May 24, 2013

TO: Senate Energy and Natural Resources Committee

RE: Discussion Draft of Nuclear Waste Administration Act of 2013

We are an ad hoc group of social and natural scientists who have been involved in nuclear waste management, some for many decades. Many of us co-authored an article in Science magazine in 2011 about the activities of the Blue Ribbon Commission (see attached). We have served on many committees of the National Academies of Sciences and advisory boards of federal agencies. Two of us helped prepare commissioned papers for the Blue Ribbon Commission (Tuler and Webler).

We welcome the opportunity to provide comments on the discussion draft developed by Senators Alexander, Feinstein, Murkowski, and Wyden. A new, reinvigorated program to manage spent nuclear fuel and high level waste is long overdue and necessary.

The draft Act has several strong points, with which we agree. Foremost among these is the need to create a new federal institution to implement siting processes and implement a waste management program. Adequate funding to ensure a successful program is also addressed in the draft legislation.

That said, the proposed Senate bill fails to clearly articulate a process that will fully address the critical social dimensions of spent nuclear fuel (SNF) and defense high level waste (HLW) management that have stalled prior efforts. In our view, the proposed bill does not go far enough to reduce the risks of repeating the past, undercutting the hope for a successful renewed effort and resulting (again) in great economic and political costs.

In particular, we note discuss several major shortcomings that must be addressed to increase the likelihood that a new program will be successful, and highlight four areas that are in need of modification:

1. The Nuclear Waste Administration Act should include a more robust definition of informed consent and a process for achieving it in potential host communities.
2. Public and stakeholder engagement processes should be more strategic and social-science based, rather than relying on public hearings which have proven to be grossly inadequate for achieving consent, building trust and confidence, and obtaining legitimate decisions.
3. Siting processes must be fully grounded in an adaptive management approach to ensure that decisions are responsive to experience and new information.
4. The Nuclear Waste Administration Act must emphasize developing a foundation for a broadly supported, socially and ethically legitimate program while also responding to the needs for urgency and efficiency. Inappropriately emphasizing urgency and efficiency over social and ethical legitimacy will endanger the success of the program.

The proposed Act must give more attention to addressing issues that may undermine social trust, confidence, and acceptance of proposed facilities. A successfully run waste
management program must: a) systematically assess reasons for opposition, b) publicly acknowledge and investigate them, c) and develop and implement strategies to address them. Fundamentally, it means being proactive about public and stakeholder engagement and ensuring that decisions are based on informed consent.

Our comments consist of comments on specific aspects of the draft Act and responses to the 8 questions posed by the Senators.

Respectfully,

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Our view of the policy challenge and social scientific foundations of public and stakeholder engagement

In the article published by Science (see attached), we emphasized that nuclear waste management has failed in this country as a result of not recognizing the importance of securing public consent and addressing social dimensions of waste management. These problems have been understood for a long time. Richard Hewlett, a DOE historian, noted in 1978 that federal officials failed to solve many fundamental issues because they “were not asking the right questions,” and “lip service was given to the importance of such non-technical factors as public understanding and acceptance, but almost nothing was invested in the analysis or evaluation of these factors. There is no evidence at all that attention was given to such matters as social, cultural or psychological phenomena that might serve as constraints in implementing a technical solution” (Hewlett 1978).

More recent efforts have been complicated by the high level of public distrust in government generally and the legacy of mistrust generated by authorities specifically responsible for nuclear waste management in particular. Furthermore, despite decades of progress in social science, scientifically-grounded guidance to DOE and NRC on how to promote adaptive learning, social trust, and social legitimacy has not been followed in addressing waste and other challenges to nuclear power. A successful waste management program must be radically different from DOE’s earlier efforts. It must operate in a context of public distrust and scrutiny and it must build social trust.

Distrust and lack of confidence exists among:

- Federal, state, and local governmental decision makers
- The nuclear industry and federal (and state) governmental decision makers
- Large swaths of the public, the nuclear industry, and governmental decision makers
- Residents within communities hosting nuclear facilities or identified as potential host communities

There are many reasons for the existing high levels of social distrust among parties with a stake in spent nuclear fuel (SNF) and defense high level waste (HLW) storage and disposal. Chief among them are:

- Decisions have been made without obtaining social support and legitimacy
- Evolving requirements and schedules were not met
- Federal decision making has lacked transparency
- Efforts to introduce equity into decision making (e.g., multiple sites considered, multiple repositories in different areas of the country) were undermined by Congressional actions
• Psychological, social, and institutional factors affecting social support did not receive appropriate attention by decision makers.

The lack of attention to pressing psychological, social and institutional questions is reflected in many ways: the lack of scholarly literature specific to nuclear waste management, low levels of research funding to consider the social dimensions of waste management, and lack of social science expertise on key advisory groups such as the Nuclear Waste Technical Review Board. It is also reflected in the draft legislation.

While scholarly research on the social dimensions of nuclear waste management is relatively small, there is a well-developed science of stakeholder engagement and risk communication (NRC 1989, NRC 2008, Morgan et al. 2002, Renn 1992, FDA 2011) and risk decision making under uncertainty (NRC 1996, NRC 2009). The best available science should be brought to bear in a SNF and HLW management program. When done well stakeholder engagement can improve decisions, improve legitimacy of decisions, and improve capacities of participants to be involved in decisions. When done well, risk communication can inform decisions and lead to better decisions. The science of public and stakeholder engagement has demonstrated important lessons and produced effective ground rules. However, simply following general rules is not sufficient. The challenge for this legislation is how to set reasonable expectations and promote good judgments by those responsible for carrying out the program in the field. What is understood to be the best practice in a particular situation will depend on what those organizing and participating in the process think about the context, the objectives, their roles, the scientific understanding of the issues, and many other factors. General guidance can only take a planner so far. The stakes are high, however. Conflicts about process can lead to or exacerbate conflicts about outcomes. As the National Research Council argues “one of the most important goals of process design is to devise procedures that are acceptable to the interested and affected parties. Obtaining agreement on a decision process can significantly affect acceptability of the outcome” (1996, pg. 122).

Consequently, public and stakeholder engagement, risk communication, and decision making under uncertainty require a firm grounding in science as well as learning and adaptive steering, which can be achieved through systematic evaluation.

Within federal agencies there are good examples of how these can be accomplished:

• During the 1990s and early 2000’s the Department of Energy Environmental Management Program funded work to systematically evaluate the performance of site specific advisory boards (Bradbury et al. 2003).

• The Food and Drug Administration created a Risk Communication Advisory Committee in 2007, which has helped ensure that communication strategies are consistent with the most current knowledge and best practices and that experience is systematically evaluated to improve learning over time (FDA 2009, FDA 2011).
• The EPA Community Involvement and Outreach Branch conducts research and develops resources to support stakeholder engagement in Superfund Program activities.

In summary, the science of public and stakeholder engagement and risk communication can support programmatic activities of the Nuclear Waste Administration in two ways:

1. Research and experience-based input from a wide variety of programs on public perceptions, public acceptability, decision making under uncertainty, mechanisms of public and stakeholder involvement and negotiation.
2. Frameworks and advice to help decision makers make sense out of experience using systematic and high quality data so that they are better able to anticipate, recognize, and address challenges.

Solutions to Problems in the existing draft

All of our comments about the draft Act do not fit cleanly into the topics about which specific comments are being sought. Before addressing the specific questions posed by the Senators we discuss specific issues with the draft Act, and provide suggestions to improve it:

1. The Nuclear Waste Administration Act should include a more robust definition of informed consent and a process for achieving it in potential host communities.
2. Public and stakeholder engagement processes should be more strategic and social-science based, and not rely on public hearings which have proven to be grossly inadequate for achieving consent, building trust and confidence, and obtaining legitimate decisions.
3. Siting processes need to be fully grounded in an adaptive management approach to ensure that decisions are responsive to experience and new information.
4. The Nuclear Waste Administration Act must emphasize developing a foundation for a broadly supported, socially and ethically legitimate program in the context of a recognized need for urgency and efficiency.

1. The Nuclear Waste Administration Act should include a more robust definition of informed consent and a process for determining it in potential host communities.

The draft Act uses the rhetoric of “consensus” and “voluntary siting,” but it does not establish a structure or process to ensure that either can be implemented. Section 304(b) sets forth general siting guidelines and requires that the Administrator issue general guidelines for the consideration and selection of sites. Section 304(f) specifies that a state governor, local governmental authority, and/or Tribal government provide consent for a facility. The term consent is not defined and we suspect it is used rather loosely. A more precise term would be consent.
The draft legislation leaves many crucial decisions unresolved and with no clear path for resolving them. For example, it would be up to the discretion of the Administrator to determine if “units of general local government that are contiguous with the unit that has jurisdiction over the site of a repository or storage facility” (Section 103) be included in negotiations, etc. While this is reasonable, communities will want to know – and should know – under what conditions they may be included or excluded from the siting process.

Key terms related to the issue of consent are not well-defined. For example, the draft states (Section 304(a)(1)) that “affected communities” should be allowed to decide whether, and on what terms, a nuclear waste facility will be hosted. While “Affected Indian Tribe” and “Affected until of general local government” are defined (Section 103) no where is “affected community” defined. But, this does not mean, simply, that the wording of 304(a)(1) should be revised. It is important – vitally important – that each potentially affected community understand the potential health, safety, social, environmental, political, economic, etc. risks, uncertainties, and benefits of a proposed facility and have some say in a) how those risks should be managed and b) whether they are reduced sufficiently for the site to be worthy of their acceptance and support.

It is a serious mistake to assume that consent is a singular decision. Classical ethical and legal doctrines require that people and institutions expressing consent must be informed fully of the risks, uncertainties, and benefits; understand them, and agree to them (Faden et al. 1986). The legislation should explicitly require that consent be informed consent, including all criteria for assessing consent before final decisions are made. This implies that interested and affected parties: have a say in determining what information is needed to addresses the issues and concerns they have (not that managers or scientists think is relevant); be provided information needed for effective decision making, including risks, benefits, and uncertainties; can access that information in a timely and easy manner; and can comprehend what they access. Informed consent should be both evaluated by ethicists and social scientists and a required condition for site selection by the Administrator, including the availability of and access to information in a timely manner and form that is understandable by interested and affected parties that addresses their concerns.

Informed consent must be explicitly granted by all the relevant multiple layers of government and the relevant public (as defined under “affected community”). Consent must be acquired periodically– about guidelines and standards, and especially, after site suitability and before site selection and any consent agreement is signed. Other countries with promising nuclear waste management processes, such as Canada and the United Kingdom, use a multi-step approach to achieving informed consent of potential host communities. Informed consent must be granted by the community at multiple points – especially after site suitability and before site selection and consent agreement signed. This has been an important feature of the process in Canada. First, in order to be considered for siting at all, municipalities have to volunteer for consideration. Volunteer partnerships allows potential host communities to take the first step in determining the outcome, actively submitting their site for consideration rather than being selected by a process out of their control. Potential host communities further maintain this self-determination capacity through much of the remainder of the review of their site given the “right to
withdraw” their site from consideration without penalty any time prior to the signing of agreements that begins construction. Much more consideration needs to be given to who is expressing consent, how it is determined, and what it means at each stage of a siting process.

Local government officials should not determine consent alone. Officials at local levels of governance are not elected with a mandate to make these kinds of single issue decisions, which have far reaching consequences for a community’s identity and cohesiveness. Neither are county, state, or Tribal officials. Secondly, local officials can become unelected, thus putting in jeopardy any agreement with the Nuclear Waste Administration. Third, a focus on local officials can lead to less transparent decision making and more strength to local power brokers. A more broad, robust form of informed consent is required, and works against backroom deals. There is nothing explicit in the proposed legislation about community / public informed consent, and how this may be different from governmental consent. One mechanism for obtaining a clearer and broader expression of community consent is via referenda. However, some communities may prefer other ways, such as Town Meetings, a series of local workshops and discussion groups, etc. As we discuss below, public hearings would be a very inadequate approach.

We recommend:

- **Section 304(b) be redrafted to include a requirement for informed consent, based on:**
  a) effective and meaningful risk communication and public and stakeholder engagement in host communities and other potentially affected jurisdictions (see next comment) and b) a requirement that the strength of informed consent be evaluated and determined, with input from the scientific advisory committee for stakeholder engagement (including both expert social scientists in relevant fields and ethicists, see below) before final decisions are made by the Administrator, including the availability of and access to information in a timely manner and form that is understandable by potentially affected parties and addresses their concerns.

- **Section 304(b) be redrafted to include a staged approach to informed consent. Section 304 should include language that mandates the stages for which informed consent must be granted by potential host communities and jurisdictions.

- **Clear guidelines for how local authorities, communities, and other jurisdictions can express voluntary and informed consent (i.e., minimal standards) in stages be developed before any solicitation of sites be made or sites considered. There should be opportunities for public comment on these guidelines, as well as input scientific advisory committee for stakeholder engagement (including both expert social scientists in relevant fields and ethicists, see below).**

- **Jurisdictions volunteering for consideration of a waste storage site or repository be required to propose a plan for demonstrating informed consent by local officials and the community at large as a pre-condition for initiating a site characterization or suitability process.**

- **the Senate bill more clearly define a process with clear roles and responsibilities for each governmental unit/jurisdiction associated with the facility as well as the affected community.**
• that specific conditions and criteria be established in advance for when and how municipalities and other jurisdictions may opt-out of further consideration at different stages of site characterization and agreement and, importantly, when an agreement is no longer revocable.

2. Public and stakeholder engagement processes should be more strategic and social-science based. The current draft has inadequate expectations of mechanisms for stakeholder involvement, with its reliance on public hearings which have proven to be grossly inadequate for achieving consent, building trust and confidence, and obtaining legitimate decisions.

The draft legislation states that a process should ensure meaningful public involvement (Section 304(a)(2)). It then goes on to state only that public hearings must be held (Section 304(d)(3)) prior to site characterization and when a site is being selected. There is nothing about utilizing the science of public and stakeholder engagement or risk communication. This science should be brought to bear in the SNF and HLW management program. When done well stakeholder engagement can improve decisions, improve popular legitimacy of decisions, and improve trust in government.

The minimal public hearing provisions in the draft bill are very inadequate. Public hearings are extremely limited tools for public engagement. They encourage staking out of extreme positions, do little to promote learning or collaboration, and do nothing to rebuild trust with the public. Furthermore, the requirement for public hearings in Section 304(e)(3) can only be read as being part of a “decide-announce-defend” approach. The public hearings are to be held before making a final decision, but there is no requirement that anything stated or learned at the public hearings be part of the basis for final determination (Section 304(e)(2)). This is a recipe for a failed public and stakeholder engagement process.

There is a strong and consistent message from scholarship, reviews, and guidelines for best practices about public participation, risk communication, hazard management, and nuclear waste management that more extensive forms of public and stakeholder engagement are called for in high stake and controversial decision processes like nuclear waste management. They are also important when deeply held values and equity are critical aspects of a proposed program or policy. This message comes from reports by the US National Research Council (NRC 1989, 1996, 2003a, 2003b, 2006, 2008, 2009), best practices from federal agencies with significant risk communication and public involvement activities (Food and Drug Administration, EPA, DOE Environmental management Program, CDC Radiation Studies Branch); and nuclear waste management programs in Sweden, Finland, Canada, and the UK). As the US National Research Council has said in numerous reports, in contexts of social distrust, technological uncertainty, and political controversy, stakeholder engagement needs to be broadly inclusive at its early stages, informed by high quality information, and facilitate dialogues with interested and affected parties. Our recommendations are based on the advice of the National Research Council.
For example, site characterization, like risk characterization, should integrate both analytic activities (systematic information gathering and analysis) and deliberative activities (discussion, learning, negotiation) (National Research Council 1996). EPA has achieved successful Superfund redevelopment efforts using this kind of framework, which devote time and resources to helping communities understand the risks of residual contamination, trade-offs of different remediation strategies, and opportunities for redevelopment. Substantial public outreach in the form of public listening and information sessions, community advisory groups, public hearings, and technical assistance grants have been used to build consent and support for specific plans (e.g., Midvale Slag site in Utah, Fernald site in Ohio, Mound site in Ohio).

We recommend:

- **The Act require the Nuclear Waste Administration to include stakeholder engagement and risk communication as strategic functions and engage in strategic planning of these activities in all aspects of its Mission Plan. The Act should highlight and prioritize the need for a public and stakeholder engagement strategy that offers diverse opportunities for dialogue and learning, that is flexible to local needs and changing conditions, and that integrates analytic and deliberative activities.**

- **The Act establish an Office of Stakeholder Engagement, to be headed by a Deputy Administrator for Stakeholder Engagement. A senior level position is critical to ensure that it is not marginalized in a context where technical and engineering approaches have dominated in the past.**

- **A scientific advisory committee for stakeholder engagement---including ethicists who are experts on consent--- should be established. These will help ensure a) stakeholder is implemented using the best available science and b) send a strong signal that a new approach to waste management places informed consent at the fore.**

- **The Office of Stakeholder Engagement be required to systematically gather data and evaluate performance of all stakeholder engagement and risk communication activities to facilitate learning. Evaluations should meet scientific standards and peer-review publication standards to ensure their quality and legitimacy.**

- **The Office of Stakeholder Engagement publish reports documenting stakeholder concerns and how they are being addressed in order to demonstrate to the public, governmental authorities, and other stakeholders that the process is being conducted in a fair and competent manner and deserving of support.**

- **The Office of Stakeholder Engagement and scientific advisory committee for stakeholder engagement---including ethicists--- be explicitly empowered to consider and address issues of equity in the nuclear waste management program.**

- **Community Advisory Groups be established in each municipality volunteering for and being evaluated for suitability as a host for storage or disposal of waste. These can be modeled on, for example, successful DOE EM site-specific advisory boards. Prior to establishing any such community advisory groups guidelines and operating principles should be established with input from a) the Office of Stakeholder Engagement, the scientific advisory committee for stakeholder engagement, and the community in which it is being established. It should be broadly representative of interested and affected parties in the area of the proposed site. Community advisory groups provide**
another effective mechanism to ensure that experts learn about the community and the community learns from experts.

3. Siting processes need to be fully grounded in an adaptive management approach to ensure that decisions are responsive to experience and new information.

The draft Act uses the rhetoric of adaptive management (Section 304(a)(3)), but it does not establish a structure or process to ensure it can be implemented. The proposed structure and process does not provide a sound foundation for flexibility. There is really only one place where there is an explicitly stated opportunity for re-evaluating program performance – revising the mission plan when deemed “appropriate” by the Administrator. This does not meet even the basic requirements for an adaptive management approach, which emphasizes that systematic analysis and evaluation to support learning is important for improving processes and activities as they proceed. Routine opportunities for learning are needed. In the context of social distrust these opportunities should be transparent. They should also be inclusive and “two way.” Experts can learn important details and information from local officials and residents about a proposed site and community. Local (and county and state) officials and local residents can learn more about the technical and engineering features of nuclear waste management. Everyone needs to learn.

Specifically, a staged, adaptive management approach can promote the competence of waste managers – as well as confidence in those managers – by enabling them to:

- address surprises as they arise,
- learn from challenges, problems, failures, and successes and provide opportunity for integrating the knowledge gained into future design and implementation,
- address technical, ethical, and societal questions and uncertainties as they arise,
- ensure opportunities for independent overview, quality control, and demonstration projects,
- monitor and evaluate performance as a condition for advancing to subsequent activities or phases,
- provide time for societal learning about complex technologies and ways to manage them safely, and
- demonstrate to regulators and the public through incremental actions that safety and security are being adequately addressed.
We recommend:

- The Act establish a requirement for a strategic timetable that identifies milestones, but plans adequate time to achieve those milestones while earning public trust and informed consent.
- The program be required to link information gathering and analysis with periodic dialogue and learning among the interested and affected parties in a step-wise process. The details of the step-wise process should be developed with the close involvement of the Office of Stakeholder Engagement and scientific advisory committee for stakeholder engagement.

4. The Nuclear Waste Administration Act must emphasize developing a foundation for a broadly supported, socially legitimate program rather than urgency and efficiency.

The proposed bill places too much emphasis on efficiency. For example, the draft legislation, for understandable reasons, seeks to push forward in the short term actions that lay the foundation for the entire program. For example, Section 304(b)(1) states that general guidelines for the consideration of candidate sites should be issues within one year of enactment.

Without even considering the time it would take to staff the new Nuclear Waste Administration’s positions and identify and enroll advisory board members, this is overly ambitious. There will not be a full year to complete complex – and socially sensitive – tasks. More to the point, it may result in the classic “decide-announce-defend” cycle that is frequently employed and just as frequently results in policy or regulatory disaster.

Furthermore, in a “staged” process that envisions the siting of a pilot storage site, a consolidated storage site, and a repository, a heavy burden is placed on the first in line. Failures in early stages will leave the Administration vulnerable to further critique, further loss of legitimacy, and further erosion of trust. Problems that exacerbate distrust and lack of confidence in the federal government, and Nuclear Waste Administration specifically, nuclear industry, states, etc. during the initial siting effort will only make subsequent activities much harder. This suggests a rushed effort to site an initial facility may end up stalling the entire program.

This is a complicated and highly charged program, that will entail many complicated and highly charged decisions. It has been repeatedly noted that it is issues of equity, social justice, economic impacts, confidence in risk managers, and fears about health and safety that have historically been the most problematic yet under-addressed aspects of waste management. Where the health and safety of communities, future generations, and ecosystems are involved, people will not tolerate cutting corners in order to meet deadlines.

The draft Act implies that social concerns, such as equity, compensation, health and safety should be addressed, but then seems to limit site selection criteria in Section 304(e)(2). In this section the emphasis is put on scientific and technical suitability, meeting regulatory
requirements (e.g., radiation protection standards), and national interest, suggesting that there is no room given for interested and affected parties to express concerns about other kinds of issues and no expectation that any such concerns need to be considered or addressed. There is no explicit requirement for considering the social impacts (stigma, etc.) relative to other options or about the degree to which informed consent was expressed by the community and the way it was expressed. This means that the Administrator may elect not to consider them. This is no way to gain social acceptance, build trust, etc.

We recommend:

- The Act should establish requirements for a more reasonable timeline, which gives considerable time upfront to allow a process to begin “on the right track.” This means allowing time for a) the Nuclear Waste Administration to hire key personnel, including the Deputy Administrator for Stakeholder Engagement and his/her staff; b) staffing and establishing the scientific advisory committee for stakeholder engagement; c) seeking public input on process design and guidelines for volunteering for consideration, site suitability assessments, and expressing and determining informed consent.

- We recommend that the Senate bill dismiss the notion of acquiring consent from a single unit of responsible local government and recognize the pluralistic nature of American governance. It is dangerous to engender a process the pits Tribes against States, towns against counties, and so on. The bill must more clearly define a process with clear roles and responsibilities for each governmental unit associated with the facility as well as the community at-large.

- Community Advisory Groups (see above) in potential host communities be established and used as a mechanism for gathering information about local concerns, including economic, cultural, social, equity (distributional and intergenerational), and confidence in risk managers to inform Administration actions, identify areas requiring further analysis, and promote discussion of compensation and local oversight in a final agreement with the host community to promote stable and strong expressions of informed consent.

- The Act make explicit that social concerns, including economic, cultural, social, equity (distributional and intergenerational), and confidence in risk managers, be included in a final determination of site suitability, legitimate topics of discussion in public and stakeholder engagement processes, addressable in consent agreements between the Administration and local/state jurisdictions, and subject of scientific study to inform discussions and negotiations.

- The Act make more explicit use of the comparative site evaluation that is required in Section 304 during final reviews and determination of sites. The Administrator should be directed to include comparative assessment of social concerns, including economic, cultural, social, and equity (distributional and intergenerational) impacts.
References


Additional suggestions for modifying the draft Act:

Section 304(c)(3)(A): include “social, cultural, ethical, and economic” in the types of information that should be considered.

Section 304(c)(4): add: “…site characterization based on an environmental and health assessment of the site, which shall include”

Section 304(c)(3)(D): add: “…and an evaluation of the decision process by which the Affected Indian Tribe or Affected until of general local government will determine and express voluntary informed consent of its residents.”

Section 304(d)(1): what happens if none of the proposed sites satisfy suitability criteria? The draft language suggests that even if this is a case the Administrator must select a repository and storage facility site for further characterization. Instead this would be a good opportunity for the Administrator to act in a way that is consistent with “adaptive management”: a review of what was missing and a re-solicitation of sites should be conducted. Instead of forging ahead, take a step back in a deliberate and organized and transparent way that can help to build trust and confidence.

Section 304(f): informed consent by the community must be shown by the local government, rather than just require consent by the local government

Section 304(f)(3) need to add terms and conditions for re-evaluation and reconsideration (opt out) mechanisms and deadlines.

Section 508: NWTRB should be explicitly expanded to explicitly include membership representing key social science disciplines and expertise relevant to the nuclear waste management program.
Responses to the 8 questions posed

1. Should the Administrator take into account, when considering candidate storage facility sites, the extent to which a storage facility would: (a) unduly burden a State in which significant volumes of defenses wastes are stored or transuranic wastes are disposed of; or (b) conflict with a compliance agreement requiring the removal of nuclear waste from a site or a statutory prohibition on the storage or disposal of nuclear waste at a site? Alternatively, should the State and other non-federal parties seeking to site a candidate storage facility be allowed to determine whether they are unduly burdened? Should the final consent agreement, which would be sent to Congress for ratification, contain an authorizing provision to amend any conflicting compliance agreement or statutory prohibition?

Equity has been a critical aspect of opposition to siting nuclear waste facilities (and hazardous facilities in general). The Administrator should be required to take into account issues of equity when making determinations of sites for storage facilities and a repository. Equity considerations should include geographic distribution of waste generators and waste storage and disposal sites, presence of other (i.e., nuclear, defense) sites and wastes, and economic burdens. The Office of Stakeholder Engagement should provide analyses of equity, including as part of (but not limited to) the comparative site evaluation that is required in Section 304 during final reviews and determination of sites. Ways of ameliorating additional burdens and inequities---such as compensation---should be explicitly stated as features that may be included within a consent agreement, as negotiated with the federal government.

2. Should the bill establish a linkage between progress on development of a repository and progress on development of a storage facility? If so, is the linkage proposed in section 306 of the bill appropriate, too strong, or too loose? If a linkage is needed, should it be determined as part of the negotiations between the state and federal governments and included in the consent agreement rather than in the bill?

The legislation should state explicitly that host municipalities and states for storage facilities are enabled to include additional linkages within a consent agreement, as negotiated with the federal government. This includes criteria for determining the definition and assessment of “substantial progress” determinations made by the Administrator and Oversight Board (Section 306(b) and 306(c)). They should not be precluded from doing so. Final determination should rest, however, with the Oversight Board (or the courts).

3. Should the bill establish separate storage and disposal programs with clearly defined requirements for each, with any linkage negotiated in the consent agreement between the federal and non-federal parties, to allow the two program to
run on separate, but parallel tracks, as proposed in the alternative section 305 (which would replace section 304(b)-(g) of the draft bill)?

The alternative Section 305 suggested by Senators Alexander and Feinstein would undermine important elements necessary for a successful and comprehensive waste management program. A pilot program for placing priority waste in a new site should not be rushed – especially since there is considerable debate as to its necessity. There is an urgent need to reduce density in reactor storage pools by expediting the transfer of wastes to dry casks. (We had a dramatic illustration of the seriousness of this threat in the accident at Fukushima). However, this can, and should, be mostly accomplished at reactor sites and certainly should not be delayed for even the time it would take to put in a pilot program. Any initial siting process will be closely watched and should avoid short-cuts for the sake of speediness that is not absolutely understood as necessary by the American public. Every aspect of the Nuclear Waste Administration program should be based on sound science and meaningful collaboration with affected communities – not just a repository siting process (the alternative Section 306). If there are problems with an initial siting process, efforts to rebuild social trust and confidence in a program will be severely undermined. This is a recipe for disaster.

Additional concerns we have with the proposed process in the alternative section 305 have been discussed above, regarding the inadequacy of public hearings, the unclear definition of consent, and the failure to include non-governmental stakeholders in decision processes.

4. To what extent should the siting and consensus approval process for spent fuel storage facilities differ from that for the repository? Should the Administrator be required to conduct sufficient site-specific research (referred to as “characterization” in the bill) on candidate storage sites to determine if they are suitable for storing nuclear waste or only on candidate repository sites to determine if they are suitable for geologic disposal of nuclear waste? Should the Administrator be required to hold public hearings both before and after site characterization (as required by current law in the case of the Yucca Mountain site) or only before site characterization?

Every siting effort of the Nuclear Waste Administration should be science based, transparent, and fair. Stakeholder engagement should be part of determining storage and repository siting efforts. As discussed above reliance on public hearings is inadequate, and the problem is not solved by adding additional public hearings. They are not an adequate mechanism for building social acceptance and making good decisions because they include no assurance that community concerns will be taken into account by government.

Site characterization should be conducted for both potential storage and repository sites. Site characterization is an important step in gaining informed consent. There can be technical and environmental factors that influence site suitability for any
hazardous material facility, including SNF and HLW interim storage. There should be no debate about their relevance, and competent assessments should be made of them before any site selection is determined.

The approval process for interim storage facilities should include severe penalties for failure to remove wastes as determined in the initial consent agreement, lest there be an incentive to delay or abandon work on a repository and the interim storage facility become a defacto longterm facility.

5. Should the siting process in section 304 of the draft bill be streamlined? If so, how?

It would be a serious mistake to “streamline” the process proposed in Section 304. Rather we strongly recommend that a) it be made more clear and b) put much more emphasis on staged activities to ensure a foundation of social acceptance and trust in the Nuclear Waste Administration and its decisions.

It is imperative to put in place explicit wording and explicit legislative requirements that will ensure a role for social scientists and input from the social sciences in the design and implementation of a highly technical program such as radioactive waste. For example, the lack of specificity in the NWPA concerning the meaning of critical terms such as “consultation and cooperation” and public participation resulted in major barriers to successful implementation. This is of particular relevance to the wording in the draft legislation concerning “consensus” and “voluntary siting” key terms such as “affected communities etc. (see above comments) and to providing specific requirements for public involvement that is involvement, rather than after-the-fact consultation.

A suggested framework for a site characterization and site selection process that can promote social acceptance and confidence is to:

- Immediately staff the Office of Stakeholder Engagement and establish and staff the scientific advisory committee for stakeholder engagement
- Within a year of enactment set-up advisory board of stakeholders that is broadly representative of community concerns and interests
- Within first year embark on national program to develop support for need for program and identify critical values and considerations that need to be addressed. This is about a) gaining support for the program in general and b) figuring out “the audience”
- Issue DRAFT mission plan. Get feedback, but do something “real” rather than a few public hearings (pg. 53).
- Issue Draft site suitability and selection criteria and guidelines and schedule. Get feedback.
- Issue final site suitability and selection criteria and guidelines and schedule.
• Go through process to identify “volunteer” sites. Ensure that public information and involvement activities take place.

• Pause to actually consider being flexible given new information and experience (pg. 22-23).

• Conduct comparative evaluation and site assessments (pg. 27)

• Select sites to invite for further investigation (pg. 27)

• Establish community advisory groups in each community that has volunteered for consideration to host a storage or disposal site. Hold public hearings. Gather feedback about concerns, studies people want done, etc.

• Set up consultation and cooperation agreement. This should ensure role of community advisory groups too. Agreement should specify a series of stages of review and assessment of site and determining community informed consent.

• Evaluate sites

• Select site

• Consent agreement and community informed consent (may need to be iterative and to include compensation, community oversight, and so on)

6. Should the new entity be governed by a single administrator or by a board of directors?

(a) If by a single administrator, should the administrator serve for a fixed term? If so, how long should the term of service be? Should the legislation prescribe qualifications for the administrator? If so, what should be the selection criteria?

(b) If by a board of directors, how many people should comprise the board and how should they be selected?

No comment on this question.

7. The Blue Ribbon Commission recommended establishment of both a board of directors for management oversight (whose “primary role ... is not to represent all stakeholder views, but rather to carry out fiduciary responsibilities for management oversight”) and “a larger and more widely representative stakeholder advisory committee.” The draft bill responds to these recommendations, first, by establishing a Nuclear Waste Oversight Board of senior federal officials and, second, by authorizing the Administrator to establish advisory committees. Should the Oversight Board and advisory committee be combined into a single body to perform both management oversight and stakeholder representation functions? Should the
focus and membership of any advisory committees be established in the legislation or left to the Administrator?

The Oversight Board and advisory committee should not be combined into a single body. They serve different purposes and require different kinds of membership and expertise.

As discussed above we believe that the legislation should explicitly require some advisory committees:

- scientific advisory committee for stakeholder engagement
- advisory board of stakeholders that is broadly representative of community concerns and interests
- Community advisory groups in potential host communities

In addition, the Nuclear Waste Technical Review Board membership should be explicitly expanded to include experts from relevant social science disciplines.

The Administrator should be allowed to establish other advisory committees as deemed necessary, and already stated in the draft Act.

8. Dr. Meserve testified in 2012 that representatives of stakeholders and public utility commissioners should be added to the Nuclear Waste Oversight Board. Would these additions make the Board better able to carry out its fiduciary oversight mission effectively?

We support this suggestion for the reasons discussed previously about the importance of establishing social trust and confidence in the Nuclear Waste Administration and its activities.
Nuclear power is re-emerging as a major part of the energy portfolios of a wide variety of nations. With over 50 reactors being built around the world today and over 100 more planned to come online in the next decade, many observers are proclaiming a “nuclear renaissance” (1). The success of a nuclear revival is dependent upon addressing a well-known set of challenges, for example, plant safety (even in the light of improved reactor designs), costs and liabilities, terrorism at plants and in transport, weapons proliferation, and the successful siting of the plants themselves (2, 3).

Particularly challenging is the disposal of high-level nuclear wastes (HLW). More than a quarter-million tons of commercial HLW is in need of disposal worldwide (1). Wastes accumulate at all stages of the fuel and weapons development cycle: mining, enrichment, fabrication, and reactor operation. The most dangerous of these wastes accumulate at the “back end” of the fuel cycle, particularly in the form of spent fuel, which, despite reprocessing technologies, may remain highly radioactive for a million years (4). Although disposal of HLW remains one of the most challenging scientific and social problems facing all nuclear nations, recent events in the United States, home of 60,000 tons of HLW, make this a particularly important time to highlight often-overlooked social science expertise needed to develop strategies for publicly acceptable solutions to the problem.

More Waste for a Stalled Waste Program

There is disagreement about short-term and mid-term approaches for disposing of HLW, which include hardened on-site or regional storage, but the global scientific and policy consensus for long-term disposal is through deep geological sequestration (5). In the United States, where a successful waste-disposal program has eluded 10 presidential administrations, the 1982 Nuclear Waste Policy Act, amended by Congress in 1987, designated a single deep geologic repository at Yucca Mountain, Nevada. Authorized to store 77,000 metric tons of spent fuel, this site was projected to begin accepting wastes by 31 January 1998. However, surprises arising from technical analyses of the site, such as the discovery that water flows more rapidly at the site than expected (6), increasing the chances of human exposure (7), led to this deadline being missed. Strong, persistent opposition among Nevada residents and others also contributed to delays, with the site not yet having accepted any waste (8, 9). The Obama Administration withdrew funding for Yucca Mountain in its 2010 budget and directed the Department of Energy (DOE), the federal agency responsible for building a repository, to withdraw its licensing application to the Nuclear Regulatory Commission (NRC). These actions are currently the subject of multiple lawsuits and NRC review (10). If successfully upheld, they will effectively stop the Yucca Mountain project, despite its being the only congressionally authorized site for a repository.

The problem could worsen. The nuclear industry has taken advantage of a new one-step licensing process for commercial nuclear plants, submitting 22 applications to the NRC for 33 new reactors (11). Each new reactor could generate about 25 metric tons of HLW per year (12). President Obama confirmed the Administration’s nuclear commitment by pledging $8.3 billion in federal loan guarantees for two new nuclear plants in Georgia (12) and by seeking to increase the total amount to $54.5 billion by next year (13).

Facing a stalled national waste program on one hand, and a possible increase in the volume of wastes on the other, the president directed the secretary of energy to appoint a Blue Ribbon Commission on America’s Nuclear Future, which “should include recognized representatives and experts from a range of disciplines and with a wide range of perspectives” (14). The 15-member commission formed in January 2010 is charged with conducting “a comprehensive review of policies for managing the back end of the nuclear fuel cycle,” including civilian and defense used nuclear fuel and nuclear waste (14). The White House further recognized that “Such a solution must be based upon sound science and capable of securing broad support, including support from those who live in areas that might be affected by the solution” (15).

Physical Constraints, Social Acceptability

Unfortunately, the scientists and officials seeking to craft an acceptable waste-management strategy are starting from the weak position created by the legacy of past actions. For example, the mishandling of wastes from military weapons facilities (16, 17) generated considerable controversy and loss of social trust and confidence in the integrity of the siting and facility development program. Trust is a key factor in risk perceptions (9, 18). The DOE is especially mistrusted (19) and has been unable to address this mistrust (20).

The key issue here is not only to get the science right but also to get the “right” science (21). Getting the right science means answering the right questions. Given the history of nuclear waste management, in the United States and elsewhere, those questions must focus on the conditions for social and political acceptability, within the constraints identified by physical science and engineering. Some communities will be asked to host the processing, storage, and disposal of used nuclear fuel and HLW. Others will be asked to allow the transport of these materials. All Americans will pay for the infrastructure. Although scientific and technical analyses are essential, they will not, and arguably should not, carry the day unless they address, both substantively and procedurally, the issues that concern the public.

Fortunately, there is a sizable social science literature that has systematically investigated the questions of public acceptability, making basic tenets of public concerns quite clear (8, 22). People do not like projects that pose highly uncertain risks, unless they see great compensating benefits and have deep trust in the institutions managing them (8, 9). Many studies have shown that these condi-

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A stalled nuclear waste program, and possible increase in wastes, beg for social science input into acceptable solutions.
tions for public acceptance are lacking with HLW (8, 9, 18, 23). Citizens have expressed great concern about siting a repository in their vicinity, even while supporting nuclear power in the abstract (8, 18).

Many studies have demonstrated the importance of engaging impacted publics at the beginning of policy planning and projects, to get the right questions to frame analyses, ensure that expectations for inclusive and fair processes are met, and ensure legitimacy of decisions (24–26). A variety of frameworks, such as the staged approach (27), have been developed for “analytic-deliberative” (21) processes to ensure a technically competent and publicly engaged solution. These frameworks emphasize “continuous, adaptive learning in both technical and societal areas,” public continuous engagement, and transparent use of public inputs (27). Case studies show the benefits of public involvement, for example, the cleanup of an Ohio nuclear weapons facility (28) and the siting of a facility in New Mexico for storage of defense-generated transuranic wastes (23).

Moreover, public engagement and transparent deliberations are “communication acts” that build social trust and legitimacy, whatever their content. The social science needed to create such communications is well understood (21, 27, 29, 30) and essential for strategies that rest on the principal of voluntary consent and the public’s right to know (31, 32).

However, despite decades of social science, guidance to promote adaptive learning, social trust, and legitimacy has not been followed in addressing waste and other challenges to nuclear power (26). For example, how state structures of democracy and the role of technical elites in policy formation and implementation may influence whether and how scientific evidence is used. Institutional cultures typically frame challenges as technical problems rather than societal challenges. To the extent that the social side is recognized, it has often been viewed as an obstacle to overcome, not an element of the democratic process; planners and officials can be fearful that public involvement may shift an unengaged or uninformed public toward more controversy or opposition, thus reducing their control. Those institutions may not trust the public to make the “right” decisions. Agency guidance is often very general, leaving planners vulnerable to missteps when dealing with contingencies of specific situations and averse to trying new approaches.

Rebuilding Trust
The Blue Ribbon Commission, the DOE, and other responsible agencies should make the rebuilding of social trust and credibility central to their operations and their proposed strategies for waste management, then draw on the social sciences needed to fulfill these commitments. This means making the public and the social sciences serving the public a driving priority (33). The science that can inform an adaptive learning process that involves the public in a way that improves decisions and enhances trust and credibility is remarkably inexpensive, compared with the stakes riding on their efforts.

The commission is particularly well positioned to begin the process of overcoming the problematic legacy that it inherited. It has taken steps toward transparency by fulfilling the requirements of the Federal Advisory Committee Act. However, there is little scientific reason to expect such a pro forma approach—which the emphasis is on meeting formal requirements, not the needs of the public—to succeed where its predecessors have failed. Rather, it runs the risk of exacerbating indifference, mistrust, and resistance (24). The alternative is to treat the public in a respectful, evidence-based way throughout the deliberations. Social science can provide effective guidance in the selection of representative publics, in the development of effective deliberation techniques, and in the integration of technical and lay knowledge. The commission, consistent with its charge and charter, should include expertise on its subcommittees to inform recommendations addressing social trust and credibility, perhaps even creating a subcommittee devoted specifically to procedural issues of a proposed waste-management strategy. The strategy adopted by the commission will affect not only how its recommendations are judged but also how the public should be involved in subsequent policy and siting decisions. Addressing relevant social issues does not guarantee success, but ignoring them increases the chances of repeating past failures.

References