Moving Forward with Consent-Based Siting for Nuclear Waste Facilities

Recommendations of the BPC Nuclear Waste Council

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Introduction

For decades, the United States has been grappling with the problem of what to do with the tens of thousands of tons of spent nuclear fuel and high-level radioactive waste generated by the nation's commercial nuclear power industry and defense programs. Despite many efforts by the executive branch, Congress, industry, citizen groups and others—and despite the expenditure of billions of dollars, the United States still has no workable, long-term plan for permanently disposing of these wastes. Meanwhile, the federal government's financial liability for failing to meet its contractual obligation to accept spent fuel from the nation's commercial nuclear power reactors—a liability that is already in the billions of dollars—increases with every year of continued paralysis and delay.

Launched by the Bipartisan Policy Center in 2014, the Nuclear Waste Council seeks to expand national and regional conversations on nuclear waste and to develop policy options that ultimately could lead to an implementable nuclear waste strategy. In the first phase of its work, the council convened five regional meetings across the United States. Each meeting included a private discussion among key stakeholders, chosen for their broad representation and varying perspectives on the nuclear waste issue, and a public event that provided an opportunity to hear local and regional concerns. The objective of these meetings was to identify barriers to solving the nuclear waste problem and explore options for overcoming these barriers.[1] Each meeting also provided an opportunity to focus on specific topics of

particular interest to local groups and the host region (for example, stranded spent fuel in California and New England; the management of defense waste in the Southeast and Northwest; and waste transportation issues in the Midwest).

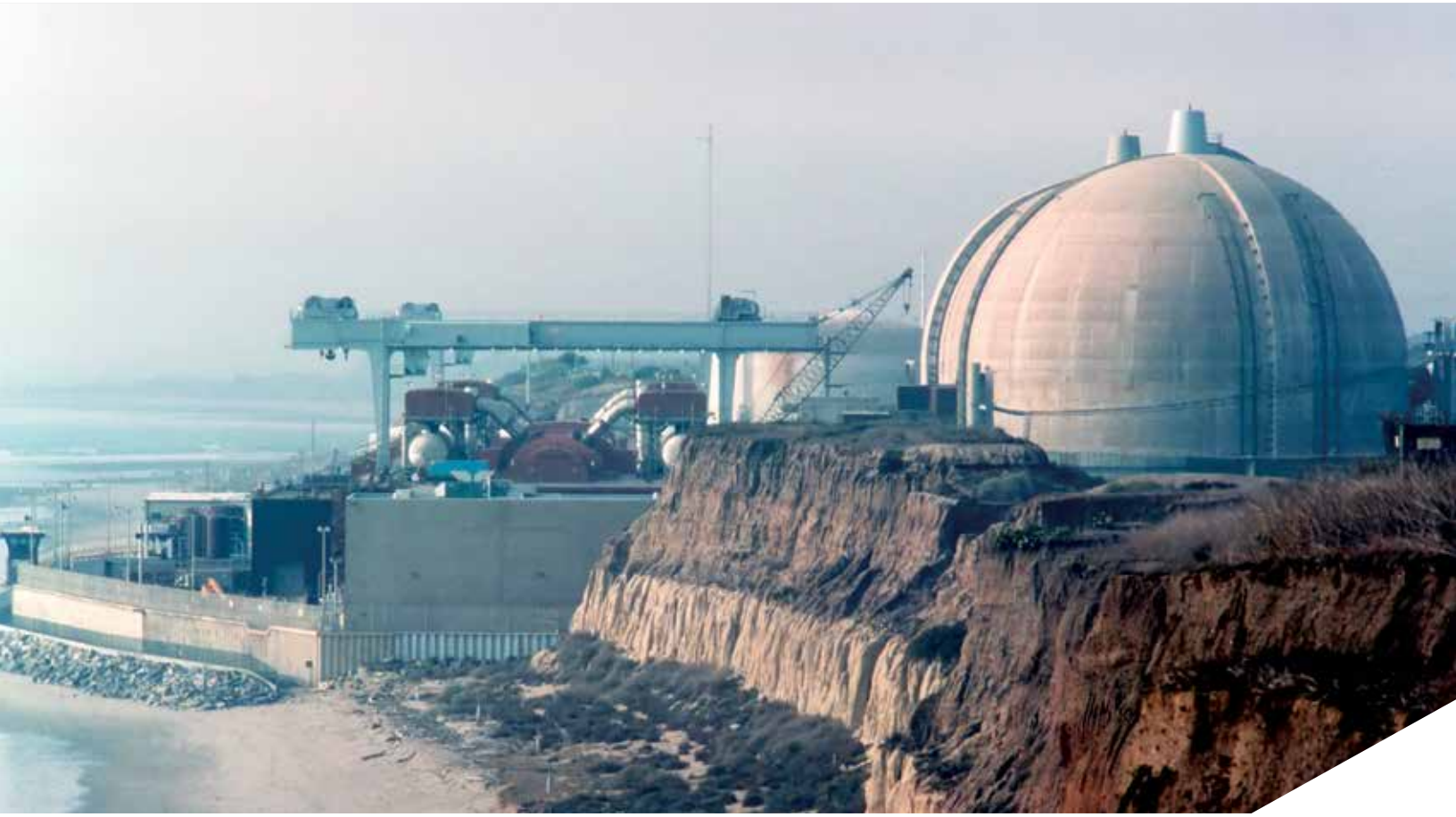
This report is the culmination of the second phase of the council's activities. It provides an update on recent developments in the nuclear waste policy arena, including relevant legislative proposals, court decisions, and current federal efforts to launch a new consent-based siting process. This report also summarizes insights from experience with other hard-to-site facilities; results from a survey, conducted by BPC, that was designed to solicit the views of state officials on a range of issues related to siting nuclear waste facilities; and input from a regional stakeholder meeting with members of communities that are considering hosting new private nuclear waste management facilities. The report concludes with recommendations intended to help advance a new approach to siting nuclear waste facilities and spur renewed efforts by all parties to find durable solutions for managing and safely disposing of these materials.

It is important to note at the outset that the council did not debate and has not taken a position or developed a recommendation on whether or how to proceed with efforts to license a geologic nuclear waste repository at Yucca Mountain. Some members of the council take the position that the Yucca Mountain licensing process should go forward, even though it is not consent-based. Other members have reached the same conclusion as the Obama administration: that the Yucca Mountain site and licensing process are unworkable and that a new strategy is needed to identify and develop a permanent geologic repository for spent nuclear fuel and high-level radioactive waste.

As a group, the council concurs with the Blue Ribbon Commission on America's Nuclear Future that a fundamental overhaul of the U.S. nuclear waste management program is required and that a different approach should be taken to site future waste management facilities, regardless of the fate of Yucca Mountain. The nation's existing inventory of spent nuclear fuel and high-level radioactive waste already exceeds the quantity that could be disposed of at Yucca Mountain under current statutory limits. And other critical elements of a robust, integrated waste management system—including facilities for the consolidated storage and transport of these materials—will face similar siting challenges in any case. Most importantly, no resolution of the Yucca Mountain controversy will erase the record of management failures and the loss of trust that have brought the nuclear waste program to its current state.

For all of these reasons, we believe a new path forward is needed. This will not be possible without congressional action on legislation that changes the current regulatory and statutory framework for managing and disposing of nuclear waste in the United States.

Background and Context



The history of the U.S. nuclear waste management program is a long and troubled one.[2] Congress first attempted to define a path for the long-term disposition of nuclear waste more than a generation ago, with the passage of the Nuclear Waste Policy Act of 1982. Thirty years later, for various reasons, the path forward is uncertain. Despite a robust scientific consensus that disposal in a deep geologic repository is the best practical option for isolating spent nuclear fuel and high-level radioactive waste over very long timescales, and despite broad agreement that future generations should not be burdened with the task of cleaning up these wastes, prospects for successfully constructing and opening a geologic disposal repository in the United States appear no better than they were decades ago.

Today, utilities are storing approximately 72,000 tons of spent nuclear fuel from the operation of commercial nuclear power plants at over 100 reactors across the nation. Roughly two-thirds of this spent fuel is being held in concrete pools, submerged in water. The remainder, roughly one-third of the inventory, has been moved to dry storage—typically in large casks or canisters—on site.[3] Continued operation of the current fleet of reactors is expected to generate an additional 70,000 metric tons of spent fuel for a total of approximately 140,000 metric tons. (By contrast, the quantity of waste that may be stored at the first deep geological repository is limited by statute to 70,000 metric tons.) The construction and operation of new nuclear power plants will generate more nuclear waste.

In addition, the U.S. Department of Energy (DOE) manages roughly 90 million gallons of high-level radioactive waste in the form of liquids, sludges, and solids generated by defense nuclear activities. Most of this material is being stored at former DOE nuclear weapons sites, including the Hanford Site and the Savannah River Site (in Washington State and South Carolina, respectively), at Idaho National Laboratory in Idaho, and at the West Valley Demonstration Project site in New York State.[4] DOE is in the process of vitrifying some of this waste into glass form as part of cleanup activities underway at several of its former weapons sites.

Pursuant to the 1982 Nuclear Waste Policy Act, DOE entered into contracts with nuclear utilities that obligated the federal government to begin removing spent fuel from commercial reactor sites in 1998. The same legislation also established a funding mechanism, in the form of the Nuclear Waste Fund, which is supported by a small fee on each kilowatt-hour of nuclear-generated electricity, to pay for the federal government's management of commercial spent fuel. This arrangement has all but broken down as progress toward licensing a permanent geologic repository has stalled. Utilities have begun suing the federal government to recover costs associated with storing spent fuel at reactor sites long past the time when DOE was supposed to have begun removing this material, and the courts have ordered that further collection of Nuclear Waste Fund fees be suspended in light of the current lack of progress in the federal government's waste management program.

Two events in particular stand out as important turning points in the contentious record of U.S. waste management efforts to date. The first was the initial decision by Congress, in the Nuclear Waste Policy Act Amendments of 1987, to designate Yucca Mountain in Nevada as the only site to be considered for the nation's first permanent disposal repository. This decision itself was prompted by the difficulties and political opposition encountered in early efforts, under the original 1982 legislation, to identify two potential repository sites.[5] The years of protracted political, legal and regulatory contention that followed (see text box on p.17) led to a second highly consequential development: the Obama administration's decision, in 2010, to stop work on the Yucca Mountain repository, based on a judgment that the project was "unworkable" in light of the ongoing and strongly held opposition of Nevada's citizens and top elected officials. In 2012, the Blue Ribbon Commission on America's Nuclear Future (hereafter the Blue Ribbon Commission), formed at the direction of President Obama to undertake a wholesale re-examination of the nuclear waste issue, delivered a comprehensive set of recommendations for redirecting and reinvigorating the federal government's waste management program, but these recommendations have yet to translate into significant legislative action.[6]

In the four years since the Blue Ribbon Commission issued its report, no decisive step has been taken, either toward resolving the impasse over Yucca Mountain or to chart a new path forward that does not include trying to restart the abandoned Yucca Mountain process. However, a number of actions by the legislative, executive, and judicial branches since 2012 could set the stage for a new administration and Congress to re-engage with the nuclear waste issue and move the waste management program forward.

First, several bills designed to implement some of the Blue Ribbon Commission's recommendations have been introduced in Congress. One of the most recent, S. 854, the Nuclear Waste Administration Act of 2015, was introduced in March 2015.[7] It would create a dedicated new waste management organization within the executive branch to take over DOE's nuclear waste responsibilities, establish a process for approving interim consolidated storage facilities, provide for a consent-based approach to siting future waste facilities, and resume the collection of Nuclear Waste Fund fees from nuclear utilities.

Three other bills introduced in the 114th Congress deal with narrower issues related to nuclear waste: H.R. 3643, the Interim Consolidated Storage Act of 2015, would provide legislative assurance that private companies can enter into contracts with DOE to store spent nuclear fuel and allows costs from these contracts to be paid from the Nuclear Waste Fund. H.R. 3483 (Senate companion bill S. 2026), the Stop Nuclear Waste by Our Lakes Act of 2015, calls for a joint international review of a proposed nuclear waste facility under construction near Lake Huron in Canada. Finally, H.R. 1364 (Senate companion bill S. 691), Nuclear Waste Informed Consent Act, requires that a written, binding agreement be struck between the Nuclear Regulatory Commission (NRC), the governor of the repository host state, the local unit of government, nearby local units of government, and affected Indian tribes before authorization of a geological repository can proceed. To date, no action has been taken on these bills.

Within the executive branch, DOE has begun working to implement some elements of the Blue Ribbon Commission plan as part of a new strategy released in January 2013.[8] Subject to available funding, DOE's new waste management strategy calls for efforts over the next ten years to license and construct a pilot interim storage facility by 2021,[9] pursue the siting and licensing of a larger interim storage facility, and achieve "demonstrable progress" toward characterizing repository sites with the aim of opening a geologic repository by 2048. In addition, DOE has indicated that it intends to implement this strategy using the "phased, adaptive" approach recommended by the Blue Ribbon Commission, including pursuing a "consent-based" approach to siting future storage and disposal facilities.

In January 2016, DOE launched its consent-based siting initiative with a kick-off meeting in Washington, D.C. The initiative will consist of three phases: (1) an initial public engagement effort designed to solicit stakeholder input on how to structure a consent-based siting process; (2) an effort to design a siting process based on input gathered during the first phase; and (3) further work with communities that might be interested in hosting a nuclear waste management facility.[10] As of this writing, DOE has held public meetings on consent-based siting in Chicago, Illinois; Atlanta, Georgia; Sacramento, California; Denver, Colorado; Boston, Massachusetts; Tempe, Arizona; Boise, Idaho; and Minneapolis, Minnesota.

Concurrent with announcing its consent-based siting initiative, DOE in 2015 announced an important policy change with respect to the management of defense and civilian nuclear waste. Specifically, DOE indicated that it would pursue a separate disposal facility for high-level radioactive wastes generated by the nation's nuclear weapons programs rather than planning for these wastes to be commingled with spent nuclear fuel from commercial nuclear power reactors in the same repository, as had been the government's policy since 1985. DOE's decision concerning defense high-level waste was prompted in part by continued lack of progress toward a permanent disposal repository and by the implications of this lack of progress in light of existing agreements between DOE and the states of Idaho, South Carolina, and Washington. These agreements commit the federal government to clean up and remove high-level radioactive waste from former nuclear weapons production sites. To meet the deadlines they establish, the federal government will need to site and construct a facility capable of accepting DOE-owned spent fuel and high-level defense wastes within the next two decades or risk incurring substantial penalties.[11]

Recent court decisions also have the potential to re-shape the nuclear waste debate going forward. A 2012 ruling by the D.C. Circuit Court of Appeals, for example, forced the NRC to reconsider the waste management assumptions on which its licensing actions for commercial nuclear reactors had been predicated, including specifically the assumption that a permanent waste repository would become available when needed.

Since finalizing a new Continued Storage Rule that does not presuppose the eventual availability of a permanent disposal repository, the NRC has resumed issuing license approvals and extensions for commercial reactors (such approvals and extensions had been suspended for a period of two years following the court's 2012 decision). The new rule was challenged by states and environmental groups, but it has since been upheld.

Meanwhile, a separate finding by the D.C. Circuit Court of Appeals concerning DOE's authority to continue collecting the per-kilowatt-hour nuclear waste fee[12] in light of the status of the Yucca Mountain project prompted DOE to stop charging the fee in May 2014. Until Congress acts to clarify or amend DOE's authority to collect the fee, this decision stops the flow of new revenues from nuclear utility customers (roughly $700 million per year) to the Nuclear Waste Fund to support federal waste management activities. In combination with ongoing legal actions by nuclear utilities to recoup costs associated with storing spent fuel at reactor sites, the suspension of nuclear waste fee collections underscores the federal government's (and, ultimately, U.S. taxpayers') mounting exposure to financial liability as a result of DOE's failure to meet its contractual obligations related to the management of commercial spent nuclear fuel.

Another important legal decision came in August 2013, when the D.C. Circuit Court of Appeals found that the NRC was legally required to continue its review of the Yucca Mountain license evaluation until Congress directed otherwise or the NRC ran out of funds for this purpose. In response, the NRC affirmed its commitment to completing key documents (subject to available funds), issuing the last of five Safety Evaluation Reports for the proposed Yucca Mountain repository design in January 2015. NRC staff found that the proposed facility could meet current regulatory requirements for post-closure performance but also identified three outstanding sets of issues that would have to be resolved before a license to authorize construction of the Yucca Mountain facility could be approved.[13] These concerned land ownership and control, water rights, and a required supplement to the environmental impact statement.

Recent years have also seen the emergence of voluntary community- and private-sector-led efforts, discussed in later sections of this report, to site a consolidated storage facility for commercial spent fuel. A plan by Waste Control Specialists, a private company, to build such a facility in Andrews County, Texas has drawn support from state and local officials. Likewise, in New Mexico, a consortium of local governments, the Eddy-Lea Energy Alliance, has voiced interest in hosting a consolidated storage facility.

Other noteworthy nuclear-waste-related events in the last several years include problems at the federal government's Waste Isolation Pilot Plant (WIPP) in New Mexico in February 2014, which disposes of transuranic defense wastes, and difficulties siting DOE-funded research projects aimed at demonstrating deep borehole disposal of radioactive waste. The incidents at WIPP involved an accidental fire on a salt haul truck due to inadequate maintenance and a small release of airborne radioactivity through the facility's ventilation exhaust system because of the use of incorrect packing material in a waste drum and subsequent explosion. They led to the temporary shutdown of the facility, which as of this writing has not yet resumed operations (see text box on p.17 of this report for a further description of WIPP).[14] In the case of the borehole demonstration projects, proposals to move forward with two project sites in North and South Dakota have stalled due to local opposition. This has prompted DOE to issue a new request for proposals that provides more explicit direction to potential contractors concerning the need for an extensive public outreach component to be included in any plans for conducting the borehole demonstration project.

Consent-Based Siting

The inherent challenge of siting facilities that manage and ultimately dispose of highly radioactive nuclear materials is at the core of the U.S. government's failure, despite decades of effort and billions of dollars in expenditures, to meet its commitments regarding the safe long-term disposition of spent nuclear fuel and high-level waste. As the Blue Ribbon Commission observed in its final report, "finding sites where all affected units of government, including the host state or tribe, regional and local authorities, and the host community, are willing to support or at least accept a facility has proved exceptionally difficult." For this reason, a new consent-based approach to siting is central to both the Blue Ribbon Commission's recommendations and to the nuclear waste management strategy announced by DOE in 2013.

Because BPC's Nuclear Waste Council shares the view that designing and implementing a successful consent-based siting process is essential to getting the nation's nuclear waste program on track, the council devoted much of its effort to exploring the elements of a consent-based siting process and developing recommendations for future siting efforts, whether initiated by DOE, by a new federal waste management entity, or by another organization or even private firm. Not surprisingly, there are widely disparate views on the council as to what constitutes consent.

This chapter summarizes the results of the council's investigation, highlighting findings from a review of the theory and practice of consent-based siting, responses from a survey of state officials on the topic of siting nuclear waste management facilities, and input gathered at a regional stakeholder meeting with the Texas and New Mexico communities that have indicated interest in potentially hosting a consolidated storage facility. The text box on page 17 provides further background on DOE's siting experience with the Yucca Mountain repository and the Waste Isolation Pilot Plant. These two projects offer a useful contrast in approach and outcomes that serves to illustrate why the consent-based approach is widely viewed as more promising for future siting efforts. Throughout this discussion we have also sought to articulate the range of views expressed by council members with respect to critical questions and challenges for a consent-based siting process.

A. *Elements of a Consent-Based Siting Process: Applying the Facility Siting Credo to Nuclear Waste Management Facilities*

Reviewing the last 25 years of experience with siting large, potentially controversial industrial facilities suggests that the traditional "decide, announce, defend" approach—in which the public is engaged, often in a perfunctory manner, only *after* key decisions about a facility have already been made—has increasingly failed to produce desired outcomes. This is especially (but not only) true in the case of "noxious" facilities that are widely perceived as undesirable due to the public health, safety, or environmental risks they pose. Increasing public awareness and concern and changing expectations about transparency, public consultation and input since the Cold War era—when many existing nuclear facilities were sited—have undoubtedly played a role in changing the outlook for future siting efforts.

These realities, and the siting failures of more recent decades, have therefore prompted interest in alternative approaches that stress voluntary consent by host communities, together with active engagement and trust building among stakeholders throughout the siting process. Council members hold differing opinions on state regulatory authority and on the question of what constitutes consent, but there is general agreement that the elements discussed in this section are important to a consent-based approach.

In 1990, a national collaboration involving academic researchers, public officials, and private sector representatives, all of whom had experience with siting controversial projects, developed a Facility Siting Credo ("Credo") designed to address many of the issues and controversies that had derailed past efforts to site noxious or locally unwanted facilities.[15] The Credo includes fourteen elements: the first seven of these elements describe procedural steps in the siting process; the remaining seven elements describe desired outcomes of the siting process. These elements, as they appear in the Credo, are listed below:[16]

Procedural Steps

1. Institute a broad based participatory process
2. Seek consensus
3. Work to develop trust
4. Seek acceptable sites through a volunteer process
5. Set realistic timetables
6. Consider a competitive siting process
7. Keep multiple options open at all times

Desired Outcomes

8. Achieve agreement that the status quo is unacceptable
9. Choose the solution that best addresses the problem
10. Guarantee that strong safety standards will be met
11. Use contingent agreements
12. Work for geographic fairness
13. Fully address all negative aspects of the facility
14. Make the host community better off

Many elements of the Credo are echoed in the approach to siting recommended by the Blue Ribbon Commission report and endorsed by DOE in its 2013 management strategy for nuclear waste. For example, the Blue Ribbon Commission describes an overall approach that is explicitly consent-based, transparent, phased, adaptive, standards- and science-based, and governed by partnership arrangements or legally enforceable agreements. In its 2013 management strategy, DOE offers its interpretation of what consent-based siting means:

In practical terms, this means encouraging communities to volunteer to be considered to host a nuclear waste management facility while also allowing for the waste management organization to approach communities it believes can meet the siting requirements. Under such an arrangement, communities could volunteer to provide a consolidated interim storage facility and/or a repository in expectation of the economic activity that would result from the siting, construction, and operation of such a facility in their communities.

As noted in the previous chapter, DOE launched a consent-based siting initiative in early 2016 and is currently engaged in gathering input from stakeholders on how to design a process that is more likely to produce successful siting outcomes. Many Council members responded to DOE's recent Invitation for Public Comment on this topic and submitted comments that reflect their unique views concerning specific aspects of a consent-based siting process.

B. Results from a Survey of State Officials

Throughout the history of the U.S. nuclear waste management program, the strongest opposition to siting specific facilities has typically come from state governments that are concerned about waste in their communities and perceive primarily negative impacts from their selection as a repository site. At a local level, by contrast, the direct economic benefits from hosting a facility might be seen by some communities as likely to outweigh expected negative impacts.[17] This history has been mixed and is not easily summarized as one marked by state opposition and local acceptance. The challenge for any consent-based siting process, however consent is defined, is to work with leaders at all levels of government—state, tribal, and local—to address concerns, build trust, and provide assurance that host governments will retain a degree of control and an active role in key decisions going forward. To gain insight into how this might be accomplished, the BPC Nuclear Waste Council surveyed governors, state attorneys general, state legislative leaders, and state regulators, including heads of state environmental protection agencies. Ultimately, the council received survey responses from twelve states.[18]

Overall, these survey responses suggest that there is a wide range of views toward nuclear waste facilities among current state officials. When asked whether their state would be open to exploring the possibility of hosting a consolidated storage facility or deep geologic repository,

for example, the responses ranged from "No, under any circumstances" to "Yes, the state would consider any such opportunity." Other survey respondents indicated a general openness to considering proposals, but cited specific concerns that would have to be addressed (such as impacts on groundwater in a state that is heavily reliant on groundwater). Questions about what types of information a state might need to consider hosting a facility and whether holding a statewide referendum would be necessary to ratify consent likewise elicited a range of responses.

A question about key attributes of a consent-based process drew answers that echoed many of the elements included in the Facility Siting Credo and in other studies. Specifically, respondents mentioned thorough evaluation of policy, economic, health, technical and environmental issues; transparency; candor; efficiency; voluntary participation and consent; financial backing; political support and leadership; strong, specific technical criteria; public input and full engagement; and rigorous impact analysis. Questions about what form consent might take and about where in the process a state's consent should be considered irrevocable drew a mix of responses, including "I just don't know." By contrast, a more general question about the merits of a consent-based approach to siting in principle drew near-universal support from survey respondents. And all respondents answered in the affirmative when asked if they would be interested in participating in regional group discussions about siting nuclear waste facilities with other state government leaders.

C. Insights from a Regional Stakeholder Meeting

On March 29, 2016, the Nuclear Waste Council held a regional meeting in Eunice, New Mexico. The area around Eunice hosts the Waste Isolation Pilot Plant, the National Enrichment Facility, and—just across the border in Andrews County, Texas—the only commercial U.S. facility licensed to treat, store, and dispose of certain classes of low-level radioactive waste. The latter facility is operated by Waste Control Specialists (WCS), which is seeking an NRC license to construct a facility for the consolidated storage of commercial nuclear spent fuel. This proposed new facility would also be located in Andrews County, Texas.

Because of these existing and proposed facilities, local communities in southeastern New Mexico and western Texas have extensive first-hand experience with siting and hosting nuclear-related projects and facilities. Their greater familiarity and local economic conditions may have also made them more receptive than other communities to considering new nuclear-related development. As noted in earlier sections, there is state and local support for a new WCS facility to store spent nuclear fuel in Andrews County, Texas, while local leaders in New Mexico's Eddy and Lea Counties have formed an alliance to explore options for hosting a similar type of facility on the New Mexico side of the border. Much of the discussion at the Nuclear Waste Council meeting focused on these proposals and on lessons learned from the experience of siting the National Enrichment Facility.[19]

Attendees noted that local support had been crucial to the successful siting of both the WCS low-level waste facility and the National Enrichment Facility.[20] In the latter case, consistent efforts by the project sponsor, Louisiana Energy Services (LES), to engage and inform the community played a critical role in building and sustaining local support. LES, which had learned the importance of effective community outreach after failed siting efforts in Louisiana and Tennessee, made concerted efforts to engage constructively with local citizens and respond to their questions in an open and timely manner. Parallel efforts to inform the community about technical aspects of uranium enrichment and about the safety standards and regulations that would apply to the facility were also appreciated, as were small but important touches, such as having Spanish

translators available at meetings. Finally, the opportunity to visit an enrichment facility in the Netherlands and speak directly with local citizens and community leaders there was cited as an extremely valuable step toward building confidence. The relatively small size of the local population and its relatively sophisticated understanding of the technical and scientific issues was also helpful; the community valued the economic benefits that came with the facility as well as the opportunity to "build something" and exercise leadership in an area of national interest. A striking contrast between the perspective of rural and urban communities was frequently mentioned; some participants noted that politicians from bigger cities like Austin and Santa Fe often raised questions and concerns, but then failed to consistently appear at local meetings or work with local officials to address these concerns.

Other key points raised at the meeting and in follow-up written comments submitted to the Nuclear Waste Council are summarized below. (Importantly, these comments were heard from meeting participants, many of whom expressed potential support for future facilities; thus, they do not represent the views of all council members.) Together these points suggest that a consent-based approach can offer advantages for future efforts to site nuclear waste facilities, provided that potential host communities understand a consent-based approach to include significant efforts at delivering honesty, transparency, and accountability throughout the siting process.

- Support can be found for new nuclear facilities, provided the sponsoring entity is willing to maintain appropriate communications throughout the siting process and conduct operations in a manner that protects human health and the environment.
- Entities that are invested in the success of a facility will do a better job of communicating and operating that facility. Private entities may be better at building trust and delivering accountability than the federal government.
- A strong state and local government presence is needed, even in the case of facilities that are federally regulated. Different views exist within the council with respect to the appropriate division of state and federal regulatory authority over future nuclear waste facilities (see text box on p.24).
- A new facility has to provide tangible value for the host community. Meeting attendees expressed the view that citizens of western Texas and southeastern New Mexico, in particular, are informed about issues relevant to the nuclear fuel cycle and have successfully navigated two consent-based processes in recent years (although not for facilities that handle commercial spent fuel or defense high-level radioactive waste).
- For the community, confidence in the science and in the safety of the proposed facility was a pre-requisite for moving to the next step. That step included developing a relationship of trust with the company and it required transparency and openness. Citizens want to hear the good and the bad and they appreciated the fact that LES was forthcoming about the difficulties it encountered in past efforts to secure a site.
- Exposure to a similar facility overseas left participants with a greater appreciation for the importance of a strong safety culture and high standards of management.
- Gaining local community approval is more important than requiring every elected official in a state to be 100 percent on board. Including a diversity of views is a good thing, but it can also lead to stalemate if consent is interpreted as unanimity.

- Artificial impediments, such as a one-size-fits-all approach to consent-based siting, must not create hurdles to actual progress. Equal weight should be given to needed facilities that are sited and developed by a private entity as to facilities that are government owned and operated.
- Flexibility is key in that consent will look different for different facilities in different circumstances. Moreover, affected state and tribal governments, as well as potential host communities, must play a key role in defining the mechanisms used to register consent and on the conditions attached to consent. These issues must be negotiated from the bottom up, rather than the top down.
- The process used to select an interim storage site may be very different from the process used to select a permanent disposal site. To the extent possible, multiple siting options should be left open so that competition on the merits—in terms of safety, performance, cost, etc.—can drive the selection of a particular site.

A Contrast in Siting Outcomes: Yucca Mountain and the Waste Isolation Pilot Plant

The breakdown of the federal government's effort to site a permanent geological disposal repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain in Nevada represents both the defining failure of the decades-old U.S. nuclear waste management program and a highly visible emblem of the growing difficulty of siting controversial facilities of all kinds.

The story of Yucca Mountain begins with the Nuclear Waste Policy Act of 1982 (NWPA), which first established deep geological disposal as the ultimate mode of disposition for spent nuclear fuel and high-level radioactive waste in the United States. Key provisions of the 1982 law established a process for siting two disposal repositories, authorized DOE to enter into contracts with nuclear utilities to begin removing spent fuel from reactor sites by 1998, and instituted a fee on nuclear-generated electricity to fund the government's commercial nuclear waste management program. The law also capped the amount of spent fuel and high-level waste that could be placed in the first repository at 70,000 tons, effectively guaranteeing that a second repository would be needed.

Several years later, in the face of escalating costs, slipping timelines, and growing opposition from states being considered for a possible repository site, Congress amended the NWPA. The amendments adopted in 1987 (over the objections of the state of Nevada) singled out Yucca Mountain as the sole site to be considered for a permanent geologic repository.

It took until 2002, four years after the 1998 deadline for the federal government to begin removing spent fuel from commercial reactor sites, for DOE to complete its site characterization studies and issue an affirmative finding on the suitability of the Yucca Mountain site. A formal recommendation by President George W. Bush and subsequent congressional action to override the continued objections of the state of Nevada cleared the way for DOE to begin preparing an application to the NRC for a license to authorize repository construction. Completing the license application took another six years and raised numerous complex technical, regulatory, and legal issues, but the license application was ultimately submitted in June 2008. Within the next year, however, the Obama administration signaled its intent to terminate the Yucca Mountain project, and in March 2010, DOE moved to withdraw its license application to the NRC. In August 2013, the U.S. Court of Appeals for the District of Columbia Circuit found that the NRC was legally required to continue its review of the original license application unless Congress directed otherwise, or the NRC ran out of funds for this purpose. Congress has not acted to further amend the NWPA and the current impasse over Yucca Mountain remains unresolved. With progress unlikely before a new Congress and administration take office in early 2017, the fate of Yucca Mountain—and of the broader U.S. waste management program—remains uncertain.

Until 2014, when its operations were temporarily suspended because of two accidents, the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico was the world's only operating deep geological repository for long-lived nuclear waste. The facility was designed to accept only transuranic defense wastes for disposal in a deep salt bed. As with Yucca Mountain, the effort to site WIPP took decades (the WIPP site was selected for exploratory work as early as 1974, but the facility did not become operative until 1999), exposed deep state–federal

tensions, and gave rise to numerous contentious and protracted regulatory, legal, and political disputes. In this case, however, the siting process—although far from smooth—ultimately led to the construction of a facility that operated from 1999 to February 2014, when two separate accidents, involving a fire and a release of airborne radiation, closed the facility. Cleanup operations are ongoing and DOE has stated that it intends to re-open WIPP but it is unclear at the time of this writing when operations might resume.

A critical ingredient that ultimately contributed to a successful siting outcome in the WIPP example was local support—from the outset, the Carlsbad business community was in favor of the project as a way to bring economic development to the area. Also key was the ability of federal and state agencies to continue working together over many years to resolve issues and undertake confidence-building measures, despite sometimes strong disagreements. It should also be noted that limits to state authority as a result of federal preemptions with respect to regulating radioactivity were also key to resolving matters—to wit, the state of New Mexico had no legal recourse to object. Notably, to the extent that WIPP can be regarded as a siting success story, and to the extent that the facility won public acceptance at the state level, a key factor was the state's ability to regulate mixed wastes at WIPP under existing hazardous waste laws. In fact, the ability of the host state to regulate a facility, even in a limited fashion, is often cited as an important step in building confidence with state officials that they will retain a measure of control. Also important in gaining public acceptance were agreements that prohibited the facility from accepting spent nuclear fuel and high-level waste and the WIPP Land Withdrawal Act. A final frequently-noted innovation in the WIPP experience was the creation of an independent third-party group—the Environmental Evaluation Group (EEG)—to help address technical issues. The EEG no longer exists (its funding was tied to the licensing and construction process), but it played a critical role in assuring the community that its concerns were being addressed in a rigorous and scientifically sound manner.

While WIPP has been called a siting success, the Blue Ribbon Commission also pointed out that the process that led to this facility was not only long, complicated, and unpredictable, it was made possible by a unique set of circumstances and conditions and thus is unlikely to be replicable. Indeed, the insight that each siting process is inherently unique is central to the concept of consent-based siting itself and to the basic notion that an adaptive and phased approach that puts a high value on preserving options, avoiding pre-conditions, and negotiating from a foundation of trust and transparency is more likely to result in siting success.

Recommendations

This chapter presents recommendations developed by the BPC Nuclear Waste Council based on the activities and stakeholder input discussed in previous chapters. In each case, we provide a short discussion of the basis for our recommendation and its practical implications for the future direction of nuclear waste management efforts in the United States. We also suggest next steps for implementing each of our recommendations.

Here it is also worth emphasizing again that the council did not seek consensus on a recommendation concerning Yucca Mountain. Like the Blue Ribbon Commission, the council takes the view that agreement can and must be found on a new approach to siting future waste facilities, and reforming the nation's nuclear waste program more broadly, even among stakeholders who hold very different views concerning the resolution of the Yucca Mountain controversy. We also did not debate other elements of a comprehensive waste management system, such as the role of consolidated storage and the linkages between storage and disposal. Overarching all of our recommendations is the recognition that new legislation will be needed to fully implement these changes and to provide a coherent statutory and regulatory framework for pursuing a consent-based approach going forward.

Recommendation #1: As part of a fundamental overhaul of the U.S. nuclear waste management program, Congress should establish a new, dedicated nuclear waste management organization, separate from DOE.

Agreement that the status quo is unacceptable is one of the core elements of the Facility Siting Credo discussed in the previous chapter—in this context, it also provides the impetus and core rationale for a larger overhaul of the federal government's nuclear waste management program. The failures of the past several decades are widely acknowledged and have been extensively documented—indeed, if there is a single point on which everyone involved in the nuclear waste policy debate can agree, it is that the approach to date has not delivered results. This has led to a steady erosion of confidence in the federal government's ability to manage nuclear waste and a growing consensus that a change of strategy is needed. It also bears noting, however, that despite this erosion of confidence, few stakeholder groups have suggested that the federal government should be relieved of the burden of managing wastes generated by the commercial nuclear industry.

In the context of a broader overhaul of the nation's nuclear waste management program, there is also some support for the proposition that DOE's past problems, including the loss of trust in DOE voiced by many stakeholders, and the inherent challenges that flow from DOE's large size, multiple missions, exposure to changing political preferences, and dependence on uncertain year-to-year congressional appropriations, argue for transferring primary responsibility for the nuclear waste program to a new organization.[21] This was one of the core recommendations of the Blue Ribbon Commission; it is also the approach that several other countries have taken. There is less agreement about what form a new waste management organization might take in the United States—potential options include a federal corporation, a new federal agency, and a private corporation. A number of studies, including the Blue Ribbon Commission report, conclude that a federal corporation is likely to be the preferred model; this is also the option included in comprehensive reform legislation introduced in 2015.[22] The Nuclear Waste Council did not attempt to come to consensus on the best form or structure for a new waste management organization, nor did we seek to resolve the statutory and regulatory tensions that would dictate the powers of such a new organization.

Council members do agree, however, that if there is to be a new entity, it will be important for that entity to deliver certain attributes—such as mission integrity, accountability, effective leadership, management consistency, and a strong safety culture, etc.—regardless of the organizational model adopted. Moreover, to provide effective leadership, appointees who head such undertakings should have demonstrated, in their past careers, strong capacities for successfully developing public trust around the resolution of complex and controversial public policy matters with a significant technological component.

Next Steps: *Comprehensive reform of the U.S. waste management program, including putting the program on sound financial footing and establishing a new waste management organization, requires congressional action. Congress and a new administration should waste no time in carefully considering, debating, and acting on comprehensive legislation to amend and update current law concerning the nation's nuclear waste management program and the siting and regulation of future waste management and disposal facilities.*

Recommendation #2: Future nuclear waste facility siting efforts can and should draw from a growing body of evidence and experience to design and implement siting processes that emphasize voluntary participation, flexibility, transparency, inclusion and consultation, trust, accountability, and scientific and technical integrity.

The current focus on consent-based siting reflects recognition that finding a way to gain broad-based state- and local-level public acceptance is key to moving forward with a successful waste management program. Such acceptance, in turn, requires confidence that

strong, protective safety standards are in place before the siting process goes forward (see recommendation 3, below). Input from our survey of state officials and from attendees at the council's regional meeting in western Texas and southeastern New Mexico increases our confidence that a well-designed consent-based process can yield positive siting outcomes that serve the interests of host communities, states, and tribes, as well as the interests of the nation as a whole. At this point, many stakeholders have weighed in on the key attributes of a consent-based process and on the important design questions and process issues that must be addressed. Future siting efforts can also draw from a wealth of case studies and from the experience of other nations, such as Canada, Finland, and Sweden, that are further along in implementing a consent-based approach to siting a nuclear waste repository.

Given the support that now exists for consent-based siting, the immediate challenge is to translate theory into practice and begin designing and implementing a process that fosters the trust, accountability, engagement, and integrity needed to succeed.

Next Steps: *Recognizing that siting will continue to be a major challenge for the U.S. nuclear waste program, regardless of the fate of Yucca Mountain or of any other individual project, Congress and a new administration should support efforts to work with stakeholders to define and implement a voluntary, consent-based approach to siting.*

The council's remaining findings and recommendations focus on key design features of a consent-based siting process. Throughout this section we refer generically to the "waste management organization" consistent with our recommendation for the creation of a new entity that would assume DOE's current waste management responsibilities.

Recommendation #3: Safety is the first criterion for siting nuclear waste management facilities and for gaining the trust of potential host communities and states. The development of generic safety standards and other siting and operating criteria is therefore a critical near-term priority.

Generic safety standards and siting criteria are important for two reasons. First, they serve the useful purpose of screening potential sites. This makes the overall siting process more efficient because it helps to ensure that time and resources are not spent evaluating sites that would likely prove unsuitable. A second key argument for developing generic standards and criteria before a site is selected has to do with public confidence in the integrity of the process. The public is far more likely to trust standards that were established independent of site selection. By contrast, standards and criteria developed later in the process may be perceived as rigged or tailored to ensure that a particular site passes muster. In fact, exactly this concern arose in the Yucca Mountain context: Because Congress selected the site up front, in a top-down fashion, and because the safety standards being applied to the Yucca Mountain repository were specific to that project, opponents viewed all subsequent regulatory findings as suspect. The possibility that standards could have been adjusted to fit the site undermined stakeholders' trust that the standard-setting process was driven, first and foremost, by safety concerns and by objective scientific considerations.

Ultimately, generic standards and criteria can provide an objective and transparent basis for selecting a particular site over other candidates. As discussed later in this section, the hope in any consent-based siting process would be that multiple communities come forward to express interest. In that case, the process for choosing a particular site should be competitive and stakeholders should have confidence that the outcome is determined on the merits (safety, cost, etc.) and not driven by political considerations.

This case will be easier to make if all proposals are evaluated—at least in the early stages of the site selection and site characterization process—against the same generic standards and criteria.

Next Steps: *The relevant regulatory authorities—in this case, primarily the U.S. Environmental Protection Agency (EPA) and NRC—should begin coordinated efforts to develop and update generic safety and performance regulations for disposal and consolidated storage facilities. These efforts should be conducted in an open and transparent manner so that knowledgeable stakeholders and members of the public can understand the thinking behind the standards and have access to the information and assumptions that regulators are using to make decisions in the standards-setting process.*

Recommendation #4: For consent-based siting to succeed, host communities and affected states must be empowered to engage as full participants in the process. Therefore, it will be important to ensure that communities and states have access to the technical expertise and resources needed to play a meaningful consultative role in key decisions.

Active engagement and meaningful consultation with host communities, states, and tribes is central to building the trust needed for a consent-based siting process to succeed. As the Blue Ribbon Commission observed:

Trust, in fact, is often the core issue whenever different parties are involved in a complex adjudicatory process—and it can be especially difficult to sustain when much of the power or control is viewed as being concentrated on one side.[23]

To address this potential imbalance of power, the authors of the Credo recommend that:

Interested and affected parties should have a full opportunity, supported with resources provided by the government, to review site selection criteria, identify research issues and data collection needs, and critique the findings and criteria on which siting decisions are made.[24]

Experience in the United States and elsewhere underscores the importance of empowering potential host communities to participate as partners in the siting process. For example, the creation of the Environmental Evaluation Group (EEG), an independent entity that provided technical support during deliberations over the Waste Isolation Pilot Plant (WIPP) in New Mexico, is often cited as having been crucial to building the stakeholder support needed to allow that project to go forward. In 1994, France formed local information and oversight committees to serve a similar purpose,[25] while Belgium provides community partnerships with resources to operate local offices near nuclear waste facilities.

As these examples suggest, a variety of models and mechanisms are available for facilitating meaningful stakeholder participation. Organizational options include citizen advisory groups, task forces, and local monitoring, oversight, and information committees, or simply facilitated access to third-party experts.[26] In addition or as an alternative, various mechanisms can be used to communicate information and solicit stakeholder input, including public hearings, information workshops, study circles, focus groups, and roundtables.

Experience suggests, for example, that the presence of an independent third-party entity to answer questions, assess relevant project data and analyses, and help translate technical findings for a non-expert audience can be extremely valuable in building confidence and trust with community members and other stakeholders. It also suggests that local councils, in particular, can be useful mechanisms for sustaining community involvement and resolving challenges and disagreements, not only through

the siting process but also in subsequent phases of facility construction and operation, when many communities will want to retain some ongoing oversight role. Finally, some council members have also advocated for and against the notion that this engagement requires reconsideration of state regulatory preemption, as discussed later in this report (see text box on p.24).

Next Steps: *The waste management organization should solicit input from a wide range of communities and stakeholders about the kinds of technical support that would be most needed and useful to facilitate their participation in a consent-based siting process. It should also develop information about the advantages and disadvantages of different models for stakeholder and community engagement and about best practices for facilitating engagement. Specific experience with local councils in the context of nuclear and other types of facilities in the United States and abroad should likewise be examined for best practices and lessons learned.*

The Issue of State Regulatory Control over Nuclear Waste Facilities

Under the Atomic Energy Act of 1954 (AEA), the federal government has exclusive jurisdiction over many aspects of the management and regulation of radioactive materials. As the Blue Ribbon Commission observed, this federal preemption substantially limits options for states to exercise a direct and meaningful role in the regulation of facilities for managing and disposing of nuclear waste.

To address this concern, some stakeholders and council members argue that the AEA should be amended to remove current exemptions—including exemptions from the federal Clean Water Act and Resource Conservation and Recovery Act—that make radioactivity, in effect, a privileged pollutant. In their view, these exemptions are at the core of the distrust with which both commercial and government-run nuclear facilities are often viewed—not only by states, but also by other federal agencies. Such changes to the AEA would make the treatment of radioactive waste consistent with the nation's other bedrock environmental laws.

Advocates for removing the current federal preemption for radioactive materials point out that there is federalist intention at the heart ofmost of the nation's major environmental laws, insofar as these laws provide for state assumption of certain regulatory authorities, including central protections for land, water and air. Where states opt to assume authority, they must meet minimum federal standards and the federal government retains independent oversight and enforcement authority. Depending on state law, states generally use their authority to impose stricter requirements or different regulatory mandates.

To bring the regulation of radioactivity in line with these norms, Congress could legislate a role for EPA and the states by amending the AEA to remove its express exemptions of radioactive material from environmental laws. Some council members believe that addressing this fundamental issue will allow for substantially improved clarity in the regulatory structure and a meaningful state oversight role. Given that establishing trust with state, local and tribal governments will be central to the success of any effort to develop geologic disposal and consolidated storage facilities, some council members believe that this step is essential to allow a truly consent-based and transparent siting process for such facilities to go forward.

Other council members, however, point out that any proposal to repeal the preemption provisions of the AEA (in whole or in part) would be very controversial and could have unintended impacts on other areas of federal law. In their view, the difficulties associated with such an approach are substantial and apparent. Not only would there be widespread opposition (including from the nuclear industry), repealing the preemption provisions of the AEA would undo more than a half-century of settled law and would require harmonizing future state regulations for radioactive materials with those of the NRC, EPA, DOE, and other federal agencies—potentially further delaying the resolution of storage and disposal proposals now under consideration.

It has also been suggested that, short of repealing the AEA's preemption provisions, several alternatives exist that could address, at least to some extent, the concern about ensuring a meaningful role for state governments. For example, states could be given a broader consultative role, or could be given a role in enforcing federal regulatory

standards along with the federal agencies. Another option would be to amend provisions of the AEA that authorize NRC–state regulatory agreements to permit the NRC and a state to negotiate a specific regulatory role for the state in connection with a proposed nuclear waste facility. Other alternatives could include amending the AEA to include citizen-suit provisions, such as exist in the Clean Air Act, or state-certification provisions, such as exist in the Clean Water Act. Such approaches could help satisfy the legitimate concerns of citizens in states where nuclear-waste storage or disposal facilities are located that their interests are being taken into account, without causing a substantial disruption to the settled regulatory and statutory framework that has been in place for decades. Stakeholder input on these and other alternatives would be needed to identify which, if any, approach is likely to be helpful in advancing a consent-based siting process.

Recommendation #5: Future consent-based siting efforts should encourage multiple applications, assure a fair and thorough assessment of all options, avoid down-selecting to a single option too early in the process, and make selections among competing options on the basis of objective, observable metrics.

Experts agree that a wide range of geologic media could be suitable for a deep nuclear waste repository. This means that numerous locations around the country could potentially host such a facility if purely technical considerations were the only concern. An even larger number could be suitable for hosting consolidated storage facilities, including existing and operating reactors that are the only current hosts for spent nuclear fuel. The problems that arose with Yucca Mountain—which was widely viewed as a political choice that was forced on a single state regardless of the merits of the site—highlight the disadvantages of considering only one option and the high cost of failure if a site proves unworkable in that situation. By contrast, a siting process that considers multiple options based on the voluntary participation of host communities is much more likely to produce an outcome that is perceived as fair and driven primarily by safety and performance considerations. These advantages are borne out by international experience: countries that have had more success winning broad political support for a particular repository site—for example, Sweden and Finland—gave serious consideration to more than one location. In Canada, twenty-one communities have stepped forward to be considered for a preliminary assessment of their potential suitability to host a repository site.

To preserve and increase options, incentives should be made available to communities that participate even if they are not ultimately selected to host a facility. Sweden, for example, took the unique approach, when it was deciding between two proposed repository sites, of awarding more compensation to the community that was not selected than to the community that was

selected. The reasoning was that this was fair because the "losing" community would miss the local economic benefits and infrastructure investments that would go to the "winning" community. Likewise, to preserve options, care must be taken to ensure that the criteria used to screen candidate proposals are rigorous without being, as the Blue Ribbon Commission put it, "excessively detailed and rigid."[27] Finally, the siting process itself should allow for the full and transparent evaluation of all proposals that pass initial screening and that are deemed promising (or competitive) from the standpoint of safety performance, cost, local support, transport, and other logistical considerations. This will increase the likelihood that the site that is ultimately selected is viewed as the "best choice" among multiple options. A process that reaches a conclusion only after vetting multiple options also provides insurance against the possibility that changing circumstances disqualify a particular site later in the process. In that case, the work that has been done to evaluate other proposals can help ensure that the process does not have to start again from the beginning and that earlier investments of time and resources are not lost.

Next Steps: *As the waste management organization works with stakeholders to design a consent-based siting process and begin a dialogue with potentially interested communities, attention should be paid not only to the standards and criteria that would be used to screen initial proposals, but also to the incentives that will be available to participants and to the approach that will be taken to select among competing proposals later in the process. In addition, research should continue into the suitability of different geologic media for hosting a repository to ensure that a wide array of potential locations can be considered.*

Recommendation #6: As part of the design of an effective consent-based siting process, it will be important to develop generic timelines for key milestones and decision points to give potentially interested communities and stakeholders a better sense of how the process will unfold and what their options are at different junctures. A particularly difficult but critical aspect of this task will be to identify, in broad terms, where and how in the process commitments by different parties will be considered irrevocable, and where and how the process will provide "off-ramps" that allow participants to opt out of further involvement.

The tendency to set unrealistic and overly rigid deadlines, and then consistently fail to meet them, has been an unfortunate and highly visible hallmark of the U.S. waste management program almost since the beginning. A track record of missed deadlines has also done much to undermine confidence in DOE. Breaking with this track record necessarily entails a new approach to setting deadlines—one that recognizes the inherent tension between flexibility and certainty and the inherent difficulty of predicting how a process that is intentionally designed to be open-ended and adaptive will unfold. On the other hand, as the Blue Ribbon Commission also recognized, "reasonable milestones for major phases of program development and implementation are important to keep the program focused and ensure that it is moving forward." Such milestones also serve an important purpose in providing benchmarks or targets against which stakeholders and policy makers can assess progress and determine whether the program is functioning (and the waste management organization is performing) as intended.

A related issue concerns the design and timing of opt-out or off-ramp mechanisms. Such mechanisms are integral to the approach being recommended, since without a meaningful ability to opt out, a process cannot be said to be consent-based and voluntary. The Blue Ribbon Commission, noting that support for any given facility "can and likely will fluctuate over time," expressed the view that "defining the point at which the right to unconditionally opt out expires must be part of the negotiation between affected units of government and the waste management organization."[28] We concur with this view.

Next Steps: *DOE has already identified timeline development and opt-out mechanisms as two "key questions" to be addressed as part of a consent-based siting process. Gathering stakeholder input on these questions and looking to past siting experience in the United States and abroad for relevant lessons learned should be an important focus of near-term efforts to design a workable consent-based siting process.*

Recommendation #7: All discussions of a consent-based approach to siting nuclear waste facilities point to the importance of incentives as a means to attract voluntary participation in the siting process, sustain local and state support for nuclear waste facilities, and address core demands for equity and compensation. Therefore, a generic list of incentive options should be developed in consultation with stakeholders and community leaders and all parties should also begin thinking creatively about how to maximize incentives, while simultaneously addressing related issues of environmental justice and equity.

The rationale for providing incentives to communities and states that agree to host nuclear waste management facilities is well established in theory and practice. An extensive literature on so-called compensation theory, for example, focuses on "the question of the appropriate role that providing benefits to a host community can play in improving the chances of siting a facility that is perceived to be potentially dangerous."[29]

Incentives also have a long history in practice, including in the context of nuclear waste facilities. The Nuclear Waste Policy Act Amendments of 1987, for example, in addition to mandating sole consideration of Yucca Mountain for a first repository site, also authorized monetary incentives in an effort to overcome state and local opposition to future waste facilities. Under the Act, states could receive up to $20 million per year for hosting a repository and up to $10 million per year to host a storage facility. The 1987 amendments also included an explicitly voluntary, incentive-based effort to site a monitored retrievable storage facility, creating the Office of the United States Nuclear Waste Negotiator and authorizing the negotiator to reach agreements with states and tribes to host such a facility under "any reasonable and appropriate terms." Interested communities were eligible for $100,000 if they volunteered to be considered and potentially several million dollars if they proceeded to a second phase of study. Incentives have likewise featured prominently in efforts by other countries to site nuclear facilities. In France, for example, communities that host underground test facilities receive an $11 million annual "image loss" tax subsidy.

Because the appropriate form and level of incentives will vary with different circumstances, the details of any incentive package cannot be defined in advance but will have to be established through negotiations between the waste management entity and the host community and host tribe or state. However, some general guidance and information—particularly concerning the scope and types of incentives that might be available—is also needed upfront to give potential host communities a reason to get involved.

Two additional points about incentives are worth emphasizing. The first is that incentives don't always work, as the experience of the U.S. Nuclear Waste Negotiator shows. (That effort was shut down in 1995, after only a few years in operation, despite soliciting initial expressions of interest from a number of communities.) In some cases, the benefits that could be realized at a local level will not be sufficient to overcome objections at the regional or state level. In other cases, it may simply prove impossible to negotiate a package of incentives that adequately satisfies all parties such that a project can move forward. Nuclear waste facilities are especially challenging because they tend to elicit strong concerns and objections.

A second key point is that non-monetary incentives should also be considered and offer considerable scope for creativity in tailoring a package to meet the specific needs and preferences of a potential host community. Examples of non-monetary incentives include obvious options, such as infrastructure investment, co-location of related research or technical and administrative support facilities, and support for local or regional economic development and educational institutions, as well as less obvious options such as a greater local role in oversight and decision-making for federal facilities or assets.

Next Steps: *The waste management organization should develop a generic list of incentives that have been made available for hosting nuclear waste and other controversial facilities in the past, both in the United States and abroad, and should work with state and local stakeholders to identify and explore new options.*

Conclusion

Past efforts to site and develop a permanent disposal facility for spent nuclear fuel and high-level radioactive waste in the United States have generated decades of controversy and opposition. Today, more than 30 years after Congress first attempted to define a path for the long-term disposition of nuclear waste in the 1982 Nuclear Waste Policy Act, the future of the federal government's nuclear waste management program remains uncertain. BPC's Nuclear Waste Council was formed to explore the potential for finding common ground, among a diverse set of stakeholders with a wide range of views, for concrete steps to move the nation's waste management policy and program forward.

Against the current backdrop of paralysis and distrust, it is useful to note that despite the apparent intractability of the nuclear waste issue, a substantial and even broad-based consensus exists, not only about the need to address the problem, but also about several core elements of a durable solution. There is broad agreement, for example, that disposal in a deep geologic repository is the best practical option for isolating spent nuclear fuel and high-level radioactive waste over the timescales needed to ensure that these materials do not pose a threat to public health and safety or the environment. Further, there is broad agreement that states, tribes, and local communities must have a voice in deciding where to locate

nuclear waste facilities and must have confidence that the safety of their citizens will be protected. Finally, there is agreement from multiple perspectives that an indefinite continuation of the current stalemate is unacceptable: not least because it leaves some states and communities to bear the involuntary risks and burdens of hosting long-term nuclear waste storage sites while also leaving the U.S. government —and ultimately American taxpayers—exposed to mounting financial liabilities.

Members of the Nuclear Waste Council and many of the stakeholders we consulted over the course of our deliberations agree on one more important point: the most difficult barriers to implementing a sound waste management strategy are fundamentally political in nature rather than technical. Our focus on a new, consent-based approach reflects this view. But we also recognize that simply invoking the term "consent-based" will not solve the problem, nor will it magically dispel the controversies that have bedeviled the nation's nuclear waste program for decades. What consent means, how it is defined, who gets a say—all of these are difficult questions that will spawn their own divisions and disagreements, as will other contentious issues such as the appropriate division of state and federal regulatory authority over future waste management facilities. Thus, we are under no illusions that pursuing a consent-based path forward will be easy, much less that it is guaranteed to succeed. What we also know, however, is that continued delay and inaction serve no one's interests, whether those of the American public, the environment, or the nuclear energy industry. A consent-based approach may be the best option only in comparison to the alternatives. We urge all parties—and most especially a new Congress and administration—to waste no time in making a good-faith effort to try it.

Endnotes

1. In 2014 and 2015, the Council held regional meetings in Boston, Massachusetts; Atlanta, Georgia; Chicago, Illinois; San Juan Capistrano, California; and Richland, Washington. A report summarizing what the Council heard at these meetings can be accessed at: http://cdn.bipartisanpolicy.org/wp-content/uploads/2015/10/BPC_Nuclear_Major-Themes-October-2015.pdf.

2. Detailed accounts of this history are available from numerous sources, including reports by the National Academy of Sciences, the Blue Ribbon Commission, and the Nuclear Waste Technical Review Board, among others. The discussion here provides a very brief synopsis before focusing on more recent developments—that is, developments subsequent to the release of the Blue Ribbon Commission Report in 2012.

3. All spent fuel is placed in pools when it is first removed from the reactor core. After the fuel cools (typically over a period of several years), it can be moved to dry storage. Utilities have increasingly transferred spent fuel to dry storage as they have run out of space in cooling pools or ceased reactor operations.

4. DOE also manages smaller quantities of high-level radioactive waste and spent nuclear fuel from other sources, such as the operation of the U.S. Navy's nuclear-powered ships and submarines, foreign research reactors, and the Three Mile Island accident.

5. The 1982 Nuclear Waste Policy Act attempted to establish a technically sound process for selecting two repository sites, in part to avoid the perception that any one region or state was being asked to bear the entire burden of disposing of the nation's waste inventory. In May 1986, Energy Secretary John Herrington recommended three sites (in Washington State, Texas, and Nevada) as leading candidates for the first repository. At the same time, Secretary Herrington—citing rising costs and changing waste projections—announced that DOE would be suspending its efforts to identify a second repository site.

6. The full report of the Blue Ribbon Commission on America's Nuclear Future can be accessed at: http://energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf.

7. S. 854, the Nuclear Waste Administration Act of 2015, was introduced by Sen. Lamar Alexander (R-TN) with Senate co-sponsors Sens. Lisa Murkowski (R-AK), Dianne Feinstein (D-CA), Maria Cantwell (D-WA), and Ron Wyden (D-OR). For more information, see: https://www.congress.gov/bill/114th-congress/senate-bill/854.

8. Accessible online at: http://www.energy.gov/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste.

9. The focus of this pilot storage facility would be to accept spent nuclear fuel from shutdown reactor sites. The Blue Ribbon Commission recommended that this fuel should be "first in line" for transfer to a consolidated interim storage facility given the disproportionate cost and burden of safeguarding this fuel at sites where there is no longer an operating reactor.

10. See: http://www.energy.gov/ne/consent-based-siting.

11. The agreements contain different specific requirements and deadlines, but under the terms of a 1995 settlement agreement between the state of Idaho, DOE, and the U.S. Navy, for example, all spent fuel currently at Idaho National Laboratory must be transported out of the state by 2035 and all high-level waste currently at the site must be ready for transport by 2035.

12. The amount of the Nuclear Waste Fund fee that was being collected prior to this decision was 1.0 mil, or one-tenth of one cent, per kilowatt-hour.

13. A separate policy brief by BPC outlines the many actions that would need to be taken and issues that would need to be resolved to re-start the Yucca Mountain licensing process. See: http://cdn.bipartisanpolicy.org/wp-content/uploads/2015/07/BPC-Energy-Yucca-Mountain.pdf.

Endnotes

14. A discussion of the incidents at WIPP and links to the reports of two Accident Investigation Boards are available online at: http://www.wipp.energy.gov/wipprecovery/accident_desc.html.

15. The collaboration included two workshops, held in 1989 and 1990 and sponsored by the MIT Hazardous Substances Management Program, the MIT-Harvard Public Disputes Program and the University of Pennsylvania's Wharton Risk and Decision Processes Center.

16. It is important to emphasize here that we include the elements of the Facility Siting Credo not because Council members believe the Credo comprehensively captures every aspect of an ideal consent-based process for siting nuclear waste facilities, but because we believe it offers a useful starting point for discussion and a possible foundation for future efforts to design more successful approaches to siting such facilities.

17. Notably, incentives for hosting a facility have typically been offered at the local, rather than the state level.

18. The Council received survey responses from the states of Connecticut, Colorado, Kansas, Minnesota, New Hampshire, New Mexico, Oregon, South Carolina, Utah, Vermont, Michigan, and West Virginia. In most cases, responses were received from state environmental agency directors, although the council also received a response from a state legislative representative and a state attorney general.

19. The National Enrichment Facility is a plant that enriches uranium using gas centrifuge technology. The plant was opened in 2011 by Louisiana Energy Services, a private company, which now operates under the name Urenco USA. It is important to point out that the National Enrichment Facility is a production facility, as opposed to a storage or disposal facility given that different types of facilities can be expected to present different siting challenges and impose different burdens and benefits on host states and communities.

20. It should be noted that although the BPC Nuclear Waste Council invited a wide range of individuals and organizations to its regional meeting with the aim of capturing the full diversity of views concerning these topics, the views of those who were willing to consider consent were disproportionately represented among attendees.

21. Many of these concerns are reflected in a BPC report on input from a series of stakeholder meetings held in 2015. See: http://cdn.bipartisanpolicy.org/wp-content/uploads/2015/10/BPC_Nuclear_Major-Themes-October-2015.pdf.

22. S. 854 is discussed on p.8 of this report.

23. Blue Ribbon Commission on America's Nuclear Future, 57. http://energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf.

24. Flynn, James, et al. "Time to rethink nuclear waste storage." Issues in Science and Technology 8.4 (1992): 47.

25. The annual budget of these committees, known in France as "commission locale d'information et de suivi" (CLIS), is €300,000.

26. Additional options are listed and described in NEA Report 7189: Stakeholder Involvement in Decision Making: A Short Guide to Issues, Approaches, and Resources, 2015, available online at: http://www.oecd-nea.org/rwm/pubs/2015/7189-stakeholder-involvement-2015.pdf.

27. Blue Ribbon Commission Report, 94. http://energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf.

28. Ibid, 56.

29. Howard Kunreuther and Douglas Easterling, "Are risk-benefit tradeoffs possible in siting hazardous facilities?" The American Economic Review 80.2 (1990): 252-256.

Notes

Notes

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