SAND2012-6260J

Designing a Process for Consent-Based Siting of Used Nuclear Fuel Facilities: Analysis of Public Support for a New Policy Approach

Hank C. Jenkins-Smith, Carol L. Silva, Kerry G. Herron, Evaristo "Tito" Bonano, and Rob P. Rechard

Hank Jenkins-Smith is professor of political science, University of Oklahoma. Carol Silva is associate professor of political science and director of the Center for Risk and Crisis Management, University of Oklahoma; and Kerry Herron is a research scientist, University of Oklahoma. Evaristo Bonano is a Senior Manager at the Sandia National Laboratories, and Rob P. Rechard is a risk analyst at Sandia National Laboratories, Albuquerque, New Mexico.

U.S. policies for long-term management of used nuclear fuel (UNF) have been placed on hold in the wake of the Obama Administration's decision to withdraw the license application for the proposed Yucca Mountain repository. After President Obama declared that the Nevada repository specified in the 1987 Amendments to the Nuclear Waste Policy Act was "unworkable," he directed Secretary of Energy Steven Chu to charter the Blue Ribbon Commission on America's Nuclear Future (BRC) to formulate recommendations for a new approach to the management of UNF.[1] One of the major conclusions of the BRC was that prior policy efforts have not garnered sufficient trust and confidence from the public or the prospective host state. To address these concerns, the BRC's recommendations, delivered in January 2012, included the following key elements (BRC 2012)[2]:

- The United States should undertake prompt efforts to develop one or more geologic disposal facilities and one or more consolidated (interim) storage facilities.
- A new consent-based approach should be developed and implemented for siting used nuclear fuel (UNF)[3] storage and disposal facilities, but the design of the consent process should not be specified and the definition of "consent" should be part of the negotiation of the process.
- The responsibility for the siting and operation of UNF interim and permanent repositories should be shifted from the U.S. Department of Energy (DOE) to a federally chartered corporation.

[1] See the charter for the BRC at *www.brc.gov/index.php?q=page/charter*.
[2] The BRC's final report (BRC 2012) can be found here*: www.brc.gov*.
[3] The terms "used" and "spent" nuclear fuel refer to the same materials, but they imply important differences in whether the materials are considered resources or wastes. In this article, we use the term "used nuclear fuel" (UNF) because we do not wish to suggest that the materials have no possible future utility.

Given the importance of public trust and confidence to a sustainable and successful UNF management process, the focus of this article is on likely public perceptions and response to the BRC's core recommendations. Our findings are based on data collected by the National Security and Nuclear Policies (NSNP)[4] project, which has measured public perceptions and beliefs about nuclear energy and the management of UNF annually since 2006. In a previous article in this journal (Jenkins-Smith et al., 2012) we addressed how policy and facility design considerations for UNF management relate to public acceptance.

In this follow-up article, we present findings from the June 2012 NSNP survey related to public understanding of current UNF management practices and investigate potential public reactions to the principles of consent-based siting recommended by the BRC. We measure (1) levels of public support for permanent and interim storage concepts, (2) credibility and perceptions of bias in institutional risk assessments, and (3) what constitutes "consent" for siting UNF facilities and how and when it may be granted and withdrawn. Our goal is to assess how readily the BRC's proposals might garner broad public support during the initial stages of policy development.

PUBLIC PREFERENCES FOR STORAGE PRACTICES FOR USED NUCLEAR FUEL

Unless UNF management practices are implicated by large-scale adverse nuclear events (such as the earthquakes and subsequent tsunami that struck Japan on March 11, 2011)[5], the level of public attention paid to UNF management policies is typically lower than it is for many other policy issues, such as the state of the economy and access to health care.

In fact, most members of the public do not seek out information about current UNF policies. Only 4 in 10 respondents in 2012 knew that UNF is being temporarily stored in cooling pools and specialized concrete casks at or near U.S. nuclear power plants at more than 100 sites in 39 states.[6] Only 14 percent

[4] The NSNP project's annual surveys are sponsored by Sandia National Laboratories and the University of Oklahoma. For an overview, see Herron, Jenkins-Smith, and Silva, 2012. Past reports are available at *http://crcm.ou.edu/projects/nuclear/*.

[5] NSNP measurements in 2011 and 2012 indicate that public support for U.S. nuclear energy production was only slightly adversely affected by the Japanese experience (a mean decline in support of –1.46 on a scale of –10 [strongly decreased support] to +10 [strongly increased support]).

[6] As noted in Jenkins-Smith et al. (2012), NSNP measurements over time indicate slowly growing public awareness of current UNF management practices from 1 in 5 respondents in 2006 to 4 in 10 respondents in 2011 and 2012.

knew whether UNF was being stored in their state of residence. In short, even in the aftermath of the well-publicized Fukushima nuclear event, details associated with UNF are not generally well known to the American public.

When measuring public assessments of complex policy issues about which knowledge and information levels vary widely, a phased approach in which basic factual information is provided in stages can ensure that respondents are at least minimally informed before they are asked for their opinions and policy preferences. After advising participants of current UNF temporary storage practices and presenting them with arguments for and against those policies, respondents were given the following descriptions of three policy options[7] for managing UNF and asked to rate them on a scale of 1 (strongly oppose) to 7 (strongly support).

a. After used nuclear fuel is removed from cooling pools, continue the current practice of temporarily storing it near ground level at designated nuclear power plants in 39 states. This option does not require additional transportation of radioactive materials by train or truck, but it is not without political and legal obstacles. Some states are suing the federal government to end temporary storage practices at nuclear power plants.

b. Construct several interim storage facilities that would be easier to secure and could store used nuclear fuel safely up to a hundred years, which is longer than envisioned for current storage at nuclear power plants. Eventually, the materials would need to be moved to a permanent nuclear repository. This option initially requires transporting used nuclear fuel by train or truck over moderate distances and is likely to generate political and legal opposition.

c. Construct two large nuclear repositories (one in the western US and one in the east) that can be most easily secured and would provide permanent storage and disposal of used nuclear fuel for thousands of years. This option requires transporting used nuclear fuel by train or truck over longer distances and is likely to generate political and legal opposition.

As shown in Table 1, the option of two permanent repositories was most favored and was the only option supported by a majority of respondents. This was followed by the interim consolidated storage facilities option; current practices were the least favored option.

[Insert Table 1 Here]
TABLE 1: Public Preferences for Alternative UNF Storage Concepts: 2012

PROXIMITY TO CURRENT AND PROSPECTIVE STORAGE FACILITIES

[7] The three options were presented in a random sequence to each respondent to avoid ordering effects.

The siting of a nuclear facility is typically assumed to generate "not-in-my-backyard" (NIMBY) reactions by nearby residents (Groothuis and Miller, 1994; Kraft and Clary, 1991), but in practice the relationship between proximity and public support has been more complex (Greenberg, 2009; Jenkins-Smith et al., 2011). In considering the BRC's recommendations for reliance on volunteer host communities and consent-based siting of UNF management facilities, locating proposed facilities raises at least three interrelated questions. First, what (if any) are the implications of residents' proximity to *current* temporary storage sites for supporting a national strategy of consolidating UNF at permanent repositories and interim storage facilities? Second, how does proximity to proposed *new* consolidated UNF facilities influence support for them? And third, does the experience of living near an existing UNF temporary storage site condition acceptance of future consolidated facilities near one's residence?

To explore how proximity to current storage facilities may relate to policy preferences, we first estimated the straight-line distance from the primary residence of each respondent to the nearest facility at which UNF is currently stored.[8] Estimated distances varied from 1 to 400 miles, with an average of 73.3 miles. Seventy-eight percent of respondents resided within 100 miles of a UNF storage site; by comparison, we estimate that 75.5 percent of the U.S. population resides within 100 miles of a licensed UNF storage facility.[9]

Figure 1 shows the sites at which UNF is currently is stored in cooling pools or dry casks, and shows the locations of the primary residences of the 1,715 survey respondents who consented to provide

[8] For participants who allowed their residential locations to be recorded, proximity was estimated using the most precise information available from three geolocation sources. If the equipment used to take the Web-based survey afforded exact latitude and longitude, precise geolocation was recorded; if the equipment did not provide latitude/longitude, an estimate based on IP address was used; for all others, estimated distance was based on the centroid of the respondent's zip code area.

[9] Estimates of population proximity to UNF storage sites are based on the Census Bureau's Zip Code Tabulation Areas (ZCTAs), using 2010 census data and including all ages/races and both genders. The Census Bureau calculates an area-weighted average point inside each ZCTA polygon, and publishes the associated latitude/longitude (similar to the centroid of a postal zip code area). We used these ZCTA center points to measure distances to the UNF licensed storage sites, as shown in the map in Figure 1. Based on the ZCTA population data and center points, we then calculated the percentages of the population of the contiguous 48 states that reside at varying distances from the nearest licensed UNF storage site.

their residential location information. The figure shows the widespread dispersal of UNF and the proximity of those locations to population densities.

[Insert Figure 1 Here]
FIGURE 1: Respondent Proximity to UNF Storage Sites: 2012

Does proximity to current temporary storage sites of UNF influence public support for the general strategy of UNF management recommended by the BRC? To address this question, we first randomly divided respondents into two equal subsamples. Both groups were then told to assume the following:

> GROUP-A: Assume that construction of two underground mine-like repositories is being considered for long-term storage and disposal of used nuclear fuel. One would be in the eastern US, and the other in the west. Each of these sites would include secure surface buildings and a mine deep underground where radioactive materials could be isolated from people and the environment and [the mine] could be designed [either] to allow retrieval or to permanently seal away the materials. The facilities and the mines would be designed to meet all technical and safety requirements set by the U.S. Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, and state regulatory agencies.
>
> GROUP-B: Assume that construction of one or more interim above-ground storage facilities is being considered where used nuclear fuel could be stored safely for up to a hundred years. Each of these sites would include secure surface facilities where used nuclear fuel could be consolidated and stored, and where the radioactive materials could cool and be prepared and packaged for later shipment to a permanent repository. These interim storage facilities would be designed to meet all technical and safety requirements set by the U.S. Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, and state regulatory agencies.

Each group was then asked to indicate support for the policy on a scale of 1 (strongly oppose) to 7 (strongly support).

Using ordinary least-squares (OLS) regression, with estimated proximity to current temporary UNF storage sites as the independent variable and support for each option as the dependent variable, we found that support for permanent repositories or consolidated interim storage sites (although favored over current practices) was not systematically related to current proximity to licensed UNF storage facilities.[10] These results indicate that the distance of one's residence from a current UNF storage site is not systematically predictive of a general preference for a national strategy for the future management of UNF.

To find out if proximity to a proposed interim storage facility or permanent repository influences support for that facility, we asked respondents to express their level of support for the same two policy op-

[10] We also considered non-linear relationships, modeled as polynomial regressions. These estimated functional forms were not significant.

tions if one of the new facilities were located within one of three randomly assigned distances—300 miles, 100 miles, or 50 miles—from their primary residence.[11] Table 2 compares (1) mean support for a permanent repository and interim storage facilities with no assumptions about proximity and (2) with progressive proximity to the respondent's home.

[Insert Table 2 Here]
TABLE 2: Mean Support for Future UNF Facilities by Proximity: 2012

When proximity to a respondent's primary residence was not taken into account, mean support for two mine-like permanent repositories was significantly higher than for one or more interim storage facilities ($p < .0001$).[12] When told to assume increasingly proximate locations to the respondent's primary residence, support for each option declined significantly. Mean support for repositories decreased about 23 percent for those living within 50 miles of the proposed facility ($p < .0001$), and mean support for interim storage facilities decreased about 14 percent at the same distance ($p < .0001$). Thus, although proximity to current on-site storage is not systematically related to preferences for consolidated management options for UNF, when considering how to site consolidated facilities, support can initially be expected to be negatively related to proximity to the proposed new sites—at least in a hypothetical scenario.

However, experience in siting the Waste Isolation Pilot Plant (WIPP)[13] in southern New Mexico revealed nonlinear variation in support relative to proximity. In this case, the strongest support was in the localized zone of greatest perceived benefits, such as jobs, economic gains, improved transportation routes and emergency response capabilities, etc. (Jenkins-Smith et al., 2011).

The answer to our third question—does living close to a *current* UNF storage site condition willingness to accept prospective *new* consolidated storage and disposal facilities relative to one's primary res-

[11] The wording was as follows: "What would your level of support be if you learned that one of these [permanent repositories for used nuclear fuel (50%) / interim storage facilities for used nuclear fuel (50%)] is to be located [randomly assigned: 300, 100, 50] miles from your principal residence?" Responses were provided on a scale of 1 (strongly oppose) to 7 (strongly support).
[12] The BRC based its recommendations on permanent repositories and consolidated interim storage facilities being complementary, not alternative choices. Our study was to determine support for each independently.
[13] Operational since 1999, the Waste Isolation Pilot Plant outside Carlsbad, New Mexico, is a disposal site for defense-related transuranic radioactive waste.

idence—shows that proximity cannot be easily relegated to predictable NIMBY assumptions or "locally unwanted land use" (so-called LULU) concerns. For this question, we divided survey participants into groups, one composed of those who had been shown[14] that their principal residences were located within 25 miles of temporary UNF storage facilities and a second group composed of those who were shown that their residences were more than 25 miles from such a facility.[15] These two groups were compared with members of a third group who were not given any information about the proximity of their residences to an existing UNF storage facility. Tables 3 and 4 show the average levels of support for siting a permanent UNF repository (or a consolidated interim storage facility) within 50, 100, and 300 miles of respondents' principal residences.

[Insert Tables 3 and 4 About Here]

TABLE 3: Effects of Proximity to Current UNF Storage on Support for a Future Permanent Repository
(Mean Values: 1 (Strongly Oppose) to 7 (Strongly Support)

TABLE 4: Effects of Proximity to Current UNF Storage on Support for a Future Consolidated Interim Storage Facility
(Mean Values: 1 (Strongly Oppose)– to 7 (Strongly Support)

Tables 3 and 4 provide modest evidence that people are slightly more willing to accept new UNF facilities *if they had been informed that they currently reside within 25 miles* of an existing UNF storage site. If the proposed new facility would be a permanent repository (Table 3), those who had been shown that they lived within 25 miles of UNF reported nominally greater support than those who either lived more than 25 miles from a site or had not been informed of their distance from a site. The increase in support was statistically significant when the new repository would be 100 miles distant. Note that the level of

[14] A random subset of 75 percent of the survey respondents received the following statement: "Based on the location information you provided, we estimate that your primary residence is approximately [insert estimate] miles (straight line) from the nearest nuclear energy facility where used nuclear fuel is currently in temporary storage. (Our estimate could be wrong, but you can check by looking at this map [a link was provided] showing where used nuclear fuel currently is being stored in the U.S.)"

[15] Distances were calculated for all respondents as described above in footnote 6, and a randomly selected subgroup (75 percent) of respondents were told how far their principal residences were (in linear miles) from an existing UNF storage facility and offered a link to a national map showing those locations. **The remaining 25 percent were not told the distance or provided with the link to the map. (IS THIS CORRECT? – Yes, this is correct.)**

support of those who *were not informed* of their proximity is very similar to that of respondents living more than 25 miles from existing UNF storage sites. Similar results were shown for a prospective siting of a consolidated interim storage facility (Table 4), with the exception that support for the new facility appears to increase if respondents were informed of proximity (regardless of distance) from existing UNF storage sites.

Based on these results, we concluded that proximity to current and future UNF facilities and the siting of a new facility is a complex relationship that does not easily lead to straightforward NIMBY responses. In fact, the effects of proximity can be subtle, subject to conditioning, and nonlinear.

However, our data do suggest that residents of potential host communities who have no prior experience of living near a UNF storage site may be less receptive than residents of candidate sites who have lived near UNF storage facilities. Thus, our analysis indicates that knowledge of existing storage sites and the proximity of those sites to the potential host community have systematic effects on receptiveness to new UNF facilities.

INSTITUTIONAL CREDIBILITY AND PERCEIVED BIASES IN RISK ASSESSMENT

The BRC was particularly attentive to issues of institutional credibility and trust, as was noted in the final BRC report (BRC, 2012, p. x):

> The overall record of DOE and of the federal government as a whole . . . has not inspired widespread confidence or trust in our nation's nuclear waste management program. For this and other reasons, the Commission concludes that a new, single-purpose organization is needed to provide the stability, focus, and credibility that are essential to get the waste program back on track.

In general, for policies for which public support depends heavily on assessments of the risks associated with alternative strategies and designs, public trust in institutional risk evaluations and perceptions of institutional bias weigh heavily in the consideration of alternative policies. The management of UNF is particularly sensitive to the credibility of official risk assessments and projections over very long periods of time for facility concepts, functional designs, operational safety and security, and transportation of radioactive materials.

How does the public assessment of trust in institutions involved with UNF management compare with the model suggested in the BRC final report? To find out, we posed the following question:

> Managing used nuclear fuel can be technically complex, and getting information you can trust is important. Please indicate your level of trust in information provided by science and engineering experts from each of the following organizations using a scale from zero to ten, where zero means *no trust* and ten means *complete trust.* [Random Order]
>
> a. The U.S. Nuclear Regulatory Commission (NRC)
> b. The U.S. Environmental Protection Agency (EPA)
> c. U.S. national laboratories for energy and security
> d. The National Academy of Sciences (NAS)
> e. State regulatory agencies
> f. Environmental advocacy groups, such as the Natural Resources Defense Council or the Sierra Club
> g. The Nuclear Energy Institute (NEI), which represents the nuclear power industry
> h. Utility companies that own nuclear power plants
> i. The U.S. Department of Energy (DOE)
> j. A private company chartered by the government and funded by fees from nuclear energy that is given responsibility for managing used nuclear fuel from U.S. nuclear power plants.[16]

After participants had rated their level of trust in each specified source of risk information, we asked the following question about expected risk bias for the same entities:

> Now we want to know more about impressions you may have about how these organizations are likely to assess risks associated with managing used nuclear fuel. Using a scale from one to seven, where one means the organization is likely to *downplay* risks, four means the organization is likely to *accurately assess* risks, and seven means the organization is likely to *exaggerate* risks, please rate your impressions of how each organization is likely to assess risks. [Random Order]

In Figure 2 we compare mean levels of trust in risk assessments by scientific and engineering experts from each of the organizations. Figure 3 shows mean expectations of institutional bias.

[Insert Figure 2 Here]
FIGURE 2: Mean Levels of Trust in Institutional Risk Assessments Regarding UNF: 2012

[Insert Figure 3 Here]
FIGURE 3: Mean Perceived Levels of Institutional Bias: 2012

[16] The BRC recommended the formation of a new single-purpose government-chartered private company outside DOE to oversee UNF policy management. In Figures 2 and 3, we call this organization "Fedcorp" for ease of reference.

The National Academy of Sciences and U.S. national laboratories for energy and security were most trusted, but the EPA, NRC, and DOE were also considered to be generally reliable sources of risk information. Risk assessments by nuclear utility companies and a prospective company chartered by the government and tasked with managing UNF policies ("Fedcorp") were seen as less trustworthy.

Several implications can be drawn from Figures 2 and 3. Note that the concept of a Fedcorp, a federal corporation for managing UNF, is not yet a factor in public discussions. Therefore, the responses shown here reflect only an initial impression based on a thumbnail characterization. We expect that variations in this characterization will influence the level of trust, and we plan to examine that issue in future studies. Nevertheless, indications are that the public will have to be persuaded that such an entity can be trusted to provide balanced information and unbiased risk assessments.

Interestingly, our sample also suggests that the broader public grants DOE a level of trust about mid-range among the key players, slightly below the level granted to EPA and NRC, but higher than the level for environmental interest groups, state regulatory agencies, and nuclear utilities. DOE, along with the National Laboratories, NRC, and state regulators, was perceived to err slightly in the direction of understating risks from UNF, whereas EPA was perceived to overstate them.

As a group, however, the government labs and agencies were seen to be more credible and balanced than nongovernmental groups. In short, our sample suggests that, although the U.S. public harbors a degree of skepticism about all of the entities involved in UNF management, it retains a non-trivial reservoir of trust in the public agencies charged with managing UNF.

PUBLIC CONCEPTIONS OF "CONSENT"

Among the key recommendations of the BRC, one of the most significant departures from prior UNF management policies is a call for a "consent-based siting process." As noted in the report, the change raises important issues about how to define and register "consent" in the policy process. First, what constitutes consent? Second, who should have the authority to grant or withhold consent? Finally, once consent has been legally given, may it be withdrawn and, if so, at what stages of the siting process?

The BRC addressed the nature of consent only in general terms, considering the specific processes to be part of the negotiations with potential host communities. Although no formal definition was recommended, the Commission essentially considered consent a function of willingness on the part of authorized entities to enter into legal agreements (BRC, 2012, p. 57):

> The Commission takes the view that the question of how to determine consent ultimately has to be answered by a potential host jurisdiction, using whatever means and timing it sees fit. We believe that a good gauge of consent would be the willingness of the host state (and other affected units of government, as appropriate) to enter into legally binding agreements with the facility operator, where these agreements enable states, tribes, or communities to have confidence that they can protect the interests of their citizens.

To explore the issue of consent with our survey participants, we first asked them to rate the importance (0 = not at all important to 10 = extremely important) of the requirement that key stakeholders grant consent before a UNF facility can be sited. Not surprisingly, the mean response was 7.55, confirming that most respondents considered the host's consent an important requisite.

We then defined two broad approaches to obtaining consent, differentiated by the degree of public involvement, and asked which approach was preferred. The two descriptions shown below were presented in random order. Each respondent's home state was inserted where indicated to personalize the question.

> A: "Consent" should involve a process where many different stakeholders must agree. Thus consent should require agreement by local elected officials, [insert state]'s governor, both of [insert state]'s U.S. senators, the U.S. congressperson representing the host community, and [insert state]'s environmental protection agencies. In addition, a state-wide vote should be held that wins the support of a majority of citizens in [insert state].
>
> B: "Consent" should involve a process where only those that are most affected must agree. Thus consent should require agreement by local elected officials and [insert state]'s governor. In addition, a vote should be held that wins the support of a majority of the residents in the local host community.

The more inclusive process (A) was preferred by a modest majority (58 percent) of respondents.

Because the nature of consent is potentially negotiable with prospective hosts of UNF facilities, another way of investigating public views on the subject is to ask ordinary citizens who they think should be allowed to block/veto a decision to site a UNF facility. We presented a randomly ordered list of the entities shown in Table 5 and asked participants to select all of those they thought should be allowed to block/veto

construction of a UNF facility in their state. Again, the name of each respondent's home state was inserted where indicated.

[Insert Table 5 Here]
TABLE 5: Who Should Be Allowed to Block/Veto a Siting Decision: 2012

Only three entities received a majority of preferences for holding veto power: (1) a majority of citizens residing within 50 miles of the proposed facility; (2) a majority of voters in the state; and (3) the governor of the state. So, although most respondents preferred an inclusive siting process, preferences for granting authority to block a siting process were restricted to those most directly affected and the chief executive of the state.

Finally, we also gained some insight into when, in the course of the siting process, consent might be withdrawn. For this exercise, we divided the siting process into five stages, each of which was described briefly. We then asked whether a host state and local community should be allowed to withdraw consent at each stage in the process; response options were "no" or "yes."

Half of the participants were given descriptions specifying a permanent repository, and half were given descriptions specifying an interim storage site. The steps in the siting process were the same for both groups. We provided the introduction and five steps as shown below:

> A related issue involves if and when consent might be withdrawn. The siting process will proceed in stages, and at some point a final decision to build or not to build the facility must be made. Each of these stages requires considerable investment of money and time. Each stage also provides more information for making a good decision. Generally, these stages include:
>
> Stage 1: The community or state volunteers to be a candidate to host a [permanent repository/interim storage facility] for used nuclear fuel, and a technical evaluation of the site is begun. This evaluation may take several years to complete. Should the host state and local community be allowed to withdraw their consent during this stage?
>
> Stage 2: Scientific evaluation of the suitability of the site for [permanent storage and disposal/interim storage of] used nuclear fuel is completed. Should the host state and local community be allowed to withdraw their consent at this stage?
>
> Stage 3: If the site is determined to be suitable, a license to construct a [permanent repository/interim storage facility] for used nuclear fuel is submitted to the U.S. regulatory agencies; the regulatory consideration may take several years to complete. Should the host state and local community be allowed to withdraw their consent during this stage?

> Stage 4: If the license is provided, construction of a [permanent repository/interim storage facility] for used nuclear fuel begins. Construction will take several years to complete. Should the host state and local community be allowed to withdraw their consent during this stage?
>
> Stage 5: Construction is completed, and the [permanent repository/interim storage facility] is prepared to receive used nuclear fuel. Should the host state and local community be allowed to withdraw their consent at this stage?

The percentages of respondents indicating whether or not consent could be withdrawn at each stage, for each type of facility, are shown in Table 6.

[Insert Table 6 Here]
TABLE 6: At What Stage in the Siting Process Should Potential Host Communities be Permitted to Withdraw Consent?

For both types of UNF facilities, substantial majorities of respondents thought potential host communities or states should be permitted to withdraw consent at each of the first three stages, which involve site evaluation and licensing. Only about four in ten respondents would allow consent to be withdrawn during stage 4 (after a license has been issued), and only about one in three respondents would allow consent to be withdrawn after stage 5 (when construction has been completed).

Participants wanted to preserve the option of withdrawing consent, but most thought withdrawal should not be available after a license had been provided or investments associated with facility construction had been made. In short, our data suggest that, although members of the public broadly support the BRC recommendation of a consent-based process for siting UNF facilities, they also prefer that withdrawal of consent be an option only in the early stages of the siting process.

CONCLUSIONS: LESSONS LEARNED

We have focused on assessing public support for some of the key BRC policy recommendations for moving forward in managing UNF. Our investigation of public support for consent-based siting of UNF facilities yielded some valuable insights.

Storage and disposition of UNF have relatively low issue salience, and most US citizens do not seek out information about current UNF management policies. When informed of current practices, and

when presented with options for consolidating UNF at permanent repositories and/or interim storage facilities, both options were preferred to current temporary storage practices. However, support for permanent repositories was significantly higher than for interim storage sites. Although the BRC recommendations include strong arguments for both types of facilities, the justification for interim storage is not as evident to those whom we surveyed.

The implications of living near current and proposed UNF facilities cannot be reduced to simple assumptions about NIMBY. However, preliminary evidence does suggest that living near a current temporary site may condition residents to be somewhat more accepting of facilities for consolidated storage and disposal. In addition, respondents evidenced different levels of trust in risk assessments, depending on the source, and evinced not unreasonable expectations of institutional biases.

Generating public support for a new federal corporation to site, build, and operate UNF facilities, as recommended by the BRC, may require a substantial investment in public engagement. Most participants favored more inclusive processes for determining public/official consent to the siting of UNF facilities. But they were cautious about allowing veto power to be widely dispersed, preferring to limit it to the populations most directly affected and the governor of the host state. Most indicated they would allow legal consent to be withdrawn during site evaluation and the licensing phase of the siting process, but not after licensing or the initiation of facility construction.

In summary, although more research is needed, our findings highlight some of the complexities that will be involved in conveying the BRC recommendations to the public. However, they also indicate broadly positive public assessments of the policy design principles underlying those recommendations.

ACKNOWLEDGMENTS

Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Company, for the U.S. Department of Energy (DOE) National Nu-

clear Security Administration under contract DE-AC04-94AL85000. The statements expressed in this article are those of the authors and do not necessarily reflect the views or policies of DOE or Sandia.

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Tables and Figures for *The Bridge* Paper #2

TABLE 1: Public Preferences for Alternative UNF Storage Concepts: 2012

Concept	% Oppose	% Unsure	% Support	Mean (1–7)	Statistical Significance
a. Continued on-site storage	35	32	33	3.92	$p < .0001$ (each pairing)
b. Several interim facilities	28	29	43	4.17	
c. Two permanent repositories	25	24	51	4.50	

FIGURE 1: Respondent Proximity to UNF Storage Sites: 2012

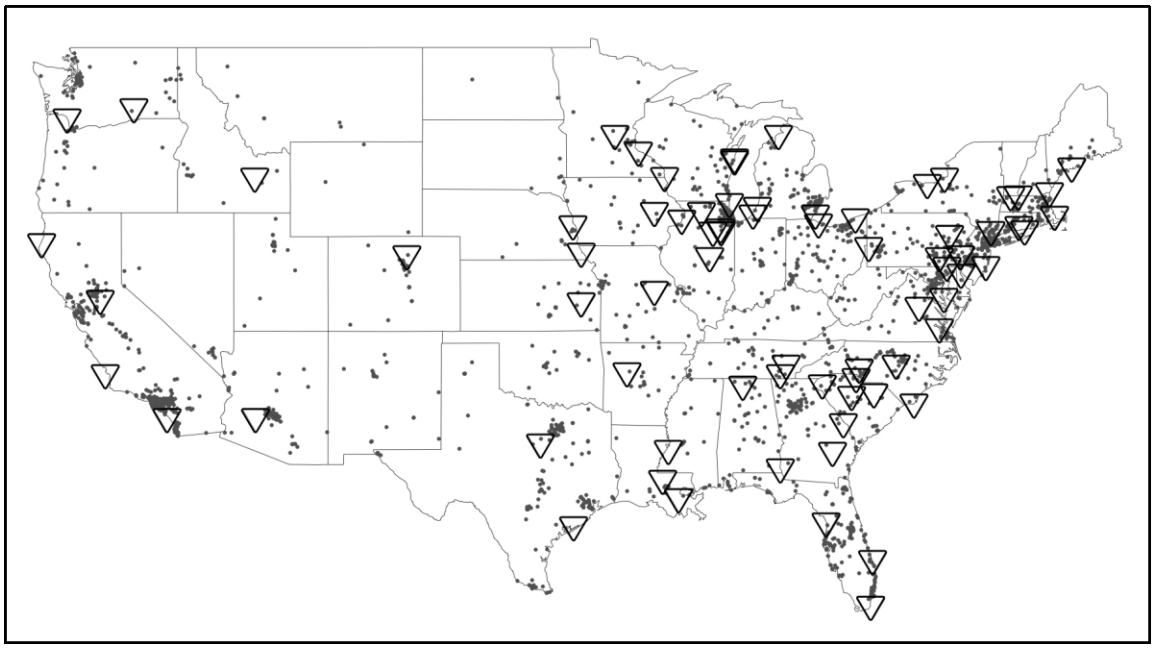

TABLE 2: Mean Support for Future UNF Facilities by Proximity: 2012

Mean Support (1–7)	No Proximity Specified	300 Miles from Residence	100 Miles from Residence	50 Miles from Residence
Permanent Repositories	4.65	4.35	4.00	3.60
Interim Storage Facilities	4.29	4.25	3.87	3.74

TABLE 3: Effects of Proximity to Current UNF Storage on Support for a Future Permanent Repository

Distance from Residence to Nearest *Current* UNF Storage Facility	Support for Repository to be Located 50 Miles from Residence	Support for Repository to be Located 100 Miles from Residence	Support for Repository to be Located 300 Miles from Residence
Shown within 25 Miles	3.89	4.79	4.71
Shown over 25 Miles	3.56	3.90	4.33
Distance not Shown	3.55	3.96	4.26
Model *F* statistic significance	*not significant*	p=0.01	*not significant*
Sample size	330	311	367

TABLE 4: Effects of Proximity to Current UNF Storage on Support for a Future Consolidated Interim Storage Facility

Distance from Residence to Nearest *Current* UNF Storage Facility	Support for Interim Storage to be Located 50 Miles from Residence	Support for Interim Storage to be Located 100 Miles from Residence	Support for Interim Storage to be Located 300 Miles from Residence
Shown to be within 25 Miles:	4.34	4.12	4.22
Shown to be over 25 Miles:	3.71	3.97	4.30
Distance not Shown:	3.42	3.49	4.13
Model *F* statistic significance	p=0.02	p=0.09	*not significant*
Sample size	289	344	366

FIGURE 2: Mean Trust in Institutional Risk Assessments Regarding UNF: 2012

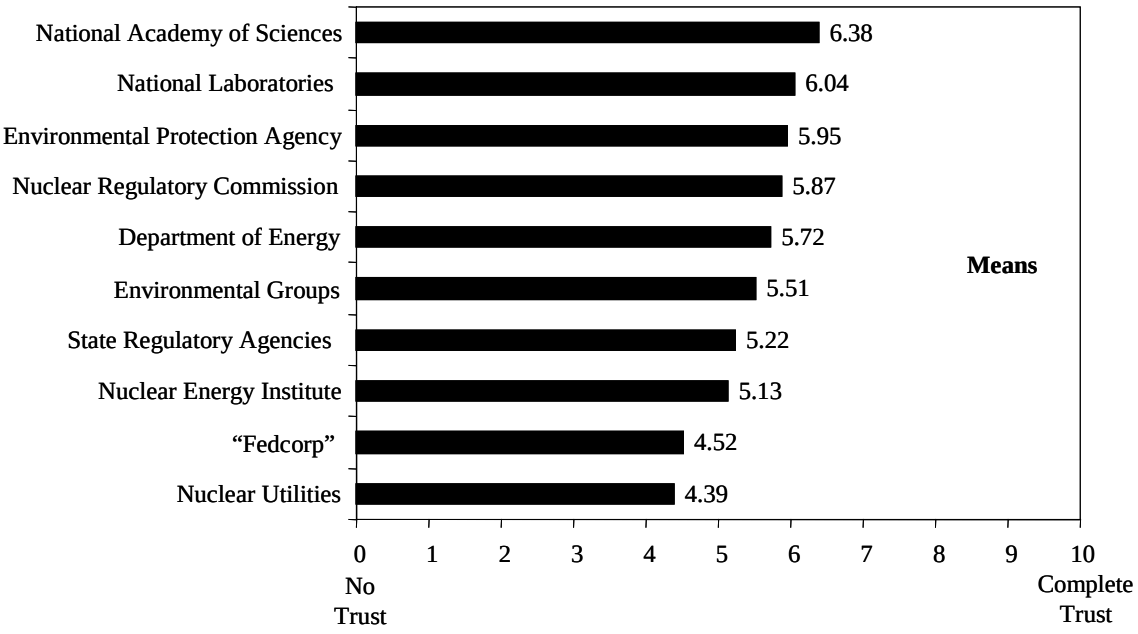

FIGURE 3: Mean Perceived Institutional Risk Bias: 2012

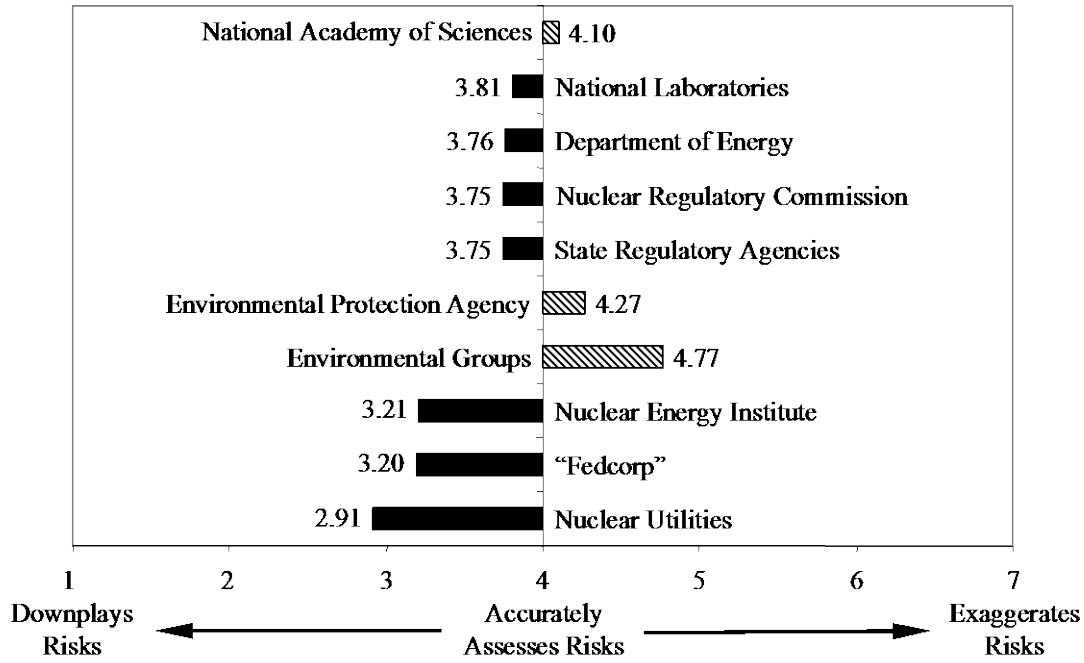

TABLE 5: Who Should Be Allowed to Block/Veto a Siting Decision: 2012

	% YES
A majority of the citizens residing within 50 miles of the proposed facilities	68
A majority of the voters of [insert state]	57
The Governor of [insert state]	55
[insert state]'s environmental protection agency or its equivalent	48
The U.S. Environmental Protection Agency	40
The U.S. Nuclear Regulatory Commission	39
The U.S. Department of Energy	36
The U.S. congressperson representing the district in which the host community is located	35
Either of the two U.S. senators from [insert state]	34
The leaders of [insert state]'s legislature	29
Nongovernmental environmental groups in [insert state]	20

TABLE 6: At What Stage in the Siting Process Should Potential Host Communities be Permitted to Withdraw Consent?

	Permanent Repositories (% Yes)	Interim Stor-age (% Yes)
Stage 1: Host community/state volunteer, site assessment initiated	74.3	74.7
Stage 2: Scientific evaluation of site suitability completed	73.6	72.6
Stage 3: License application to construct a UNF facility is submitted to agencies	62.2	66.2
Stage 4: License is obtained, facility construction initiated	40.5	46.3
Stage 5: Construction completed, facility prepared to receive UNF	30.5	33.9