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United States Senate Committee on Environment and Public Works
Subcommittee on Clean Air and Nuclear Safety

Recommendations from the Blue Ribbon Commission on America's Nuclear Future for a
Consent-Based Approach to Siting Nuclear Waste Storage and Management Facilities
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Chairman Carper and Ranking Member Barrasso, and the distinguished members of the Committee; thank you for inviting me to testify before you today. I am Mr. Andrew Orrell, and I have the pleasure of serving as the Director of Nuclear Energy & Fuel Cycle Programs at Sandia National Laboratories.¹

I am proud of the numerous science and engineering contributions Sandia has made for over 35 years in the fields of repository science and nuclear waste management, including transportation, storage and disposal. Sandia has provided the Department of Energy the program leadership and technical expertise for several nuclear waste management initiatives including the Waste Isolation Pilot Plant (WIPP) and the Yucca Mountain Project.² I personally have over two decades of technical and managerial experience supporting the development of both these repository projects, as well as the transportation program for WIPP. I lived in Carlsbad New Mexico in the 8 years leading up to the compliance application submittal, and in Las Vegas Nevada for the 12 years leading up to the license application submittal, in addition to interfacing with several international repository programs. Throughout my career I have experienced first-hand the meaning of consent-based approaches to repository projects and the "cauldron of public controversy"³ that can surround them. It is from this perspective that I offer my comments today, recognizing any such comments are my own and do not necessarily represent the opinions or positions of the Department of Energy or Sandia National Laboratories.

That some communities are vigorous in their demands to have spent nuclear fuel and high-level waste removed from their backyards, while other communities are now equally interested in hosting the storage and disposal of that very same material simply illustrates the adage that one man's waste is another man's treasure, but it also begs the question what's the problem? It would seem it is a matter of reaching an agreement that some would argue is right before us.

¹ Sandia is a multi-program, multi-disciplinary Department of Energy national laboratory operated by Sandia Corporation as a Federally Funded Research and Development Center. We are an independent entity sponsored by the U.S. government to provide detailed technical expertise on complex national challenges.

² Sandia was designated as the Science Advisor for WIPP salt repository science in 1975 (and continues as such today) and designated in 2006 as the Lead Laboratory for Repository Systems for Yucca Mountain under the former DOE Office of Civilian Radioactive Waste Management.

³ Quotation excerpted from comments made by former NRC Chairman Richard Meserve: "Any decision about the management of nuclear wastes must be made in the cauldron of intense public controversy."

But nothing is as simple as it seems, especially when it involves nuclear waste management and the issues of consent.

The United States contain many geologic formations that are considered to be technically suitable for deep geologic disposal of nuclear waste, and even more locations technically suitable for interim storage. Given appropriate repository designs, there is substantial confidence that compliance with regulatory standards for waste isolation can be demonstrated for several geologic settings, disposal concepts, and rock types, including salt, shale, volcanic rock, granite, and deep boreholes. Thus, I and my colleagues are confident there are a number of technical solutions available, and stand ready to serve the nation once again in developing safe, secure and responsible solutions to nuclear waste storage, transportation and disposal. However, despite a plethora of technical solutions, challenges remain to site and develop facilities that are socially and politically acceptable to both local communities, host states, and the federal government. In large part, the intent of the Blue Ribbon Commission recommendations is to open opportunities for the federal government to meet its nuclear waste management obligations and to promote a larger number of opportunities for states and communities to willingly host needed facilities. Achieving and sustaining the federal-state-local partnership that will be needed (beyond the passive sense of consent) is the ultimate objective of the consent-based approach to siting.

When discussing consent-based approaches to siting nuclear facilities, the Commission's report makes liberal reference to the successful outcome of the WIPP development history. I can assure you the WIPP is a phenomenal facility, developed and managed by remarkable people, with an enviable safety record both in operations and confidence in its long term performance. The commission report also correctly notes that the success of WIPP was not straightforward or quick. Indeed, even with many factors in its favor, the first shipments to WIPP were over a decade later than planned. I agree with the Commission's statement in the report that ". . . no one could have designed the process that was ultimately followed ahead of time nor could that process ever be replicated."⁴ While the WIPP process can't be replicated exactly, it does offer important lessons. We need to recognize the Commission's recommendation for a consent-based, staged and adaptive management approach is intended to provide all parties a siting experience that is understood looking forward as well as in hindsight.

Many of the challenges and conditions experienced on WIPP, and elsewhere, are unique and not likely to be experienced again in any new project. For example, the WIPP facilities were built under a period of DOE self-regulation; only after it was built and ready for operation, and regulatory authority assigned to the Environmental Protection Agency (EPA), was the compliance application prepared and submitted. Secondly, the WIPP was permitted under a containment standard⁵, and deemed compliant with safety standards via the EPA's

⁴ See BRC final report page 49.

⁵ As noted on page 90-91 of the BRC final report, containment-based standards (e.g. 40 CFR Part 191) are designed to limit cumulative releases of key radionuclides, while risk-based standards (e.g. 10 CFR Part 60) are designed to limit doses (radiation exposure) to individual members of the public.

Administrative Procedures rulemaking process, in contrast to the legally-intensive adjudicatory process of NRC hearings.

Regardless, many aspects of the WIPP path to success can be replicated, and should be replicated in any new consent-based initiative, and several of these are recognized in the details of the BRC's recommendations.

Foremost perhaps are the qualities of credibility (i.e. I believe you) and integrity (i.e. I trust you even when I don't fully understand) that must be unquestioned in both institutions and individuals. Such qualities are synonymous with individuals and institutions long held as crucial to WIPP's opening; for example George Dials (Manager of the DOE Carlsbad Area Office), Wendell Weart (Technical Director for Sandia National Laboratories WIPP Science Advisor role), and similarly with Ward Sproat (Bechtel M&O General Manager) on Yucca Mountain, and the New Mexico Environmental Evaluation Group.⁶ In virtually all consent-based approaches, the placement of trust and credibility of institutions and individuals will be a prerequisite for success. Care must be exercised to not design or implement solutions which achieve any objective while eroding the placement of trust and credibility.

Which leads me to what I believe are other prerequisites and priorities for a consent-based approach to siting new nuclear waste management facilities. While all of the Commission's recommendations are important some are particularly relevant to the issue of pursuing a consent-based program. I identify three extant uncertainties in the future direction of the nuclear waste management program that left unresolved can reasonably be expected to confound any consent-based siting process.

1. Who will be the federal representative of a consent-based negotiation, the Department of Energy or a new government-chartered corporation?

The commission calls for establishing a new single-purpose independent (outside DOE) government-chartered corporation with a mission-oriented responsibility for implementing the nation's program for managing spent nuclear fuel and high-level radioactive wastes (responsibilities currently assigned to the U.S. Department of Energy). If such a government-chartered corporation is to be the primary mechanism to "re-establish trust with the public and key stakeholders" and to implement the consent-based siting process, then its existence would seem to be a prerequisite to initiating the siting process and the solicitations of interest from potential host communities and states. As such, the basic question of whether to implement the recommended government-chartered corporation (and requiring congressional action) is unresolved in the eyes of potential host communities. This creates another uncertainty of whether a potential host community is now dealing with the Department of Energy but will later be directed to a new responsible entity with potentially new liberties or constraints, changes in any preliminary understandings, etc. Such uncertainty over who the federal actor will be could further complicate perceptions of the validity and integrity of the consent-based process.

⁶ This list is not exhaustive.

Complicating this uncertainty is the unresolved issue raised by the Commission regarding whether or not to continue to commingle defense and commercial waste management responsibility. The Commission notes ". . . a decision to move responsibility for defense wastes to a new organization (versus leaving that responsibility with DOE) would have major implications for the scope of responsibility for the new organization . . ." Indeed, the concerns raised by the uncertainty of who will be the federal representative for consent-based negotiations are exacerbated by the possibility that there could be more than one actor (one inside DOE, one outside DOE) representing federal interests, potentially with different processes.

Prompt action toward the designation of the federal actor (or actors) in the consent-based process yet to be defined, even if it is to re-affirm that the responsibility will remain with the Department of Energy, will remove this uncertainty and enable potential host communities to act with confidence. If defense and commercial wastes are separated, then care will be needed to ensure the institutions, the actors involved and the processes utilized are harmonized to the extent possible.

2. What are the disposal standards and regulations that will govern safety?

The Commission notes the first requirement in siting a repository for disposal centers on the ability to demonstrate the site adequately complies with the performance criteria that provide for the protection of the public health and safety and the environment. To this end, the BRC report calls for development of a new generic disposal standard and supporting regulatory requirements that "**should be finalized prior to the site selection process**"⁷ (emphasis added).

The BRC correctly notes that doing otherwise risks public and stakeholder suspicion that safety standards are being adjusted to fit a particular site and therefore not fully protective of health and safety. The Commission also calls for the development of a "safety case"⁸ early in the process of exploring potential sites, which I agree with. The development of iterative safety case assessments is a hallmark of most repository development programs and typically provides the frame of reference by which safety is assessed for stakeholder, regulator, and implementer alike.⁹ While not strictly necessary for at least initial safety case development, the availability of final disposal standards and regulations is helpful in reducing speculation in the assessment of safety by stakeholders.

⁷ See BRC final report page 94

⁸ A safety case is the collection of quantitative analyses, qualitative arguments, and other lines of evidence that serve to assess the potential performance of a site and disposal concept relative to the safety and performance criteria, and assembled with information available at that time.

⁹ Ultimately the determination of safety and compliance with performance standards rests with the regulatory authority, and thus early safety cases must take care not to be proffered as or perceived to be advocacy trumping the regulatory authority role.

The call to finalize such disposal standards and regulations prior to the site selection process raises two concerns:

- a) a review of the development history of prior repository standards and regulations indicates they typically take years longer than anticipated (often ~18 months beyond the 1-2 years allotted in the directive to the agency, and occasionally years longer), potentially lengthening an already extensive process, further eroding confidence in the siting process among potential host communities, and,
- b) without final disposal standards and regulations, some potential host communities may be unable or unwilling to provide expressions of interest to host a facility if they lack a standard by which to assess safety and the risks they may assume, which could further limit options available to site such facilities. Proceeding with even preliminary site evaluations and expressions of interest without final standards is counter to the transparency called for in the consent-based process.

Both these concerns are addressed by taking prompt action to direct the EPA and NRC to develop the new disposal standards and regulations called for by the Commission. Doing so will remove one more potential impediment to the timely initiation of a transparent, consent-based siting process. In addition, prompt action on promulgating final disposal standards and regulations will help resolve the societal value judgments and technical debates concerning the appropriate form and stringency that new regulatory standards should take.

3. Is there confidence that a geologic repository for permanent disposal of spent nuclear fuel and high-level waste will be realized in a timely manner?

The commission correctly notes ". . . the challenge of siting one or more consolidated storage facilities cannot be separated from the status of the disposal program." Further they note ". . . a program to establish consolidated storage will succeed only in the context of a parallel disposal program that is . . . making discernible progress in the eyes of key stakeholders and the public." The answer to the question of what will constitute stakeholder-acceptable "discernible progress" is unknown, but logic would suggest the greater discernible progress the better.

At the present, the DOE is pursuing through the Office of Nuclear Energy Used Fuel Disposition Program a R&D program looking at a broad range of technical issues generic to the repository sciences. At present, it would be difficult to characterize this program as a disposal program with discernible progress toward implementation simply because it is not designed or authorized to do so. As with the uncertainty over who will be the federal representative for a consent-based process (item 1 above) the question of discernible progress in a disposal program is compounded by the whether or not the defense and commercial wastes will continue to be commingled for disposal.

The uncertainty regarding discernible progress toward a disposal program implementation is analogous to the 'waste confidence decision' (which in its most recent rendering has prompted

legal challenge over the change to an unspecified timeframe for repository availability)¹⁰ and the basis for several states moratoria on new nuclear power constructions. By extension the lack of a discernible, mission-oriented repository development program can be expected to thwart the willingness of some communities or states to consider the hosting of needed waste management facilities (i.e. storage facilities and repositories) and perpetuate the moratoria on new nuclear construction.

Thus, as the BRC notes, “discernible progress” on a disposal program, or what I term 'repository confidence', will likely be needed to ensure the potential for community and state interest to host consolidated storage (what some see as more pressing to reduce federal liabilities). This can be achieved by the clear signal that the current repository science program is moving toward a disposal mission-oriented program as called for by the BRC (p. 62). An actual repository development program with substantive progress (i.e. a site or sites identified, either through volunteer processes or by siting criteria, under active site characterization or development) would likely bring a determination of discernible progress and the attendant 'repository confidence' that would lend itself to more expressions of interest from potential host communities or states.

In this regard, it is logical to consider the benefits of a new repository development mission in the Delaware Basin of New Mexico. Such an effort could provide an accelerated availability of both repository capacity and consolidated storage capacity simply because of the ability to leverage the substantial technical and scientific basis that already exists for salt-based repositories. Much of the site characterization data already developed for WIPP is extensible to other nearby locations within the Delaware Basin, and thus could be used to offset an otherwise time consuming site characterization effort. While a repository program could be developed in many locales and geologies, few other locations in the US would have the relevant data and data density expected of an extensive site characterization program. This is not to suggest avoiding development of repository capacity elsewhere, but simply to consider such development of additional Delaware Basin repository capacity in the overall sequence and timing of needing two or more repositories as noted by the BRC. When additionally recognizing the local community has already expressed interest in hosting storage and disposal capacity, and that the State of New Mexico has indicated an openness to consider such possibilities pending determinations of safety, then the strategic value to both the federal and local interests, as a consequence of the WIPP experience, will need to be confronted.

Summary

Writ large, the intent of the BRC recommendations is to open opportunities for the federal government to meet its nuclear waste management obligations and to promote a larger number of opportunities for states and communities to willingly host needed facilities. Given the clear international and domestic evidence as to the fragility and limited number of such opportunities, actions or positions which preclude or limit those opportunities from either perspective are counterproductive and jeopardize the interests of all concerned.

¹⁰ The BRC Final Report, page 25-26 provides a summary of the Waste Confidence Decision and its evolution.

To this end, the issues of consent-based approaches to the siting of consolidated storage and permanent disposal capacity hinge to a large degree on a few uncertainties that should be addressed before the details of consent-based mechanisms can be confidently worked by either the potential hosts or the waste management organization. These uncertainties and their needed action include;

- ***Who will be the federal representative of a consent-based negotiation, the Department of Energy or a new government-chartered corporation?***

Take action to identify unequivocally the responsible institution for carrying out the future of the US nuclear waste management program.

- ***What are the disposal standards and regulations that will govern safety?***

Take action to initiate development of new disposal standards and regulations, and resolve the commingling decision.

- ***Is there confidence that a geologic repository for permanent disposal of spent nuclear fuel and high-level waste will be realized in a timely manner?***

Take action to initiate a change to a mission-oriented repository development program.

The challenge to develop one or more consolidated storage facilities and one or more geologic disposal facilities, with local and state consent, is not a trivial one. However, the technical solutions for storage, transportation and disposal exist or are readily developed. The Blue Ribbon Commission final report notes (page 44): “Simply put, it will take years to more than a decade to open one or more consolidated storage facilities and even longer to open one or more disposal facilities.” Given the technical solutions to storage and disposal are readily available; the timeframes suggested are thus rooted in the prerequisites to initiating a consent-based program. Prompt action on resolving the items noted above will help minimize further delay and better enable this generation to meet its obligations for responsible nuclear waste management.

Thank you for the opportunity to testify; I look forward to answering the Committee's questions.