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Yucca Mountain: A Post-Mortem

Adam J. White

Imagine the following scenario: The President of the United States delivers a speech on nuclear energy. With gasoline prices high and oil being imported from unfriendly countries, the president says that "a more abundant, affordable, and secure energy future" will be a crucial part of getting the nation out of its economic slump. "One of the best potential sources of new electrical energy supplies in the coming decades," the president notes, "is nuclear power." But there are obstacles:

> Nuclear power has become entangled in a morass of regulations that do not enhance safety but that do cause extensive licensing delays and economic uncertainty. Government has also failed in meeting its responsibility to work with industry to develop an acceptable system for commercial waste disposal, which has further hampered nuclear power development.

To alleviate these problems, which have caused utilities to shy away from nuclear power, the president issues instructions intended to remove regulatory hurdles and to "proceed swiftly toward deployment of means of storing and disposing of commercial, high-level radioactive waste."

This scenario, so familiar in its particulars, would not seem out of place in today's newspapers. But the quoted speech was actually delivered in 1981 by President Ronald Reagan. And even though some hoped the speech would mark a turning point—one trade journal celebrated the president for striving to "make a faltering nuclear industry viable and robust again"—nuclear power largely remains, more than three decades later, mired in regulatory uncertainty. While nuclear power currently accounts for about a fifth of the total electricity-generation capacity of the United States, it could satisfy a much greater portion of the national demand. And if the nation ultimately chooses to pursue an energy future that relies less on carbon, then nuclear power will be all the more important.

The promise of nuclear power is impeded by the lack of a permanent solution to the difficult problem of where to dispose of its radioactive

***Adam J. White**, a* New Atlantis *contributing editor, is a lawyer in Washington, D.C. His firm, Boyden Gray & Associates, has clients in the energy industry, including clients with nuclear assets, but the opinions here are strictly his own.*

byproducts, and moreover by the ongoing uncertainty over whether there will ever be a solution. As a 2003 M.I.T. report argues, the "perceived lack of progress towards successful waste disposal clearly stands as one of the primary obstacles to the expansion of nuclear power around the world." At least in the United States, a solution to this problem seemed to be on its way, following the decision of President Reagan and Congress to store our nuclear waste in a facility planned for Yucca Mountain in Nevada. But the Obama administration has scuttled the project without offering any specific alternative. "The termination of Yucca Mountain," noted a 2011 report from the Government Accountability Office (GAO), "essentially restarts a time-consuming and costly process [that] has already cost nearly $15 billion through 2009." By ending the Yucca Mountain repository, the Obama administration has forced nuclear power plants to continue to store spent nuclear fuel on-site, a "temporary" solution of indefinite—perhaps permanent—duration. This comes at great cost to the facilities and to taxpayers, threatening the industry's ultimate financial and political viability.

Whether one supports or opposes the project, the planned Yucca Mountain nuclear waste repository stands as a cautionary tale on the broader questions of how America develops and maintains its energy infrastructure. The saga of Yucca Mountain's creation and apparent demise, and of the seeming inability of the courts to prevent the Obama administration from unilaterally nullifying the decades-old statutory framework for Yucca, illustrates how energy infrastructure is uniquely subject to the control of the executive branch, and so to the influence of presidential politics.

The Problem of Nuclear Waste

Nuclear reactors produce power through controlled nuclear fission—the splitting of the atom. For fuel, all commercial power reactors in the United States use enriched uranium, which is weakly radioactive. As it undergoes fission, the uranium splits into a variety of much more radioactive products, including different isotopes of uranium as well as plutonium and radioactive gases. In some countries, the spent fuel is "reprocessed" so that it can be reused, a procedure that produces high-level radioactive waste. For reasons related to cost and the risk of weapons proliferation, no American commercial nuclear plants have reprocessed fuel since the 1970s, and reprocessing has been repeatedly banned and unbanned by successive administrations, but there is still high-level radioactive waste

in the United States left over from past decades and from non-commercial nuclear programs. And so the two byproducts of nuclear power generation that require long-term storage are the spent nuclear fuel and the waste resulting from reprocessing. Both are dangerously radioactive and must be stored in isolation for tens of thousands of years until most of the radioactive elements decay into stable elements.

The nation's 104 operational commercial nuclear power reactors produce between 2,000 and 2,400 metric tons of spent nuclear fuel each year. Over time, they have accumulated some 65,000 metric tons of spent fuel. That is greater than the mass of the *Titanic* when fully loaded; by one estimate, all that spent fuel would "cover one football field to a depth of approximately 20 feet." Even if no new nuclear plants were built after today, the amount of spent nuclear fuel in the United States would be expected to more than double to 140,000 metric tons by 2055.

Nearly all of this material is now stored, either in water-filled concrete pools or in dry casks, on-site at the plants that produced it (including some plants with decommissioned reactors). There are 75 such storage sites spread across 33 states, mostly in the East and Midwest. (There are fewer storage sites than reactors because some power plants have more than one reactor sharing one pool.) The eight states with the most spent nuclear fuel—Illinois, Pennsylvania, North Carolina, New York, Alabama, California, Florida, and South Carolina—have a total inventory greater than the other 25 states combined.

In addition to the spent nuclear fuel stored in civilian facilities, the federal government is directly responsible for about 2,500 metric tons of spent nuclear fuel (mostly produced at a handful of commercial sites, plus much smaller amounts from research institutions and the U.S. Navy), as well as around 90 million gallons of other high-level radioactive waste.

These commercial and government storage facilities are designed to withstand most natural disasters, though not all disasters can be anticipated and hardened against. And although nuclear plants are guarded, a federal appeals court held in 2006 that the threat of terrorist attacks was sufficiently plausible to require regulators to consider the environmental impact of such events when licensing a new temporary storage site.

The question of what to do with the dangerous byproducts of nuclear power generation was recognized from the early years of civilian nuclear power. The Atomic Energy Commission (AEC), successor to the wartime Manhattan Project, grappled with decisions about how much exposure to radiation is too much, and how the nation should go about disposing of the new nuclear industry's spent fuel and waste. Some critics argued that

the AEC was subordinating security concerns to the growth of nuclear power—the pursuit of "electrical energy too cheap to meter," as AEC Chairman Lewis Strauss famously put it in a 1954 speech. For instance, the renowned Shell Oil geologist M. King Hubbert chastised the AEC in 1960 for being "peculiarly reluctant to face up to the fact that disposal sites for the existing plants must soon be chosen."

As historian J. Samuel Walker recounts in *The Road to Yucca Mountain* (2009), in the 1960s the AEC began considering a plan to store nuclear waste at a site in central Kansas. But Kansans balked at the "somewhat debatable honor of becoming an atomic garbage dump," as one newspaper put it. When President Gerald Ford signed the Energy Reorganization Act of 1974, terminating the AEC and creating the Nuclear Regulatory Commission (NRC), the waste disposal issue had officially outlived the AEC itself.

After the 1979 incident at Three Mile Island spooked the nation and galvanized the anti-nuclear movement, the demoralized nuclear industry hoped the 1980 election of Ronald Reagan would offer a path forward. During his first year in office, as mentioned above, President Reagan instructed Secretary of Energy James Edwards to proceed swiftly toward development of the means for storing and disposing of commercial radioactive waste. It was by then a familiar mantra—a call for further study of a subject that had been studied for decades—and skepticism would have been warranted had the proposal remained strictly a matter of bureaucratic introspection. But just a year later, Congress joined President Reagan in committing to a framework for finally deciding where to store the nation's spent nuclear fuel.

The Nuclear Waste Policy Act of 1982 (NWPA) devised a series of steps that would culminate with the establishment of two national nuclear disposal sites by 1999. First, the Department of Energy (DOE) would study five possible sites and recommend three to the president. The president would then select one of those sites and inform Congress, and the DOE would apply for NRC approval of the specific storage facility to be built at that site, with a decision to be issued in 1990. A second site would be selected, reviewed, and constructed by the same process a short time later. The government would collect fees from the nuclear energy industry to pay for the facility. Finally, the DOE would take possession of spent fuel and waste before 1999.

The NWPA-prescribed process began according to plan, with the DOE studying sites in Mississippi, Nevada, Texas, Utah, and Washington. In 1986, Secretary of Energy John Herrington recommended three sites:

Yucca Mountain, Nevada; Deaf Smith County, Texas; and Hanford Engineer Works, Washington. The selections ignited a predictable firestorm among local groups, and Herrington's further announcement that DOE would select only one site, rather than two—ostensibly owing to lack of need—exacerbated the controversy, leading Congress to stop funding the site-analysis process.

The impasse was broken not by spreading the burdens of nuclear waste among more sites, but rather by further focusing the burden on one and only one site: Yucca Mountain. In the Nuclear Waste Policy Act Amendments of 1987, Congress and the president instructed the Department of Energy to stop analyzing the Texas and Washington sites, and instead to focus exclusively on Yucca Mountain. Senator J. Bennett Johnston (D.–La.), chairman of the Senate Energy and Natural Resources Committee, boasted, "I think it's fair to say we've solved the nuclear waste problem with this legislation." But as Walker notes in *The Road to Yucca Mountain*, others on Capitol Hill were less sanguine. "It's a roll of the dice with Yucca Mountain," an anonymous congressional staffer observed. "We have reason to believe it will work out, but if it doesn't…man, we're in trouble."

The Science of Yucca Mountain

Before continuing with this account of the policy, political, and legal history of the Yucca Mountain project, it is worth examining the justification for storing nuclear waste underground and in particular at Yucca Mountain, as well as the arguments against both.

Today there is a broad consensus among scientists from around the world on the best available option for permanent disposal of spent nuclear fuel and high-level radioactive waste. "Among technical experts," noted a 2003 paper by the International Atomic Energy Agency (IAEA), "the generally accepted method for disposing of radioactive waste is to contain the waste and isolate it from the environment generally accessible to humans." Such isolation "is considered to be best achieved through its emplacement at significant depths underground, that is, by 'geological disposal.'"

The IAEA paper echoed a 2001 report of the National Research Council, which said, "After four decades of study, geological disposal remains the only scientifically and technically credible long-term solution available to meet the need for safety without reliance on active management." The report conceded that there are still uncertainties

associated with geological disposal, since "providing convincing evidence that any repository assures long-term safety is a continuing technical challenge." But it noted that "our present civilization designs, builds, and lives with technological facilities of much greater complexity and higher hazard potential." Thus, the "biggest challenges to waste disposition" are not technical but "societal"—that is, cultural and political.

Even if society is willing to proceed with projects that present residual uncertainty, the risk of low-probability but high-impact catastrophe should not be ignored. But by the same token, Yucca Mountain's proponents have marshaled mountains of evidence demonstrating the project's relative safety. "After over 20 years of research and billions of dollars of carefully planned and reviewed scientific field work," Energy Secretary Spencer Abraham reported in his official 2002 recommendation of the Yucca Mountain project, "the Department has found that a repository at Yucca Mountain brings together the location, natural barriers, and design elements most likely to protect the health and safety of the public, including those Americans living in the immediate vicinity, now and long into the future." The department laid out its analysis in a voluminous Final Environmental Impact Statement, published in February 2002 and supplemented in 2008 with an analysis of the risks posed by transporting waste to the Yucca repository, concluding that the disposal facility would not "result in impacts to public health beyond those that could result from the prescribed radiation exposure and activity concentration limits in [federal laws] during the 10,000-year period after closure."

The DOE's analysis had its critics, however, several of whom contributed to *Uncertainty Underground* (2006), a collection of technical critiques co-edited by Allison Macfarlane (later appointed by President Obama to chair the NRC) and Rodney Ewing. As Macfarlane summarized in her concluding essay, the DOE's analysis was undermined by the sheer uncertainty inherent in a project of such complexity and duration—the "variety of factors that make it difficult to predict repository behavior over geologic time," including climate, volcanism, and "the environmental and chemical conditions of the repository environment as it evolves over time, especially the chemistry of the water that will exist in the repository." Macfarlane's preferred alternative, in the end, was to continue to store spent nuclear fuel and waste on-site at the reactors, decrying the "false sense of urgency [that] surrounds nuclear waste disposal in the United States."

Macfarlane and other critics' appeal to prudence and skepticism is not unreasonable, at least in theory. But in practice, there remains a substantial question of whether long-term nuclear waste disposal must remain in

limbo until regulators successfully prove a negative. As Harvard's Cass Sunstein, a scholar of risk and regulation and until recently President Obama's Administrator of the Office of Information and Regulatory Affairs, explained in a 2002 essay, the demand for absolute certainty, taken to extremes, ultimately transforms the Precautionary Principle into the "Paralyzing Principle," for "any effort to be universally precautionary will be paralyzing, forbidding every imaginable step, including no step at all."

Decades of Inaction

Scientific findings were supposed to determine the outcome of the Yucca Mountain debate—at least that was the intention of the 1987 NWPA amendments: to end the political war over *where* to store spent nuclear fuel and move on to a purely technocratic consideration of precisely *how* to store it, to be settled in short order. But the amendments disappointed on both counts. The political debate over Yucca Mountain only intensified, and the technical questions over design specifications for the proposed facility dragged on for decades.

On the latter point, the process that followed the 1987 amendments bore little resemblance to the process prescribed by the original statute of the NWPA. By the terms of the Nuclear Waste Policy Act, the Energy Secretary was to submit the formal project application to the NRC in time for a decision in 1990. But the DOE came nowhere close to meeting that deadline. Slowed by years of litigation, bureaucratic inertia, and political controversy, the DOE waited fifteen years from the amendments before Energy Secretary Spencer Abraham finally submitted to the president a formal recommendation that Yucca Mountain house the nuclear storage facility. President George W. Bush immediately approved Abraham's plan for the site.

The state of Nevada formally objected to the decision, as was its right under the NWPA, but Congress swiftly overrode the veto by a bicameral vote pursuant to its own statutory right. Finally, in June 2008, the DOE filed its official 8,600-page project application to the NRC. By that time, the application was already a decade behind schedule. Meanwhile, the federal government's failure to take possession of nuclear waste accumulating at commercial nuclear plants gave rise to myriad breach-of-contract claims, since the government had been obligated to provide the storage facility to energy companies. The government's eventual total liability was estimated to be as great as $50 billion, according to the Congressional Research Service.

These delays were largely a symptom of the more fundamental problem. By settling upon Yucca Mountain as the sole site for consideration of a nuclear waste repository, President Reagan and the 100th Congress may have alleviated the concerns of local communities in Washington and Texas, but only at the cost of the concerns of Nevadans, along with various anti-nuclear groups. The 1987 NWPA amendments effectively left only two venues for opposition to the Yucca Mountain site selection: the regulatory proceedings before the Department of Energy and, ultimately, the Nuclear Regulatory Commission.

Yucca Mountain aroused the ire of one important Nevadan in particular. Harry Reid, a Democrat elected to the Senate one year before the law was passed, complained that Nevada, "the small kid on the block," was being bullied with "an act of naked and unprovoked aggression by the people of several states against a state which is smaller and has less power." While Nevada's senior Senator Paul Laxalt had muted his criticism of the Yucca Mountain plan out of deference to President Reagan, his close friend and fellow Republican, the newly elected Senator Reid felt no such reluctance and promptly joined those who dubbed the 1987 amendments the "Screw Nevada Bill."

While Senator Reid was initially pessimistic about Nevada's prospects for blocking the project, he succeeded in delaying it years beyond the statutory timeline. And as his power grew in the Senate, so did his ability to block the project. In March 2003, Reid (then Senate Minority Whip) and Senate Minority Leader Tom Daschle (D.–S.D.) formally requested that President Bush appoint Reid's staffer Gregory Jaczko to one of the NRC's Democratic seats. The White House unsurprisingly rebuffed the suggestion of putting a clear Yucca opponent on the NRC, but Reid was undeterred, and held hostage President Bush's executive branch nominations until the White House acquiesced to Jaczko's nomination. President Bush seated him by a recess appointment and he was ultimately confirmed by the Senate in 2006 and again in 2008.

Significant though it was, the Jaczko appointment was overshadowed by the election that year of Barack Obama. Throughout his campaign, he had been an outspoken opponent of the Yucca Mountain project, echoing the Democratic Party's broader skepticism of nuclear power and acknowledging the electoral importance of the state of Nevada. In 2007, just months after announcing his candidacy, then-Senator Obama wrote a letter to the *Las Vegas Review-Journal* disputing criticism that he was insufficiently opposed to the Yucca project. "I want every Nevadan to know that I have always opposed using Yucca Mountain as a nuclear waste

repository," he wrote. "I believe all spending on Yucca Mountain should be redirected to other uses." While paying lip service to an approach "based on sound science above all else," he had seemingly decided on his own that the Yucca project must end. Later, during the heat of the Democratic primary, Obama added, "You've got the [Hillary] Clinton camp out there saying, 'He's for Yucca.' What part of 'I'm not for Yucca' do you not understand?"

The Rogue Regulator

Once inaugurated, President Obama quickly set his administration into action, employing both of the two powerful levers that the NWPA had given the executive branch: the Department of Energy and the Nuclear Regulatory Commission. The administration used both fiscal starvation and regulations to shut down the Yucca Mountain project. Most prominently, President Obama promoted Commissioner Jaczko to the status of NRC chairman in May 2009, placing a firm anti-Yucca hand on the wheel. It is worth lingering in some detail on the administration's actions because they constitute a stunning record of overreach, with Jaczko standing out for abusing his position.

In November 2009, documents leaked to the press revealed an imminent administration plan to withdraw the DOE's Yucca Mountain application to the NRC. At the same time, the administration would dramatically reduce its budget request for Yucca Mountain activities, eliminating all funding for activities other than winding down the project. A leaked DOE memorandum noted that "all license defense activities will be terminated in December 2009." This strategy was so aggressive that even some Nevada officials who opposed the Yucca repository suggested that the cutoff date was a typographical error.

But in January 2010, President Obama issued a Presidential Memorandum ordering Energy Secretary Steven Chu to convene a Blue Ribbon Commission on America's Nuclear Future, which would review "all alternatives for the storage, processing, and disposal of" nuclear waste. The memorandum, which made no mention of the Yucca project, tacitly signaled its demise and the further delay by untold years of a permanent nuclear-waste solution. (As Obama had joked while campaigning for president, commissions are "Washington-speak for 'we'll get back to you later.'")

More importantly, the president's decision raised significant legal problems. First, the 1987 NWPA amendments directed the Department

of Energy to pursue the Yucca Mountain project and *only* the Yucca Mountain project. And because the Nuclear Regulatory Commission had accepted the DOE's application as complete in 2008, the law required the commission to complete its review and issue a decision by 2011. As the U.S. Court of Appeals had explained in 2002, the NWPA amendments "affirmatively and finally approved the Yucca site for a repository, thus bringing the site-selection process to a conclusion."

Nevertheless, at a public ceremony on the day that the president issued his memorandum, Carol Browner, the White House energy and climate "czar," stressed that "as the president has said many times, we're done with Yucca and we need to be about looking for alternatives." According to *National Journal*, "when asked why the administration has taken Yucca out of consideration, Browner said it was the president's choice and they were carrying out his decision."

Weeks later, in March 2010, the Department of Energy filed a motion with the Nuclear Regulatory Commission to withdraw its application for the Yucca repository. It was a remarkable document—for the department did not merely seek to end the proceedings conducted thus far, but went even further, clarifying that it wanted the NRC to dismiss the application "with prejudice." The words "with prejudice," peppered throughout the motion, were of great legal significance: the department was effectively asking the NRC to *permanently prohibit* any future DOE officials, under future presidential administrations, from submitting a new Yucca Mountain application. As the department explained in a fine-print footnote, "DOE seeks this form of dismissal because it does not intend ever to refile an application to construct a permanent geologic repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain." The upshot was that, in spite of President Obama's professed commitment to letting science drive the nation's nuclear waste policy, his administration was attempting to end the Yucca project *irrevocably*, regardless of any present or future scientific findings supporting it.

The project's proponents, including states and local communities affected by the federal government's refusal to accept nuclear waste, responded on two fronts: they filed papers with the NRC opposing the motion, and they filed federal lawsuits challenging it (which we will return to in a moment). The licensing board of the NRC sided with them, rejecting in June 2010 the Department of Energy's motion to withdraw the Yucca application on the grounds that the department lacked the discretion to do so:

> Why would Congress have specified in detail the steps that the [Energy] Secretary, the President, the State of Nevada, and even Congress itself had to take to permit the Yucca Mountain application to be filed, and included provisions mandating that the Application be filed with and considered by the NRC, if DOE could simply withdraw it at a later time or in the same breath if the Secretary so desired?

The NRC staff, bent on terminating Yucca, did not wait for the Department of Energy to appeal the board's decision to the NRC commissioners: the very day after the decision, the NRC's Secretary issued an order inviting the parties to file an appeal to the full commission, which they soon did. But that was where the NRC's speediness ended: the process promptly ground to a halt. Chairman Jaczko stalled the commission's decision by withholding his own vote for more than two months, offering a variety of dubious and inconsistent reasons to explain his inaction. (As an inspector general's report later noted, Jaczko's refusal to cast a vote was an unusual violation of the NRC's standard operating procedure.) And even after Jaczko finally cast a preliminary vote, the NRC did not proceed to an official public vote—for reasons that are unclear—and the matter remained in limbo for ten more months.

But these procedural tactics were only half the story. On September 30, 2010, as the federal government's annual fiscal cycle came to a close without agreement on a new budget, Congress passed the first of a series of "continuing resolutions" directing government agencies to keep spending money at the same levels as the last fiscal year—including, in the case of the NRC, spending on Yucca. Yet on October 4, 2010, Chairman Jaczko unilaterally ordered the NRC staff to commence the orderly closure of the Yucca Mountain review proceedings, and to cease ongoing work on a multi-volume safety evaluation report.

To recap: Under the NWPA and the continuing resolution, the NRC was required by law to continue work on Yucca Mountain unless and until the Department of Energy succeeded in withdrawing its 2002 application. But Chairman Jaczko was stalling the vote on whether to accept the DOE's withdrawal, and he meanwhile ordered work on Yucca to wrap up. Without having formally voted on whether the Yucca Mountain application would be withdrawn, he effectively terminated the application. Thirty years after the president and Congress passed the Nuclear Waste Policy Act, and nearly twenty-five years after they amended the act to settle upon Yucca Mountain, Jaczko appeared to have single-handedly killed the project.

Eventually, on October 29, 2010, Jaczko did cast the vote that he had long withheld, but that did not settle the matter of the DOE's application, since his vote meant the commission was deadlocked 2-2. (A fifth commissioner had recused himself because of previous involvement in Yucca issues.) And so the fate of the Yucca project formally remained in limbo, even as the law required it to continue and the NRC staff continued to dismantle it.

Nearly another year passed before this bizarre stalemate was resolved. In September 2011, the NRC finally reached a resolution—of a sort. A very short two-page order from the commission noted that it "finds itself evenly divided" on whether to end the Yucca project as the Obama administration wanted. But, the order continued, "we exercise our inherent supervisory authority" to order the NRC licensing board to completely dispose of the Yucca case "by the close of the current fiscal year." In other words, the NRC was ordering its staff to wind down the Yucca project in the next three weeks.

No Relief in the Courts

Even as the Obama administration was using both the DOE and the NRC to shut down Yucca Mountain, it had made noises about pursuing alternative disposal strategies, most notably through the establishment of the Blue Ribbon Commission in 2010. But when the commission issued its final report in January 2012, it declined even to suggest alternative disposal sites. Instead, the report laid out a general "strategy" for the establishment of "a truly integrated national nuclear waste management system," much of which would include substantial legislative reform. And its recommendation that local communities be given veto authority over proposed disposal sites effectively dispelled any suggestion that the report was intended to constitute a serious effort. If the Obama administration was wiping out decades of progress toward developing Yucca, the Blue Ribbon Commission was effectively conceding that no other permanent national nuclear-waste storage facility would ever be built anywhere else.

Meanwhile, the Obama administration's actions on Yucca triggered an avalanche of lawsuits, resulting in a series of recent decisions from the federal courts of appeals that were harshly critical of the administration.

First, in May 2012, the U.S. Court of Appeals for the Federal Circuit affirmed a lower court's decision that nuclear utilities were entitled to nearly $160 million in damages for the government's failure to accept their spent nuclear fuel and nuclear waste under the NWPA. This was

but the latest decision in a course of litigation that had already cost the government $2 billion and was estimated to cost much more. Then in June 2012, the U.S. Court of Appeals for the D.C. Circuit held that the Department of Energy had violated the NWPA by failing to consider whether to adjust the fees nuclear facilities paid to the DOE in light of the fact that the government would no longer be providing a waste repository. The court declared DOE's actions "legally defective" and ordered the secretary to respond within six months as to the agency's plan of action going forward. Finally, just a week later, the same court issued another decision holding that the NRC's environmental review of proposed rules for the temporary storage of nuclear waste and spent nuclear fuel was legally insufficient without a full consideration of the consequences of the absence of a long-term government storage facility.

Each of these decisions highlighted the consequences of the government's failure to complete the Yucca Mountain project, but none offered the project's proponents any prospects for reversing the administration's actions. Such a case was brought—twice—but the D.C. Circuit's treatment of the case illustrated the inability or unwillingness of the courts to force the administration to comply with the NWPA.

In the first case, the D.C. Circuit's opinion recognized the substantial possibility that the Department of Energy had violated the NWPA by ceasing to proceed with the Yucca application. Nevertheless, the court held that the suit was technically premature, because there remained a possibility—at least in July 2011, when the case was decided—that the NRC commissioners would reject the DOE's motion to withdraw. The court left open the door that a new suit could be filed even without an NRC decision, if the NRC subsequently failed to satisfy the NWPA's three-year deadline for issuing final approval or disapproval of Yucca Mountain. When that deadline did indeed pass in September 2011, a new suit was filed in the D.C. Circuit, this time against only the NRC, challenging its failure to comply with the deadline.

At oral argument, the judges grappled with constitutional questions of separation of power. Speaking to the petitioners, Judge Brett Kavanaugh conceded, "it is difficult for a Court to force the Executive Branch to take affirmative acts, as opposed to prohibiting the Executive Branch from doing forbidden acts, and that's what you're asking in this case." The day after oral argument, the court took the extraordinary step of inviting the Justice Department to file a brief, on behalf of the White House and the DOE, explaining the Obama administration's position on the case. The Justice Department said that its absence from the case owed only to

the petitioners' failing to sue the DOE in addition to the NRC, and that the Obama administration believed that the lawsuit should be dismissed because the NRC lacked funding specified by Congress to proceed with the Yucca Mountain review. (In a status report filed with the court in October 2012, the NRC argued that the upcoming lame-duck session, in which "Congress will be faced with the proposed 'sequestration' cuts, which are scheduled to take effect on January 1, 2013," might result in Congress and President Obama cutting Yucca Mountain funding as part of the final deal.)

The administration's argument ultimately persuaded the court. In August 2012, a two-judge majority suspended the case pending knowledge of whether the federal government's budget for the 2013 fiscal year would appropriate money to the NRC for Yucca Mountain's review. The third judge, A. Raymond Randolph, dissented, arguing that the NRC's clear violation of the NWPA entitled the petitioners to an immediate decision, and that whether a decision "should issue when an agency is willfully defying an earlier Congress's command has never depended on the possibility that a later Congress might do something to excuse the violation." He added that "the Nuclear Regulatory Commission has disregarded a clear statutory mandate, citing a lack of funding, when in fact it has sufficient funds to move forward."

While the Yucca Mountain proceedings were pending in court, the man most responsible for the current predicament was forced to resign from the Nuclear Regulatory Commission. Gregory Jaczko's handling of Yucca Mountain not only outraged the project's proponents, it led to congressional hearings and harsh criticism from the NRC's inspector general. Meanwhile, his professional and interpersonal dealings with his fellow commissioners (and the NRC staff) led to so much bitterness and frustration that all four of them took the unprecedented step of going over his head to lodge a formal complaint with the White House. While Jaczko initially rebuffed calls for his resignation, he ultimately announced it in May 2012.

But Jaczko's ouster did nothing to improve Yucca Mountain's prospects, as the administration promptly replaced him with Allison Macfarlane. As mentioned above, Macfarlane is a geologist with a long record of opposition to Yucca, including co-editing the manifestly anti-Yucca book *Uncertainty Underground*. In a 2009 interview with *Technology Review*, presciently titled "Life after Yucca Mountain," Macfarlane endorsed the verdict that Yucca Mountain is "off the table," arguing that "there are lots" of alternative locations "all over the country." When

pressed by her interviewer to "name two or three," she replied, "I haven't studied anything in detail, and I don't want to get anybody upset. But we have a huge country, and there are many locations." When the White House tapped Macfarlane in 2012 to chair the NRC, it was clearly with the aim of continuing the dismantling of Yucca that her predecessor had begun.

Energy and the Executive

In the end, the Obama administration succeeded, by a combination of legal authority and bureaucratic will, in blocking Congress's plan for the Yucca Mountain repository—certainly for the foreseeable future, and perhaps permanently. A future president could theoretically pursue the project again, but that would require restarting an immense regulatory machine that had been mothballed for years. Even under the best of circumstances, that is a long-shot scenario unlikely to comfort those looking to invest in existing or new nuclear generation capacity.

Considering the full scope and history over the last few years of the actions of the Nuclear Regulatory Commission and the Department of Energy regarding Yucca Mountain, it is increasingly clear that Judge Kavanaugh fundamentally misdiagnosed the situation when he wrote, in a concurring opinion, that "the President does not have the final word in the Executive Branch about whether to terminate the Yucca Mountain project." In fact, the president's NRC chairman, Secretary of Energy, and other appointees have effectively ground the project to a halt—achieving just what President Obama promised to do.

In response to the Yucca Mountain regulatory meltdown, Senator Jeff Bingaman (D.–N.M.) proposed new legislation, the Nuclear Waste Administration Act, to amend the NWPA. The act would create a new agency, the Nuclear Waste Administration, that would plan a permanent facility for the storage of spent nuclear fuel and waste, as well as an interagency Nuclear Waste Oversight Board. The head of the Nuclear Waste Administration would replace the Energy Secretary in the NWPA process, but he would be appointed by the president, with the Senate's advice and consent—just like the NRC Chairman and the Secretary of Energy. And the new law would set deadlines for action, just like the NWPA.

In short, the proposal does not address the fundamental problem: not too little presidential discretion, as Judge Kavanaugh had diagnosed, but too much. Twenty-five years after Congress and President Reagan determined that Yucca Mountain would be the site of the nation's nuclear

waste repository, we have no comprehensive storage and disposal capacity, and no clear path going forward. We have only regulatory uncertainty.

"Uncertainty" has become a common concern in politics today, with both Republicans and Democrats decrying it—and each other—as the cause of slow economic growth. But in the case of energy infrastructure, regulatory uncertainty poses a particularly potent threat: A complex regulatory environment imposes great risk upon a project, and that risk is multiplied when the regulators are seen as acting arbitrarily, capriciously, contrary to evidence or law, or without transparency. And that regulatory uncertainty is in turn only exacerbated when tremendous power is vested in a single official—in the case of Yucca, the chairman of the Nuclear Regulatory Commission.

The problem is not limited to nuclear energy infrastructure. In 2010, after the Deepwater Horizon oil spill, the Obama administration attempted to impose a full moratorium on deep-water oil drilling. When the federal courts intervened, nullifying the moratorium for failing to satisfy the requirements of administrative law, the administration responded by simply refusing to process drilling-permit applications. According to administration documents obtained by the House Oversight Committee, the official moratorium and unofficial "permitorium," as it came to be called, prevented the drilling of a hundred new wells by December 2010.

A more recent example of the harm imposed by regulatory uncertainty is the Obama administration's handling of the proposed Keystone XL pipeline, which would import oil from Canada. After a three-year review, the State Department concluded in August 2011 that the project "would comply with all applicable laws and regulations," and that it would cause "no significant impacts to" local environmental resources. Nevertheless, President Obama, sensitive to environmentalists' heated criticism of the project, first withheld the final permit, and then denied it outright, and he has offered little indication of how he will treat the revised application for a permit to build the pipeline into the United States. This uncertainty imposes great costs upon the project. A pipeline official explained in a statement to a federal court that the delays "not only affect TransCanada's investment in the Keystone XL, but also result in diminishing the value of the entire Keystone pipeline system."

In each of these cases, the ultimate question is whether the government can create a transparent framework for the evaluation of energy infrastructure proposals. If projects cannot rely on the government to make good on its legislative and regulatory commitments, then few companies—if any at all—will devote the capital and other resources

that complicated energy infrastructure projects require. This reliability and commitment requires both a Congress willing to legislate substantive energy policy and a president willing to put those policies into effect.

Our nation is capable of great things. But our energy infrastructure is bedeviled by issues of regulatory policy and constitutional law, making it difficult to reach lasting decisions—let alone wise ones—on some matters of great consequence. The Yucca Mountain project is, by all appearances, dead. It might someday be resurrected, but we can't count on miracles. If we are ever to settle on a long-term solution to the decidedly long-term problem of storing nuclear waste, it will require either a political consensus we have no reason to expect or a new sturdy process that prevents any branch or agency of government from unilaterally bringing the project to an end.