Siting Considerations for Consolidated Storage of Used Fuel in the United States – Assessing the Impact of Key Developments since Release of the Blue Ribbon Commission Report in 2012 - 15458

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ABSTRACT

This paper offers a formula for achieving success in siting a facility for the Interim Pilot Storage Facility and a Consolidated Storage Facility for Used Fuel as envisioned by the Blue Ribbon Commission Report in 2012 and by the DOE in its Strategy Recommendations issued in 2013. Particular attention is given to the potential impact of recent events (i.e., the underground fire and radioactive release incidences at WIPP in February 2014) on the proposed formula and for their potential impact on future siting efforts. Particular attention is giving to the continuation and application of the Consensus Based Approach which will now face additional challenges.

INTRODUCTION

Despite the increased attention being paid by the public and policy-makers to the critical need for the safe management of nuclear waste, especially for the storage of used (spent) fuel from commercial nuclear plants, a process for doing so has yet to be defined. This issue has multiple dimensions. First, Yucca Mountain, as envisioned in the 1982 Nuclear Waste Policy Act and the subsequent 1987 Amendments Act, was supposed to be well on its way to opening by now. In 2012, Yucca Mountain found itself derailed and demobilized almost single handedly by Senator Harry Reid (D-NV), Senate Majority Leader with the support of the Obama administration. Now, with a Republican Congress in place, and with Senator Harry Reid in a less powerful position as Senate Minority Leader, there is new hope for legislation that refocuses attention back on Yucca Mountain. Also supportive of the restart of Yucca Mountain, the Nuclear Regulatory Commission (NRC) continues to move forward to comply with a Court Mandamus issued in 2013 to resume the licensing process and, at this writing, has prepared five volumes composing the Safety Evaluation Report and is headed to prepare a required Supplemental Environmental Report. The next step will be Construction Authorization which will have to be approved by the NRC Commission.

Pressure has been mounting to move forward on Yucca Mountain as the result of other court decisions including zeroing out the fee rate payers pay to cover disposal costs, waste confidence that continues to be of concern to utilities looking to invest in new reactor construction, and, most importantly, continuation of huge monetary judgments being awarded to utilities as they sue the DOE for failing to deliver on its commitment to provide disposal for their spent fuel. As

a result, a growing number of policy makers and industry observers (perhaps a critical mass!) now believe it is time to move legislation and a support base is developing for a dual track that would: (1) fund and remobilize Yucca Mountain, and (2) implement a Consensus Based Approach (CBA) for siting other consolidated facilities as recommended by the Blue Ribbon Commission (BRC).

Following the BRC recommendations, one year later, the DOE put forward an implementation strategy that would: (1) make an Interim Pilot Facility available by 2021 for storing stranded fuel from the shutdown commercial reactor sites; (2) make a Consolidated Storage Facility available by 2026 for other commercial reactor fuel; and (3) open a new repository by 2048. Several sites have all expressed an interest in hosting at least one, if not all, of these facilities. These include South Carolina, Texas, New Mexico, Nevada, Kentucky, Idaho, Virginia and Mississippi. However, Congress has yet to fund implementation of any of the BRC and DOE recommendations. As a result no process exists today within the DOE to evaluate sites proposed by communities and states and no DOE contact person has been named.

So where does that leave us? Bottom line, we dare not fool ourselves that the debate and legal action on Yucca Mountain will end even if Congress passes legislation. Therefore, it is important that we look beyond Yucca Mountain for a more comprehensive solution to the management of Used Fuel and High Level Waste and also factor in other key developments that have occurred since the BRC report. Redundancy is a well-accepted and widely implemented approach to safety and security within the nuclear industry so why not with storage capabilities? As prescribed in the BRC report, other sites for consolidated storage should be developed and a well-defined public process for siting such facilities needs to be outlined and implemented.

Another obstacle to getting the nuclear storage problem solved that must be acknowledged is the simple fact that most people are indifferent to this issue. If the lights are still on and storage of used nuclear fuel next to the power plants is safe for now, why worry? Because gasoline is so cheap why worry about alternatives to fossil fuel?

This is decidedly a short-term, myopic view. The reality is that spent fuel pools and dry storage facilities at commercial nuclear power plants continue to fill rapidly to capacity. Increasing numbers of nuclear power plants are being shut down -- contributing to an ever increasing number of non-operating facilities with stranded used fuel. Because the DOE has not met its obligation to take the fuel, utilities continue to sue them and huge judgments will continue to be rendered to an amount over $50B. This is not a sustainable approach especially as the nation addresses the growth of carbon based emissions and the need for cleaner air. Overlooked somehow are the facts that nuclear power must be a part of our clean-air focused growth in electric supply. Also ignored is the fact that scattered storage creates a security issue. Centralized storage would be much easier to protect and guard from potential terrorists.

Suggested Formula and Path Forward

In order to address the problem of safe storage of used nuclear fuel, we must get started immediately by laying out realistic solutions. This is needed regardless or not if Yucca Mountain is restarted. A realistic solution must be boiled down to 4 "P's:"

(1) **P**lace or Location -- identify a site that satisfies basic technical requirements;

(2) **P**rocess -- apply an open and credible approach sustainable from siting to operations

(3) **P**ackage -- provide a mix of attractive incentives to host states and communities

(4) **P**olitical alignment – ensure an enduring commitment by jurisdictions approving sites

As we examine these four "P's," we will weave in some observations of past attempts where siting interim facilities that have failed. We will glean the lessons learned from these failures and apply them to construct a successful framework for today.

We will also examine WIPP as it was cited several times by the BRC as a model in future siting efforts because it used a Consensus Based Approach (CBA). As many readers are aware, WIPP experienced both an above ground and below ground radioactive release in February 2014. The release, along with some initial missteps in the response to it by the DOE, has hurt the trust that had been built with stakeholders since the opening of WIPP in 1999 and its operation over the last 15 years. This consensus includes Capitol Hill, the DOE, the State of New Mexico, community leaders (in Carlsbad and Hobbs) and other stakeholders. The WIPP incidences must be recognized and addressed if we are to maximize the probability of success in identifying, approving and finally securing a new site. In addition to WIPP, stakeholder distrust has grown as a result of the Fukushima – Daichi event in March 2011. Therefore, in implementing the recommendations made by the Blue Ribbon Commission (BRC) for a "Consensus Based Approach" it is extremely important that factors are acknowledged as "in play" and solid, credible responses must be developed ahead of time.

THE FOUR "P's"

P #1 Place or Location

In addition to Yucca Mountain, there have been at least four bona fide attempts in our country to locate a commercial used fuel storage or disposal facility. Of these, Yucca Mountain ended up being cancelled, and four other sites for interim storage were not successful: the Private Fuel Storage effort located on the Goshute Reservation in Utah; the Monitored Retrievable Facility (the most serious being the one proposed for Oak Ridge, Tennessee and the other for the Mescalero Apache Reservation near Ruidoso, New Mexico); and a relatively mature effort for siting of Used Fuel Interim Storage that was proposed for southeastern New Mexico in the

vicinity of WIPP by the Lea/Eddy Energy Alliance (ELEA). Common to all these efforts was the fact that they were initiated by a host community who saw that hosting a consolidated interim storage facility would serve as an economic boon for local economic development in the way of new jobs and other benefits. Also common to all, is that each of these efforts ultimately failed because of the lack of state support. Interestingly, all four of these sites met basic technical siting criteria. The BRC rightfully recognized that, in addition to meeting the basic siting criteria, there is a huge need to **obtain state support early on.**

It is important to note that as we move forward with this first "P," locational models have been developed and are available to be utilized for initial screening. This will prevent wasting time (and political capital) on sites that do not meet basic criteria. In this regard, the author recommends that the DOE consider utilizing a model developed by Gary Mays, Group Leader, Advanced Reactor Systems and Safety at Oak Ridge National Lab that was used to screen sites across the nation for Small Modular Reactors. Gary recently indicated that his model could be easily adapted to provide a "first sweep" to identify potential used fuel storage sites.

P #2 Process

The second "P" is defined as the process for more precisely targeting an individual site and testing its basic suitability. This includes site investigations for everything from soil and ground water testing to checking for the existence of Native American burial grounds and endangered species. It is at this point that the siting effort could begin to hit major obstacles. As activities begin and information begins to leak out, it will generate a strong emotional reaction among some local or state stakeholders. Some will undoubtedly view the investigation process as an effort to sneak a "nuclear waste dump" into their area and stimulate a familiar "Not In My Backyard" response. Every effort possible should be made to avoid this. Open communications at every step are the key from the community to the state level. Although it has not been done yet, the best approach would seem to be for the state to be on board early in allowing potential sites within its borders to be investigated. The siting entity should be prepared to be open to answering all questions. In addition, the siting entity should consider hiring someone known to the state and community with a high degree of knowledge, credibility and unquestioned integrity.

Some of the basic questions that will have to be answered early on are likely to focus on the proximity of the site to water supplies (underground aquifers being as important as rivers or lakes), the proposed transportation routes and mode of transportation (rail or truck), and safety of the proposed storage technology (especially its safety features) and where it has been used before. Preliminary technical investigations to be conducted should include site and soil characterization, possible seismic activity and the probability of adverse natural phenomena (tornadoes, hurricanes, etc.). They should also focus on uncovering any economic "show stoppers" such as whether it is too expensive to move the used fuel from its current location to the site, or whether infrastructure requirements would be too expensive relative to other sites. The availability of an operational rail line is also a critical factor.

Concomitant with the effort to assess the economic and technical feasibility of a site is the need to initiate the Consensus Based Approach. Remember all the other site efforts to date have failed because they either were not able to secure the critical mass of support needed at the state wide level and/or by non-local stakeholders. The best way to overcome and to gain the broader (i.e. non-local) support necessary is by early stakeholder education. For example, with WIPP educational efforts began very early in the host communities and state-wide some 20 years before the site actually opened. Another key element of success at WIPP was the establishment of a New Mexico statewide independent oversight group, the Environmental Evaluation Group (EEG). For the most part, the EEG was well trusted by stakeholder and political leaders alike and had a strong review role in evaluating the plans for WIPP and in suggesting ways to make the site safer. Along the way, many battles were fought to get WIPP open including the overcoming of lawsuits, two by the State Attorney Generals, Attorney Generals who went on to be members of the U.S. Senate. One of them, Jeff Bingaman went on to approve the WIPP Land Withdrawal Act in 1992 that allowed the land to be transferred to the Bureau of Land Management. The other, Tom Udall, is now a Senator from New Mexico. From the vantage point of this author, the final seals of approval for WIPP from the National Academy of Sciences and the combined evaluations of the OECD/Nuclear Energy Agency and the International Atomic Energy Agency were the most important factor in the passage of the Land withdrawal legislation and the ultimate certification of WIPP.

As pointed out earlier, since 2012 when the BRC report was issued there has been a radioactive release at WIPP. Ironically, WIPP was the BRC proposed model project for its proposed Consensus Based Approach (CBA) and was being highly touted to other communities and states if they were interested in hosting a facility. In selling the acceptability of an interim site in the future, it is the view of this author that the release at WIPP, and accompanying issues, will figure prominently in influencing public opinion of whether, and under what conditions, they would be willing to support a facility for interim storage. A key issue in this regard is the fact that it took five days after the release for the community of Carlsbad to be notified and this only came after a monitoring device at the Carlsbad Environmental Monitoring and Research Center detected it. The technical causes for the release and how they will be prevented in the future is a subject to be covered in the WIPP Recovery Plan. It is critical that this plan give priority to the immediate use of an emergency alert and response system; fortunately, one was available but, unfortunately, it was not utilized at WIPP.

In addition to community oversight, it is also critical that the state be involved in providing a strong on-going oversight role. The New Mexico Department of the Environment has expressed “serious concerns” with the way the DOE handled the release event at WIPP. It is the opinion of the author that this could have a significant impact on public and official acceptance of other proposed sites in the future in New Mexico and elsewhere. Therefore, it is important that DOE proceed to “recover” WIPP under a transparent and open process like the Consensus Based

Approach prescribed by the BRC and carefully assemble the lessons learned that can be applied to future siting efforts.

P #3 Package

The third "P," is defined as the package of incentives that will be required in order to provide fair economic benefits to work in harmony with the host state and community. The BRC reported that ultimate acceptance will depend on not just the jobs and other economic benefits that an interim storage facility will generate, but also on the "whole" package of incentives and benefits that the siting entity is willing to offer. These will include road and transportation improvements, education benefits, research and development monies for universities, and possibly, preferred siting status for other federal projects.

Relative to our third "P," it is important to note a short lived effort in the early mid-80's, when it became clear that siting and opening Yucca Mountain was going to take a lot longer than originally anticipated. This effort was the Monitored Retrievable Storage (MRS) program headed by Office of the Nuclear Waste Negotiator in the DOE. The purpose of this effort was to locate and secure a site for the interim storage of used fuel. It was planned to be heavily monitored to ensure its safety to the public and the environment. Unfortunately, the federal government over-anticipated the eagerness of a community and state willing to host a facility. While many states and communities were quick to apply for grants that allowed them to study potential sites, in the long run, only two proposed sites, one in Oak Ridge, Tennessee, and one at the Mescalero Apache Reservation in New Mexico, applied but were not approved. Though well intended, the MRS failed in part because the Nuclear Waste Negotiator was not authorized to offer an incentive package. Both were hindered by the lack of state support. Ultimately, the MRS program was cancelled and legislation was passed that prohibited an Interim Storage Facility until the Yucca Mountain Facility was operational.

Thus, the reality of locating a site has been diminished by these past failures. Once again, we can learn lessons from each of these failed efforts to ensure we do not repeat the mistakes of the past. It is the opinion of this author that because of the mistakes at WIPP that the storage of used nuclear underground at all will be questioned. This could impact the re-opening of Yucca Mountain and lead to a sharper focus back again on monitored above ground facilities ("Back to the Future" if you will). This time however successful negotiations will now require the DOE to offer interested states and communities an attractive incentive package up front.

P #4 Political Alignment

We now come to the final "P," to achieve successful siting. This is defined as lining up the critical mass of community, state and national officials needed to overcome obstacles and to provide sustainable support for a site. Sustainability is required at every step -- from initial identification of a site to its eventual operation. As we have seen from past efforts the biggest gaps manifested themselves between the state and local communities. In the case of WIPP, it

has also manifested itself in post-operational issues that have sharply divided the host state and community from the siting entity (in this case, the DOE).

It is absolutely critical that interested host communities inform and involve state officials and their congressional delegations right at the beginning. A very high level of trust will be required at the beginning that must be sustained all the way through. In addition, the state officials (including the Governor) need to be essential players in the development and negotiations that will occur as the CBA moves along and as the dollar value and composition of an acceptable incentive package is determined. As recommended earlier, the person negotiating on behalf of the siting entity will need to arrive on the scene with an initial package similar to an opening bid in an auction. The fact that an offer is being made at all should give the state official or member of the congressional delegation adequate reason to engage in discussions. These officials can answer initial objections that may arise by pointing to the jobs and other economic benefits a used fuel storage facility can bring. They can also argue that they intend to negotiate a final offer that includes a safety and environmental oversight role as well as unique and significant economic benefits to the state. These benefits can include improvements to infrastructure (including roads, utilities and internet capabilities), educational system, R&D opportunities and preference for other Federal projects.

It will also be necessary to show a clear benefit to all residents of a host state beyond the community where the site is located. Consideration should be given to requiring a "reverse severance tax." The State of Alaska as well as several other states with highly valued minerals and other natural resources provides for an annual payment to individual residents from a resource depletion fund. (In the case of Alaska individual payments range from upwards of $4,000 or more for the depletion of oil reserves.) A fund should be created whereby every state resident is compensated for their agreement in sustaining the operation of a facility at the point in time it begins receiving used nuclear fuel. To the favor of the siting entity, other elements of the agreement could include a full or partial payback to cover the costs incurred by the siting entity if the state changes its mind or fails in providing critical support.

CONCLUSIONS

This paper has examined the key elements factors in the process of selecting a site for the consolidated storage of used nuclear fuel. Unless our nation begins to initiate a defined and well understood process very soon, we will have to rely on the status quo for energy production. We will continue to create a huge liability for the next generation and likely affect the quality of the air they will breathe. Unfortunately, the status quo is well entrenched and characterized by over dependence on fossil fuel especially with low gasoline prices. The resultant damage will continue to be harmful to the environment and to the public health with no real end in sight. The best way to offset this damage is to begin now with concrete solution that puts development of nuclear energy as one critical component of a cleaner future portfolio.

In order to stimulate the development of clean nuclear energy we must do all that we can to address the waste issue. This will require that new disposal/storage facilities be developed even if Yucca Mountain is resurrected. The technology exists to do this but the sense of resolve is sorely lacking. Although, the Blue Ribbon Commission has laid out a good blue print for locating sites it did not anticipate important court rulings that point to the fact that Yucca Mountain can be reopened safely, nor did it foresee WIPP incidences nor the earthquake/tsunami at Fukushima - Daichi. I think we all can agree that it will take a lot more now to overcome stakeholder distrust and resistance. This will raise the stakes even higher in finding states and communities that will agree to act as host sites in the future. If the nuclear waste negotiation process is to be re-established then the burden rests squarely on the shoulders of the DOE and Congress to be able to provide an attractive minimum incentive package to get the negotiation process started.

The lesson learned from siting failures points to the need for state involvement early on and therefore it is advised that the Governor's office should be the first stop on any Federal effort to identify and locate a site. This should be followed by strong stakeholder education efforts not only in communities where a site is being proposed but also all across a potential host state. The "sell" will be tougher and the financial bar will be higher. In this regard, consideration should be given to providing monetary benefits, such as a reverse severance tax, that would be provided to every resident household in a state that agrees to host a storage facility. Finally, the DOE, the contractor industry, and policy-makers should glean the lessons learned from WIPP and WIPP Recovery and apply them to develop new approaches that will result in storing and managing our used nuclear fuel safely, securely and cost-effectively in the future. This includes inclusion of new technology that has developed since WIPP opened 15 years ago: technology that can make sure the site and operations of WIPP are as safe and transparent as possible. The WIPP Recovery Plan is the place to start now in implementing a publicly supported solution and a Consensus Based Approach. How this is done is absolutely critical to future siting of other storage or disposal sites.