenges or contentions filed by the State of Nevada and others in opposition to DOE's Yucca Mountain license application. The full proceeding may never resume, but if it does, Nevada has stated that it is prepared to fully prosecute all of the admitted challenges to demonstrate that the site and the DOE disposal plan are unsafe.

Dr. M.C. Thorne, a Nevada technical advisor who has also advised several European repository programs, argues that Yucca Mountain would likely not even have been considered for a repository under international standards governing SNF and HLW disposal. A suitable candidate site would exhibit "long-term (millions of years) geological stability, low groundwater content and flow at repository depths, stable geochemical or hydrochemical conditions at depth, mainly described by a reducing environment and a composition controlled by equilibrium between water and rock-forming minerals, and good engineering properties that readily allow construction and operation of the repository." None of these favorable conditions exist at Yucca Mountain (Thorne, 2012). Thorne concludes:

Based on what is now known of the conditions existing at Yucca Mountain and the large number of safety, environmental and legal issues that have been raised in relation to the DOE License Application, it is suggested that it would be imprudent to include Yucca Mountain in a list of candidate sites for future evaluation in a consent-based process for site selection. Even if there were a desire at the local, tribal and state levels to act as hosts for such a repository, there would be enormous difficulties in attempting to develop an adequate postclosure safety case for such a facility, and in showing why this unsaturated environment should be preferred over other geological contexts that exist in the USA and that are more akin to those being studied and developed in other countries (Thorne, 2012).

One can quickly see from Table 3 that following the passage of the NWPAA, there was an illusion among many that progress toward the Yucca Mountain repository was occurring. This illusion of progress was bolstered by the DOE Draft EIS for Yucca Mountain in 1999, the issuance of the NRC Licensing Regulations for the Repository in 2001, and the EPA Standard for Yucca Mountain in 2001, which gave the appearance of coordinated federal agencies moving toward ultimate approval of the site. Yet, what did not disappear was the increasing resistance to the forced siting within Nevada and among regional entities (Mushkatel, 2013; Byron, 2011; Janairo & Bailey 2010; Moore, 2011; Gervers, 2011; Western Governors' Association Policy Resolution, 2011). DOE ignored its own 1993 Secretary of Energy Advisory Board's recommendations on how to earn public trust and confidence in the program, a requisite for managing the radioactive nuclear waste program. As it failed to build this trust deemed necessary, resistance continued to grow. The NAS 2006 Report, utilized in and central to the Final BRC recommendations issued in 2012, repeatedly echoed the importance of the 1993 report on public trust and

confidence, citing DOE's failure to address this key issue area in an effective manner (NAS, Committee on Transportation of Radioactive Waste, 2006).

Hence, when the President and Congress decided to override the Nevada veto of the Yucca Mountain site recommendation in 2002, Nevada pursued litigation along a number of fronts. This legal battle continues today. Moreover, the Western Governors' Association (WGA) has over the past decade adopted policy resolutions on nuclear waste facilities and transportation that support many of Nevada's positions on these issues, most recently readopted in 2014. (WGA, 2014-05, 2014-06) In short, Nevada is no longer a lone isolated western state battling the federal government. Yet, the political stream was changing as well. Nevada's Senator Reid was elected majority leader of the U.S. Senate and pledged to stop the forced siting of the repository in Nevada. He was reelected in 2010 and continues his opposition to the Yucca Mountain project. In 2008 and again in 2012, President Obama was elected and remains committed to an alternative approach to managing nuclear power and waste policy issues. Indeed, a completely different perspective on alternative energy sources has emerged since his election.

These new positions of power for political actors opposed to the current approach to waste management and the repository siting at Yucca Mountain have altered the political environment and stream. The BRC recommendations contained in the 2012 Report represented the opening of a policy window and reflect new definitions of the waste problems. In addition, new political actors and forces have emerged with recommendations for new policy direction. The associated focusing event is the Fukushima Daiichi nuclear accident. The accident involving the reactors and SNF storage following the earthquake and tidal wave continues to pose difficult, if not intractable issues for the Japanese and has already had long-term impacts on the future of nuclear power in Japan. Once again, lessons are being studied and new views are emerging on the management of radioactive waste in the U.S., including the relative safety and security of dry cask storage compared to wet pool storage and the implications of extended at-reactor storage for off-site transportation, consolidated interim storage and geologic disposal.

A recent study of nuclear waste law and policy concluded:

Yet even if a construction license for Yucca were eventually granted, Congress would still have to provide the money to build it. Despite the Republican majority in the House gained in the November 2010 elections, Senator Reid remains majority leader in the Senate and will continue to oppose funding of Yucca. In addition, there remain many hurdles to be surmounted before Yucca could be licensed and built, and even if all the legal and political stars realign in Yucca's favor, it would not open for decades.

In attacking the constitutionality of the 1987 NWPA amendments, Nevada had argued that the courts should intervene to protect the state's interests because the political safeguards of federalism

had failed. Yet, notwithstanding the federal government's plenary constitutional authority to build a repository on federal land in Nevada, and Congress's exercise of that authority in 1987, Nevada succeeded in delaying implementation of NWPA until it was able to take advantage of the shift in political tides in its favor.

The rise and fall of Yucca tracks the swings in Nevada's political influence from its nadir in 1987 to its apogee in the 2008 elections. The long delay in the siting process, even after the 1987 designation of Yucca, ultimately enabled Nevada to take advantage of shifting political contingencies. The delay was the result of the inevitable complexity of the decision process, the division of regulatory authority over Yucca among three federal agencies, and Nevada's determination to use litigation and other available tools to further slow the process. The political contingencies that favored Nevada included the fortuitous early timing of the Nevada Democratic presidential primary, the lack of a commanding Democratic front-runner, and Harry Reid's position in the Senate. But underlying these contingencies resides the powerful if unpredictable role of local issues and interests in U.S. national politics and policies, and the enduring strength of the political safeguards of federalism that ultimately defeated Congress's design, which would impose a repository on an unwilling state. (Stewart & Stewart, 2011:229-230).

After more than two-and-one-half decades of nuclear waste policy gridlock, Kingdon's three process streams - problem, policy, and political – have again converged. The BRC Report signifies an opportunity to move the U.S. program in a different direction, but implementation of key BRC recommendations would require congressional authorization. Congressional deliberations began soon after issuance of the BRC Report in 2012, supported by a DOE Strategy for implementation of the BRC recommendations issued in January 2013, (DOE, 2013) and heightened congressional activity throughout 2013. A similar merging of streams was observed prior to new policy direction resulting in the NWPA and the NWPAA. There are strong indications that the gridlock we have traced from the NWPAA is about to give way toward a new policy opportunity in response this convergence. The most promising legislative vehicle to emerge thus far is discussed below. However, failure to remedy the shortcomings of this promising measure could result in the loss of a rare policy window opportunity.

THE NUCLEAR WASTE ADMINISTRATION ACT OF 2013

Evidence of the postulated current policy window is pending legislation in the U.S. Senate that would implement the BRC recommendations. The Nuclear Waste Administration Act of 2012 (S. 3469) was introduced in August 2012 by the retiring U.S. Senator from New Mexico, Jeff Bingaman, with the goal of starting a discussion on the BRC report. Referred to the Senate Committee on Energy and Natural Resources, that bill died in committee. However, on April 25, 2013 the Committee issued a "discussion draft" of legislation "intended to implement the recommendations" of the BRC. Over the next month, the Committee received more than 2,500 public comments on the discussion draft bill (Feinstein, 2013).

The Nuclear Waste Administration Act (NWAA) of 2013, S.1240, was introduced in the U.S. Senate on June 27, 2013. It was originally scheduled for amendments and debate in early 2014. [31] The bill represents the collaborative work of the Committee's Chairman (Wyden, D-OR) and Ranking Member (Murkowski, R-AK) and the Chairman (Feinstein, D-CA) and Ranking Member (Alexander, R-TN) of the Senate Appropriations Subcommittee on Energy and Water Development. As of March 2014, the schedule is uncertain do to a change in chairmanship of the committee. The provisions of S.1240 generally follow those of S.3469 and the "discussion draft". At the heart of S.1240 is consent-based site selection for all new nuclear waste storage and disposal facilities. The proposed consent-based siting process would not, however, apply to Yucca Mountain.

A Consent-Based Nuclear Waste Facility Siting Process

The BRC Final Report recommended legislative action to establish a new facility siting process:

"The NWPA, as amended in 1987, now provides only for the evaluation and licensing of a single repository site at Yucca Mountain, Nevada. The Act should be amended to authorize a new consent-based process to be used for selecting and evaluating sites and licensing consolidated storage and disposal facilities in the future" (BRC, 2012: viii).

Title III of S.1240 would direct the newly created agency, the Nuclear Waste Administration (NWA), to assume responsibility for siting and operating a geologic repository for spent nuclear fuel and high-level radioactive waste and to site and operate a pilot spent fuel storage facility and one or more consolidated storage facilities. This title creates a consent-based site selection process for such new facilities, together with siting and licensing requirements. Separate subsections would govern the siting process for storage facilities (Section 305) and repositories (Section 306) and spell out specific requirements for written consent agreements with state, local, and tribal governments.

These provisions of S. 1240 resolve one stakeholder criticism of the BRC recommendation for consent-based siting – the lack of a specified role for state Governors. Consultation with Governors of potential host states and public hearings would be required before selecting sites for development of storage facilities and for repository characterization. A written consent agreement with the Governor or authorized official of the State, in addition to local and tribal governments, would be required upon a final determination of site suitability but before submission of a license application to NRC. This provision is consistent with the WGA policy resolution that no centralized interim storage facility "shall be located within the geographic boundaries of a Western state or U.S. flag island without the written consent of the governor, in whose state or territory the facility is to be located." (WGA, 2014-06)

Importantly, S.1240 does not require prior approval of the Governor (only consultation) for sites recommended by local governments or tribal governments. The authors believe consent of the Governor should be obtained as early as possible in the siting process. Neither Section 305 nor 306 explicitly consider the need for consent agreements to address the potential impacts of nuclear waste facilities on neighboring local units of government and Native American lands. Adjacent and/or nearby counties, cities, and tribes could be heavily affected by transportation, socioeconomic, and environmental impacts. The authors believe the Administrator should be explicitly required to address such impacts.

While Section 306 (a) requires the Siting Guidelines to be consistent with NWPA 112(a), there is no requirement for consistency with EPA and NRC repository rules. Sections 306 (c), (d), (e) and (f) do not explicitly require the Administrator to prepare an Environmental Impact Statement (EIS) prior to submission of a license application to NRC.

Yucca Mountain Excluded from Consent-Based Siting Process

The BRC Final Report side-stepped the future consideration of Yucca Mountain: “We have not: Rendered an opinion on the suitability of the Yucca Mountain site or on the request to withdraw the license application for Yucca Mountain. Instead, we focused on developing a sound strategy for future storage and disposal facilities and operations that we believe *can and should be implemented regardless of what happens with Yucca Mountain*” (BRC, 2012: viii).

Following the BRC approach, S.1240 mentions Yucca Mountain only in the findings section, which concludes “in 2009, the Secretary found the Yucca Mountain site to be unworkable and abandoned efforts to construct a repository.” [Sec. 101 (5)] However, three provisions would impact Yucca Mountain:

- (1) Section 506 (a) states “This Act shall not affect any proceeding or any application for any license or permit pending before the Commission on the date of enactment of this Act.” This would allow the Yucca Mountain licensing proceeding to resume, as ordered by the U.S. Court of Appeals for the District of Columbia Circuit in August 2013.
- (2) Section 301 transfers to the new Administrator all functions vested in the Secretary of Energy by the NWPAA, including the construction and operation of a repository at Yucca Mountain.
- (3) Section 306(e) requires that the NWA Administrator enter into a written consent agreement with the Governor (or other authorized official) of the potential repository host state, before submitting a repository license application to NRC. Since the Yucca Mountain license application has already been submitted, this provision would not apply to Nevada.

These three provisions of S.1240 would continue the current deadlock over Yucca Mountain. They also create uncertainty regarding the future status of the proposed Private Fuel Storage (PFS) facility, located on the Skull Valley Goshute Reservation in the State of Utah. The PFS project, which is opposed by the State of Utah, received an NRC license for construction and operation in 2006, but has not obtained other necessary federal agency approvals. (NRC, 2006) The NRC license is effective for a period of 20 years,

raising the possibility that the new Nuclear Waste Administration might seek to move PFS forward as a federal project. Opposition by the States of Nevada and/or Utah could endanger passage of S. 1240. The authors recommend that Section 306 be amended to require a consent agreement before construction of any repository or storage facility authorized under this Act or current law (the NWPA). Alternatively, a new provision could be added to Title IV prohibiting use of Nuclear Waste Fund monies for construction of any repository or storage facility without a written consent agreement as specified in Section 305 or 306.[‡] These changes would also ensure consistency with the WGA policy resolution on storage and disposal facilities.

Removal of the Nuclear Waste Program from DOE

The BRC Final Report recommended legislative action to establish a new waste management organization: “Responsibility for implementing the nation’s program for managing spent nuclear fuel and high-level radioactive wastes is currently assigned to the U.S. Department of Energy. Legislation will be needed to (1) move this responsibility to a new, independent, government-chartered corporation focused solely on carrying out that program and (2) establish the appropriate oversight mechanisms.” [1, p.viii]

S.1240 would transfer responsibility for the nuclear waste program from the DOE Office of Civilian Radioactive Waste Management (OCRWM) to a new executive-branch agency. The proposed Nuclear Waste Administration (NWA) differs from the BRC recommendation for creation of a government-chartered corporation, the management option generally favored by the nuclear industry. Title II would establish an NWA headed by an Administrator and a Deputy Administrator, both appointed to a six-year term by the President with the advice and consent of the Senate. Under the Act, additional NWA staff would be appointed by the Administrator of the new agency. In addition, an Inspector General and a five-person Oversight Board would also be appointed by the President and confirmed by the Senate.

Experience with the Yucca Mountain project strongly supports removing the nuclear waste program from DOE. Because of the way it conducted siting for the first and second repositories, the Oak Ridge MRS

[‡] The State of Nevada has also expressed concern about Section 509, which would repeal the current 70,000 MTU capacity limitation for SNF and HLW emplacements in the first repository, included in the NWPA to assure geographic equity by requiring the construction of a second repository. That amount is one-half the projected total inventory of wastes requiring deep geologic disposal, assuming no new reactor construction. Nevada has also proposed amending the defense waste commingling provisions. Section 308(e) provides that not later than 1 year after enactment, the Secretary of Energy will notify the President and Congress of whether the previous (1985) decision by the President to commingle civilian and defense wastes will be reevaluated. Defense HLW and DOE-owned SNF are expected to account for about 10 percent of the total inventory of nuclear wastes requiring deep geologic disposal. If the Secretary finds separate storage or disposal facilities are “necessary or appropriate for the efficient management of defense wastes”, the Administrator may proceed, with the concurrence of the President, to site, construct and operate one or more separate facilities for the storage or disposal of defense wastes. Nevada has recommended amendments to: (1) require congressional approval before any decision is made to construct and operate separate defense waste facilities; (2) expand the basis of the Secretary’s decision to include “cost efficiency, health and safety, regulation, transportation, public acceptability, and national security,” as specified in the section 8 of NWPA of 1982; (3) clarify that siting, construction and operation of separate facilities for defense wastes must fully comply with all other provisions of Title III regarding siting, consent agreements, and licensing by the NRC [As the current provision stands, the Administrator of the NWA does not need to comply with these key provisions in siting and licensing a defense-waste-only facility]; and (4) clarify the funding requirements for separate defense waste facilities. [Presumably construction and operation of separate defense waste facilities would require specific congressional appropriations, but there is no provision in the bill for a separate fund.]

proposal, and the mishandled Yucca Mountain project, DOE lost the confidence of potential repository host states and Indian Tribes. DOE's role in nuclear weapons production and the resulting high-level radioactive waste, its role promoting civilian nuclear power, and its track record of environmental contamination at defense nuclear facilities across the country, all continue to undermine public confidence in the Department.

The authors believe that the S.1240 provisions for transfer of functions from the DOE OCRWM to the new NWA provide a sufficient basis for implementation of the other BRC recommendations. The authors note considerable congressional skepticism about transferring the nuclear waste program to a government-chartered organization based on the Tennessee Valley Authority model. The authors also note that the advice and consent provisions of Title II would require eight Senate confirmation proceedings in the first year of operation and, because of the staggered terms and term limits, one or more Senate confirmation proceedings would be required each year for the first six years of operation. Such a large number of confirmations could provide a challenge to implementation of the Act.

The Nuclear Waste Fund

The BRC Final Report recommended legislative action to ensure access to dedicated funding: “Current federal budget rules and laws make it impossible for the nuclear waste program to have assured access to the fees being collected from nuclear utilities and ratepayers to finance the commercial share of the waste program’s expenses. We have recommended a partial remedy that should be implemented promptly by the Administration, working with the relevant congressional committees and the Congressional Budget Office. A long-term remedy requires legislation to provide access to the Nuclear Waste Fund and fees independent of the annual appropriations process but subject to rigorous independent financial and managerial oversight” (BRC, 2012: viii).

S.1240 would partially implement the BRC recommendation. Section 401 would create a new Working Capital Fund, comprised of annual utility fee payments under the existing standard contracts, which would be available to the NWA without congressional appropriations. Utility payments totaled \$765 million in 2012 and are projected to average about \$730 million (in 2012\$) per year over the next decade (2013-2022). DOE has projected that future utility fee payments would total \$27.1 billion (\$20.5 billion in 2012\$) through the year 2095 (DOE, 2013). The Working Capital Fund also would receive

congressional appropriations for defense waste expenditures and interest on the unexpended balance of this new fund.[§]

Section 402 would continue the current system under which the fees already collected and interest payments on the accrued fees would be made available to the NWA by congressional appropriation. The balance in the Waste Fund totaled about \$28.2 billion in August 2012 (2012\$). This amount, often referred to as the “corpus” of the Waste Fund, has grown significantly through interest earnings. Using the range of future interest rate estimates considered by DOE in its recent fee adequacy report, interest on the current balance would be expected to accrue at about \$1 billion or more per year (DOE, 2013). The authors believe that the new Working Capital Fund, which would not require congressional appropriations, would likely be sufficient to support all of the activities authorized under the NWPAA and the NWAA, except for construction and operation of one or more geologic repositories.**

Transportation of SNF and HLW

The BRC Final Report recommended a number of legislative and administrative actions to enhance transportation safety and security and to address public perception of transportation risks.

The BRC Executive Summary highlighted legislative action to broaden support to jurisdictions affected by transportation. “The NWPA provides funding and technical assistance for training public safety officials to states and tribes whose jurisdictions would be traversed by shipments of spent fuel to a storage or disposal facility. The Act should be amended to give the waste management organization the broader authorities given to DOE in the WIPP Land Withdrawal Act that supported the successful large-scale transport of transuranic waste to WIPP (including a public information program, support for the acquisition of equipment to respond to transportation incidents, and broad assistance for other waste-related transportation safety programs)” (BRC, 2012: viii).

The BRC Final Report specifically recommended adoption of the NAS 2006 transportation recommendations to improve safety, including “full-scale cask testing, more systematic examination of social or societal risk and risk perception, making planned shipment routes publicly available, shipping

[§] According to the BRC, cumulative defense appropriations for the waste program totaled about \$3.8 billion through FY2010, about 35 percent of total appropriations from the Fund; defense costs projected forward are estimated to total about 20 percent of life-cycle program costs.

** We estimate that siting, construction and operation of a 60,000 MTU capacity storage facility for 50 years could be about \$3.5-4.0 billion (\$2012), not including transportation costs. Our estimate is based on DOE estimates of costs derived from J. Kessler, Cost Estimate for an Away-From-Reactor Generic Interim Storage Facility (GISF) for Spent Nuclear Fuel, 1018722, Technical Update, May 2009.) DOE’s most recent total system life-cycle cost estimate for a waste program based around a repository at Yucca Mountain is about \$97 billion (2008\$), which includes about \$14.5 billion (2008\$) already spent between FY1983 and FY2007. Direct repository costs for Yucca Mountain are estimated at \$51.3 billion (2008\$) [Ref. 18, pp.B-21 to B-23]. According to DOE, repository disposal in bedded salt or an open mode shale repository could be “about half the cost of the YM repository,” while other options (crystalline rock, enclosed shale) could be up to 80 percent higher.

stranded spent fuel from shutdown reactor sites first, and executing technical assistance and funding under NHPA, Section 180(c).” [BRC, Pp.81, 150] The BRC also recommended ending “DOE’s plans to use its own self-regulating authorities under the Atomic Energy Act” by requiring full NRC and DOT regulation of future SNF and HLW shipments; “... a new waste management organization should be subject to independent regulation of its transport operations in the same way that any private enterprise performing similar functions would be – in other words, the new organization should not receive any special regulatory treatment. This will help assure regulatory clarity and transparency” (BRC, 2012: 83)

The WGA, like the BRC, endorses the 2006 NAS transportation report as providing “a comprehensive set of findings and recommendations that provide a sound basis for planning spent fuel and high-level waste shipping campaigns.” WGA, like the BRC, also endorses applying the provisions of the DOE-WGA WIPP Transportation Safety Program to future spent fuel and HLW shipments. Moreover, “[t]he Governors believe it is the responsibility of the generators of spent nuclear fuel and HLW and the federal government, not the states and tribes, to pay all costs associated with assuring safe transportation, responding effectively to accidents and emergencies that may occur, and otherwise assuring public health and safety. This includes costs associated with route evaluations and inspecting and escorting shipments” (WGA, 2014-05). Further, WGA resolves that commercial SNF should stay at reactor sites until “DOE, the U.S. Department of Transportation and the nuclear utility companies have ensured and funded adequate state and local emergency and medical responder training and resources in case of an accident or terrorist attack while shipping this waste” (WGA, 2014-06).

The authors believe that successful operation of the nuclear waste program requires full implementation of the BRC and NAS transportation recommendations. Both routine shipments and accidents create the potential for radiation exposures to workers and members of the public and heighten perceived risks in cases where actual radiation exposures are far below regulatory concern.^{††} Once regular shipments of spent nuclear fuel and high-level radioactive waste to centralized storage and/or geologic disposal begin, there would likely be about 100-150 train-load shipments and at least 100 truck shipments every year for 50 years or more, impacting an extraordinary number of people, communities, and political jurisdictions. Most of the nation’s spent fuel and high-level waste is currently stored at 76 sites in 34 states. The

^{††} Aside from a successful terrorist attack, the spent fuel transportation incident of greatest concern would be a severe accident in which a cask was engulfed in a long-duration, high temperature fire, resulting in a release of radioactive material that is dispersed in the smoke plume from the fire. On this point the NAS, the NRC, the DOE, and the State of Nevada generally agree. In the Final Supplemental EIS for Yucca Mountain, DOE estimates the probability of such an accident at 5 in one million per year, costing up to \$10 billion to cleanup in an urban area. Studies prepared for the State of Nevada concluded that accident consequences and cleanup costs could be significantly greater than the DOE estimates. The consequences of a successful terrorist attack or radiological sabotage against a spent fuel shipment could be even more severe. (Halstead & Dilger, 2011)

“representative routes” identified by DOE, from these sites to Yucca Mountain, would have traveled 22,000 miles of railways and 7,000 miles of highways, traversing 44 states, the District of Columbia, and more than 30 Indian nations. According to the 2010 Census, about 56 percent of the total US population, about 177 million people, live in the 955 counties that would have been traversed by those routes. Those routes would have affected more than 400 of the nation's congressional districts (113th Congress) (Halstead & Dilger, 2011).

S.1240 provides only partial implementation of the BRC transportation recommendations.^{##} The authors recommend that: (1) all transportation of SNF and HLW conducted under the Act should be subject to licensing and regulation by the NRC and by US DOT as provided under existing law; (2) the Administrator should be required to report to the President, within two years of enactment, on measures taken or to be taken to implement the transportation recommendations of the NAS and the BRC before the commencement of any shipments under the Act; (3) the Administrator should be required to implement by administrative rulemaking the Transportation Assistance program described in Sec. 308 (d) before the commencement of any shipments under the Act; and (4) the Act should restate Section 9 of the NWPA: “Nothing in this Act shall be construed to affect Federal, State, or local laws pertaining to the transportation of spent nuclear fuel or high-level radioactive waste.”

CONCLUSION

John Kingdon’s conceptual approach for the development of policy and the importance of policy windows provides a useful mechanism for analyzing the political environments in which Congress enacted the NWPA of 1982 and the NWPA of 1987, and for assessing the current political environment for potentially restructuring the U.S. nuclear waste program as recommended by the Blue Ribbon Commission (BRC) on America’s Nuclear Future in 2012. Kingdon’s model assesses the policy window or opportunity that can result from the merging of three process streams – the problem stream (pressing issues are identified and prioritized), the policy stream (feasible solutions are formulated and advocated by policy elites), and the political stream (changes in public opinion, interest group receptivity, and

^{##} Under Section 309, the NWA would be responsible for all transportation to storage and disposal facilities constructed under the Act. The NWA would be directed to provide financial and technical assistance to affected States and Indian tribes, including conducting “a program to provide information to the public about the transportation of nuclear waste.” [Sec. 309(d)(1)] The NWA would be required use transportation packages explicitly governed by some but not all NRC regulations. The NWA would be required to provide advance notification to affected States and Indian tribes, but is not explicitly subject to existing NRC regulations regarding notification. There is no mention of the transportation risk management measures (such as shipment of older fuel first, full-scale testing of shipping casks, cooperative identification of shipping routes, and creation of a social impact advisory committee) that the NAS and BRC recommended be implemented before commencement of large-scale shipping campaigns. S.1240 fails to address regulatory gaps, for example the exemption of DOE shipments from the NRC transportation security and safeguards regulations (10 CFR 73.37), and creates a new regulatory gap by failing to mention NRC requirements for advance notification to affected States and Indian tribes (10 CFR 71.97). Moreover, the transportation assistance provisions do not require implementation through rulemaking, a key objective of most transportation-affected state regional groups (SRGs) for the past three decades.

elected and appointed leadership). When these three streams converge, perhaps aided by a focusing event (such as a crisis or disaster), the *opportunity* for a new policy direction exists.

The postulated current policy window grows out of a problem stream 26 years in the making, the gridlock over the NWPA and Yucca Mountain resulting in a US nuclear waste program that in the words of the BRC “has been troubled for decades and has now all but completely broken down.” The current policy stream has emerged over the past two decades from ideas originating with DOE advisory groups and NAS study groups and then formulated by the BRC into a new and comprehensive approach to program management for the storage, transportation, and disposal of SNF and HLW. The political stream grows out of election results since 2006 that dramatically altered power relationships, personnel and leadership in Congress, the White House, and key federal agencies. The focusing events are the 2011 Fukushima Daiichi nuclear reactor accident in Japan, and also the precipitous reversal of the recent “nuclear renaissance” due to changing energy economics, resulting in reactor shutdowns and cancellation of new nuclear projects.

The central focus of the current policy discussion is legislation being considered by the Committee on Energy and Natural Resources of the U.S. Senate. That legislation, the Nuclear Waste Administration Act of 2013, S. 1240, would implement key recommendations of the Blue Ribbon Commission on America’s Nuclear Future and create a promising new environment for solving the nuclear waste dilemma five decades after the National Academy of Sciences first endorsed geologic disposal. At the current time, March 2014, the Committee is preparing to amend and debate the legislation introduced last June. Will the coming months provide a classic example of Kingdon’s opening of a policy window resulting in a new direction for the nation’s efforts to dispose of spent nuclear fuel and high-level radioactive waste?

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