DRAFT CONSENT-BASED SITING PROCESS

for Consolidated Storage and Disposal Facilities for Spent Nuclear Fuel and High-Level Radioactive Waste

January 12, 2017

U.S. DEPARTMENT OF ENERGY

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1. INTRODUCTION

The Administration's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* (Strategy),[1] released in 2013, calls for "a phased, adaptive, and consent-based approach to siting and implementing a comprehensive management and disposal system" for spent nuclear fuel (SNF) and high-level radioactive waste (HLW). In December 2015, the Department of Energy (DOE) launched an initiative to develop a process for siting disposal or storage facilities for these materials collaboratively with the public, communities, stakeholders, and governments at the tribal, state, and local levels. As part of the first phase of this initiative, DOE issued an Invitation for Public Comment[2] and conducted a series of public meetings with stakeholders and communities around the country to seek feedback and inform future efforts.

This document outlines DOE's current thinking regarding specific steps and broader design principles for implementing a consent-based siting process. It reflects the input gathered from a wide range of participants in DOE's earlier outreach efforts,[3] as well as the findings of several expert groups that have reviewed these issues, including the Blue Ribbon Commission on America's Nuclear Future (BRC).[4] In addition, this document offers preliminary views on siting considerations for federal SNF and HLW storage and disposal facilities. As DOE continues to refine its approach to consent-based siting, it is committed to proceeding in a manner that is inclusive, participatory, and responsive to new information and the suggestions and recommendations of communities, stakeholders, and the public.

2. RATIONALE FOR MOVING FORWARD WITH A CONSENT-BASED SITING PROCESS

As the BRC explained, "finding sites where all affected units of government, including the host state or tribe, regional and local authorities, and the host community, are willing to support or at least accept a facility has proved exceptionally difficult."[5] Lacking a disposal solution, most of the nation's inventory of SNF is currently being stored at commercial nuclear reactors around the country, and additional quantities of HLW and SNF are being stored at various DOE sites. The issuance of this draft consent-based siting process reflects the DOE's judgment—grounded in conclusions reached by previous studies[6] and real-world experience with siting controversial facilities in the United States and elsewhere—that a consent-based process is more likely to deliver successful outcomes.

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[1] U.S. Department of Energy, *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste, January 2013.* https://energy.gov/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste.

[2] U.S. Department of Energy, *Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities,* 80 FR 79872, December 23, 2015. https://www.federalregister.gov/documents/2015/12/23/2015-32346/invitation-for-public-comment-to-inform-the-design-of-a-consent-based-siting-process-for-nuclear

[3] U.S. Department of Energy, *Designing a Consent-Based Siting Process: Summary of Public Input Final Report*, December 29, 2016. https://www.energy.gov/ne/downloads/designing-consent-based-siting-process-summary-public-input-report.

[4] The BRC formed in 2010 at the direction of President Obama to develop a new strategy for managing the nation's spent nuclear fuel and high-level radioactive waste. It issued a number of recommendations in 2012 that helped inform the Administration's Strategy. A reference to the BRC's Report to the Secretary of Energy is included in footnote 5.

[5] Blue Ribbon Commission on America's Nuclear Future, *Report to the Secretary of Energy*, January 2012. https://energy.gov/ne/downloads/blue-ribbon-commission-americas-nuclear-future-report-secretary-energy.

[6] National Research Council of the National Academies, One Step at a Time: The Staged Development of Geologic Repositories for High-Level Radioactive Waste, 2003. https://www.nap.edu/read/10611/chapter/1.

DOE also recognizes that action by Congress will be needed to implement some of the steps and design principles outlined in this report, and that implementing an integrated waste management system[7] that includes disposal capabilities can be expected to take decades. In light of this reality and in the interest of getting started, DOE has sought to outline key steps for a consent-based siting process that could be applied by any federal implementing organization, including a new nuclear waste management entity as discussed in the Strategy.

3. TYPES OF FACILITIES

DOE's vision is for an integrated waste management system that will provide for the safe and secure transportation, storage, and disposal of the nation's SNF and HLW. It could include:

- A pilot interim storage facility, initially focused on accepting spent nuclear fuel from shutdown commercial reactor sites
- A larger, consolidated interim storage facility, potentially co-located with the pilot facility and/or with a geologic repository, that provides flexibility within the integrated waste management system
- One or more geologic repositories for SNF and HLW

The Department is also investigating the concept of deep borehole disposal, which could be an option for the disposal of smaller and more compact waste forms currently stored at DOE sites. Transportation infrastructure to move SNF and HLW will be needed. Planning for the safe and secure shipment of materials to a storage or disposal facility is a critical activity that demands close cooperation between the implementing entity and tribal, state, and local governments along likely transportation routes. As it has done for past radioactive materials shipments, DOE is committed to working with tribal, state, and local authorities, including state regional groups,[8] to address transportation issues and respond to the concerns of affected communities.

The remainder of this section provides a brief overview of the existing U.S. SNF and HLW inventory and a short description of the types of facilities that DOE would propose to site using a consent-based approach. Each poses different kinds and levels of opportunity, benefits, risk, and impact, and thus presents different siting challenges. Project cost and timescales for siting, licensing, constructing, operating, and closing a facility will vary from facility to facility.

3.1 SNF and HLW Types and Quantities

The types and quantities of material in the nation's inventory of SNF and HLW vary. SNF from the operation of commercial nuclear power plants accounts for the largest portion of the inventory: approximately 75,000 metric tons of heavy metal (MTHM) in total.[9] This SNF exists in the form of

[7] DOE webpage on Integrated Waste Management https://energy.gov/ne/integrated-waste-management.
[8] For example, DOE already interacts frequently with groups such as the Southern States Energy Board, the Western Interstate Energy Board, and the Midwestern Office and Eastern Regional Conference of the Council of State Governments on transportation planning issues and shipping programs associated with nuclear materials.
[9] Spent nuclear fuel quantities are often reported in terms of metric tons of heavy metal (MTHM). This is a measure of the amount of uranium used in the fuel and does not account for other metals used in the manufacture of a nuclear fuel assembly. The 75,000 MTHM figure includes commercial SNF in storage as of the end of 2015.

fuel rod assemblies, and nearly all of it is being stored at the reactor sites where it was generated, either submerged in pools of water (wet storage) or in shielded casks (dry storage).

High-level radioactive waste, most of which was generated by reprocessing for defense nuclear activities, consists of roughly 90 million gallons of high-level waste liquids, sludges, and solids. Most of the defense high-level radioactive waste in DOE's current inventory is stored at the Hanford and Savannah River sites and is planned to be (or has already been) vitrified into a glass form. DOE also manages defense high-level radioactive waste in a dry calcine form at the Idaho National Laboratory. DOE also manages spent nuclear fuel from the operation of the U.S. Navy nuclear fleet, and from research and development (R&D) activities. The DOE spent nuclear fuel inventory totals approximately 2,400 MTHM.[10]

3.2 Pilot Interim Storage

The Strategy calls for the development of a pilot interim storage facility with limited capacity that would initially be focused on taking spent nuclear fuel from shutdown reactor sites. This pilot facility would need to have the capability to transfer large dry storage canisters (DSCs)[11] from transportation casks into dry storage. DOE's current concept for this type of facility includes constructing and operating a canister handling building, a canister transfer facility, a storage cask fabrication facility, an administration building, and a visitor center. In addition, a pilot interim storage facility may provide expanded storage capability such that additional spent nuclear fuel could be handled from other shutdown and/or operating reactors that have dual-purpose casks (DPCs) and transportable storage casks (TSCs) available to ship.

3.3 Consolidated Interim Storage

Building on experience gained through the development of a pilot storage facility, the Strategy includes a larger, consolidated interim storage facility that would provide sufficient capacity to accept spent nuclear fuel from operating commercial nuclear power plants and, if necessary, from DOE sites. A larger storage facility could potentially be co-located with the pilot facility and/or a geologic repository, and could accommodate a much broader variety of storage systems. DOE's current concept for this type of facility includes constructing and operating facilities similar to those identified as part of a pilot interim storage facility, but could also be expanded to include a bare fuel receipt facility, a canister inspection and remediation facility, a research and development facility, a repackaging facility, and a fleet and cask maintenance facility. The scope of this facility would differ from that of the pilot facility in that the total spent nuclear fuel storage capacity could be as much as 70,000 MTHM. A larger facility (or facilities) would continue to receive DPCs and TSCs, and may also receive and store individual fuel assemblies, depending on the spent nuclear fuel acceptance strategy.

[10] U.S. Department of Energy, *Assessment of Disposal Options for DOE-Managed High-Level Radioactive Waste and Spent Nuclear Fuel*, October 2014, p. 8-9. https://www.energy.gov/ne/downloads/assessment-disposal-options-doe-managed-high-level-radioactive-waste-and-spent-nuclear.

[11] This draft siting process document reflects concepts that could support future decision-making by DOE. No inferences should be drawn from this document regarding future actions by DOE. To the extent that elements in this draft siting process document conflict with provisions of the Standard Contract, the Standard Contract provisions prevail.

3.4 Deep Geologic Disposal

The Strategy includes at least one permanent geologic repository for spent nuclear fuel and high-level radioactive waste from commercial and defense activities. After the President's March 2015 finding that the development of a repository for defense high-level radioactive waste only is required, DOE also has been planning for a separate repository for the disposal of SNF and HLW resulting from atomic energy defense activities and/or DOE research and development activities (hereinafter referred to as a defense waste repository).[12]

Any permanent geologic repository would be designed based on the geologic media in which it is sited. The BRC report provides a useful overview of the basic concept:

> *In a mined geologic repository, wastes would be placed in engineered arrays in conventionally mined cavities deep beneath the earth's surface. The waste itself would be contained in canisters or other packages appropriate to its particular form, chemical content, and radiation intensity. As developed and studied around the world, proposals for geologic disposal also employ the concept of multiple barriers. These include both engineered and geologic barriers that improve confidence that radioactive constituents will not return to the biosphere in biologically significant concentrations.... While engineered barriers would be tailored to a specific containment need, geologic barriers would be chosen for their in-situ properties with respect to both waste containment and isolation.*[13]

A geologic repository would also include a number of surface systems and facilities to support waste receipt, handling, and disposal operations. Many of these surface support systems would be similar to those needed at an interim storage facility. Unlike a storage facility, however, a geologic repository would also need systems and capabilities to support subsurface operations.

Borehole disposal is another form of deep geologic disposal that may be appropriate for smaller waste forms. This disposal concept consists of drilling borehole(s) to a total depth of about 5,000 meters (16,400 feet or greater than three miles) into crystalline basement rock, placing waste packages in the lower emplacement zone portion of the borehole, and sealing and plugging the upper portion of the borehole. The required bottom-hole diameter of the borehole(s) depends on the waste package configuration for the reference concept, but ranges from 22 centimeters to 43 centimeters (8.5 inches up to 17 inches). DOE is currently pursuing research and development efforts not involving nuclear waste to investigate the feasibility of the deep borehole disposal concept.[14]

[12] U.S. Department of Energy, *Draft Plan for a Defense Waste Repository*, December 2016. https://www.energy.gov/ne/defense-waste-repository.
[13] Blue Ribbon Commission on America's Nuclear Future, *Report to the Secretary of Energy*, January 2012, p. 29.
[14] U.S. Department of Energy, Request for Proposal Number/Title: DE-SOL-0010181, Deep Borehole Field Test. https://www.fedconnect.net.

4. GENERAL DESIGN PRINCIPLES FOR A CONSENT-BASED SITING PROCESS

Building on input gathered during the initial public engagement phase, DOE has identified a number of design principles for an effective consent-based siting process. The Department is committed to adhering to these design principles in its efforts to refine and move forward with the consent-based siting framework detailed in Section 5.

- *Prioritization of Safety* – The highest priority will be to site, design, construct, operate, and close nuclear waste management facilities in a safe and secure manner that is protective of human health and the environment.
- *Environmental Responsibility* – The siting process will support the development, construction, operation, and closure of facilities that successfully isolate radioactive materials from the environment and use best practices with respect to rigorous planning, implementation, and monitoring.
- *Regulatory Requirements* – The siting process will support the development of facilities that meet or exceed applicable regulatory requirements. Regulatory requirements will be applied rigorously and transparently.
- *Trust Relationship with Indian Tribes* – The siting process will respect tribal sovereignty and self-determination, lands, assets, resources, and treaty and other federally recognized and reserved rights. The process will take into account siting impacts on sacred tribal lands, and other areas and resources of religious or cultural significance. (The importance of recognizing Tribes' special trust relationship with the U.S. federal government in the siting process is discussed further in Section 5.4 of this document; siting considerations are also discussed in Chapter 6.)
- *Environmental Justice* – The process will pursue fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income. The process will also embrace environmental justice principles, and comply with federal requirements and guidance on these issues.
- *Informed Participation* – Consent is not meaningful unless it is informed. This means that the implementing organization[15] will share information and provide financial and technical resources to communities as needed to enable effective participation and provide for informed decision-making.
- *Equal Treatment and Full Consideration of Impacts* – The siting process will be conducted in a manner that is considerate of parties who are or may reasonably be affected, identifies and shares information about potential impacts, and makes explicit the role of fairness and equity considerations in its decision-making.

[15] Under current authority, DOE is legally responsible for implementing the waste program. The BRC recommended a new organization be created that would be dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed. The Administration's Strategy agrees with the recommendation of the BRC. DOE is prepared to maintain this function or support the transfer of this role to a new organization based on direction from Congress.

- *Community Well-being* – Communities will want to weigh the potential opportunities and risks of hosting a facility, including the social, economic, environmental, and cultural effects—both positive and negative—it may have on the community. To ensure that the siting process is fair and durable, consideration of all these impacts and benefits will be integral to the siting process.
- *Voluntariness/Right to Withdraw* – Participation in the consent-based siting process will be voluntary. Further, a community that volunteers to be considered for hosting a nuclear waste management facility will reserve the option to reconsider and withdraw itself from further participation up to the point that a binding agreement has been signed. Provisions specifying when and on what grounds agreements could be terminated or amended beyond that point could be negotiated as part of the agreement.
- *Transparency* – The siting process will be open to input throughout and transparent with respect to how decisions are made. Every effort will be made to share information and input with all participants in the process and explain how this information and input is being considered or applied.
- *Stepwise and Collaborative Decision-Making that is Objective and Science-Based* – The process will be implemented in discrete, transparent, and easily observed and evaluated steps, in consultation with the public, interested stakeholders, and affected parties. Decisions will be based on sound science and siting considerations and regulatory requirements will be applied rigorously and transparently. The siting process will recognize the value of supporting robust participation, encouraging multiple applications, and keeping options open, especially in the early phases of the siting process.

5. SITING PROCESS

5.1 Early Engagement and Outreach

In designing this draft consent-based siting process, DOE considered the input received during the yearlong effort to engage with the public and stakeholders in a national-level dialogue about consent-based siting for nuclear waste management and disposal facilities. DOE also reviewed and considered the findings and recommendations of other organizations and expert groups that have looked at the challenge of siting nuclear waste facilities, including the National Academy of Sciences, the Nuclear Waste Technical Review Board, and the BRC (among others). In addition, DOE considered international experience in this area, including consent-based siting efforts being undertaken by other governments (e.g., Canada and the United Kingdom). Specific activities and outputs from the initial public engagement phase of DOE's consent-based siting initiative include the following:

- Publishing an *Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities* and hosting a series of 10 public meetings (including 8 regional meetings across the country and 2 in Washington, DC).
- Publishing *Designing a Consent-Based Siting Process: Summary of Public Input Report*, summarizing input gathered through the Invitation for Public Comment and public meetings.

- Publishing the *Draft Plan for a Defense Waste Repository* (December 2016) to solicit input on this proposed element of DOE's integrated waste management strategy.

- Continuing interactions with the National Transportation Stakeholders Forum (NTSF) and several ad hoc working groups associated with NTSF, the Transportation Core Group, state and regional groups, and the Tribal Caucus.16 In addition, DOE has continued to engage with the Nuclear Energy Tribal Working Group (NETWG).

- Discussing DOE's vision for an integrated waste management strategy at numerous venues (the *Summary of Public Input Report* contains a full list).

Copies of these documents can be found on the Department's Consent-Based Siting website at https://energy.gov/ne/read-more-about-nuclear-waste-management. Summaries, videos, and transcripts of the 10 consent-based siting meetings hosted in 2016 can be found at https://energy.gov/ne/activities-and-events.

Before turning to a discussion of specific phases and steps in DOE's proposed design for a consent-based siting process, it is worth reiterating that any consent-based process—by its nature—will have to be flexible and adaptive. Thus, DOE's aim in this draft consent-based siting process is to offer general direction and guidance in an effort to seek additional input, rather than to set out a rigid blueprint to be followed. Experience in the United States and elsewhere suggests that siting processes, especially for complex and controversial facilities, are inherently unique. That means the steps described here may not occur exactly in the sequence described and may need to be modified—in duration and/or scope—based on the particular needs of potentially interested communities and on the nature of the facility itself. Some steps may also proceed in parallel with others. For example, the development of generic repository standards by the U.S. Nuclear Regulatory Commission (NRC), the U.S. Environmental Protection Agency (EPA), and other agencies (if applicable) will take time and could occur in parallel with other preliminary repository siting efforts. As such, the timelines listed below are rough estimates based on preliminary planning assumptions and are meant only to provide a rough approximation of the amount of time it may take to complete any given phase.

It should also be recognized that the while the local community is generally the most affected by any siting process, local and state government, Congressional delegations, as well as any affected Tribal governing body, will play important roles in the siting process. Therefore, the use of the term "community" in the following draft consent-based siting process should be interpreted as the broad and inclusive participation from all of these groups and not limited to the local community.

[16] While these interactions focused primarily on transportation, consent-based siting was also discussed.

5.2 Draft Steps in the Siting Process

Phase I	Initiate Consent-Based Siting Process and Invite Communities to Learn More *Rough estimate of schedule: 1–3 years to initiate the consent-based siting process for each type of facility.*
Step 1	**Implementing organization obtains legislative authority and funding.** Initiate a consent-based siting program, with sufficient authority and funding, to collaborate with communities and stakeholders at the local, state, and tribal levels to site waste management facilities.
Step 2	**Implementing organization initiates the consent-based siting process.** Provide information, answer questions, and engage with the public on consent-based siting and an integrated waste management system to store and dispose of nuclear waste. Discuss consent-based siting with potentially interested communities and stakeholders, and encourage mutual learning between communities and the implementing organization. Information-sharing, open discussion, and mutual learning activities continue throughout the consent-based siting process. The NRC, EPA, and other agencies (if applicable) initiate development of generic repository standards.
Step 3	**Implementing organization issues a funding opportunity for communities to learn more.** Establish a federal grant program and issue a funding opportunity for communities interested in learning more about consent-based siting, nuclear waste management, siting considerations, and the role a waste management facility (or facilities) may play in the community. Additional funding opportunities may be issued in later steps of the process based on Tribal, state, community, and program needs.
Step 4	**Communities express interest in learning more respond to funding opportunity.** Communities respond to the funding opportunity notice indicating an initial interest in learning more about consenting to host an interim storage facility or repository. Briefings, meetings, information materials, and opportunities for open discussion are made available to communities that express interest. Communities submit grant applications.
Step 5	**Implementing organization evaluates applications and awards grants.** The implementing organization reviews grant applications and evaluates whether the community has the potential to play a role in an integrated waste management system. This early-stage evaluation focuses on high-level, readily detectable factors that could exclude a community from further consideration, such as proximity to major population centers, national parks, or other areas of special significance. This step relies on readily available information, such as reports of the U.S. Geological Survey, state geological agencies, academic papers, and National Laboratory-developed geologic information systems with data relevant to both surface facilities and underground repositories. The implementing organization awards grants based on criteria in the funding opportunity notice to enable communities to learn more. The implementing organization works closely with communities to encourage mutual learning, establish an open dialogue, identify potential environmental justice concerns, and support community planning efforts to assess whether a facility fits into the community's long-term vision

	and well-being, including economic benefits and challenges. This engagement with the implementing organization continues throughout the consent-based siting process. The NRC and EPA, and other agencies (if applicable) continue development of repository standards.
Step 6	**Community requests preliminary assessment of site.** The community decides whether to request a preliminary assessment to determine whether a site or sites within the community have the potential to possess the geological, geographical, and technical attributes expected for hosting a SNF and/or HLW management facility. Communities may choose to hire their own experts to help them evaluate if they wish to proceed to a preliminary assessment and continue their involvement with the siting process.
Phase II	**Site Assessment** *Rough estimate of schedule: 1–2 years for interim storage facility; 2–4 years for repository.*
Step 7	**Implementing organization conducts preliminary site assessment.** At the request of the community, the implementing organization conducts a preliminary site assessment. This includes site evaluation activities to assess technical concerns and feasibility, infrastructure issues, local socio-economic and environmental conditions, and potential impacts. The assessment begins with an extensive analysis based on the full range of existing information that can be obtained in a reasonable time. In addition to the information gathered in the first phase, data sources considered may include a more comprehensive review of literature and related studies in the public domain and the private sector (when available); various meteorological, environmental, socioeconomic, and transportation studies conducted in the affected area by federal or state agencies; and available data from existing exploratory boreholes or other existing field investigations in the region of the site. If this analysis identifies additional data that are necessary to support a decision to conduct a detailed site assessment in Phase III, some additional activities may be undertaken following completion of required environmental reviews, including surface investigations such as geologic mapping and geophysical surveys, compilations of satellite imagery data, aerial photography, or limited surface-disturbing work such as trenching. After analysis of the information collected, the implementing organization completes the assessment, shares the results with the community, and determines whether a site (or sites) within the community is eligible to be considered for a detailed site assessment. The decision-making process used to determine whether sites are suitable for a detailed assessment and the bases for the decision are discussed clearly and openly with the community. The NRC and EPA, and other agencies (if applicable) propose generic repository standards.

Step 8	**Community requests detailed assessment of site.** A community that has a site (or sites) that pass the preliminary site assessment decides whether to request a more detailed assessment to determine whether that site (or sites) has the potential to obtain a license for the construction and operation of a storage and/or disposal facility for SNF and/or HLW. The community decides whether it is interested in requesting a detailed site assessment for an interim storage facility, a disposal facility, or both. In addition, the community identifies any additional features of interest that would be important in terms of supporting community well-being.
Phase III	**Detailed Assessment** *Rough estimate of schedule: 2–4 years for interim storage facility; 5–10 years for repository.*
Step 9	**Implement organization conducts detailed site assessment.** The implementing organization conducts a detailed assessment of the site. Data obtained is used to develop the facility design, satisfy requirements of the National Environmental Policy Act (NEPA) and other environmental laws, and prepare licensing documentation. The implementing organization initiates activities to comply with NEPA, including issuing a Notice of Intent to prepare an Environmental Impact Statement where appropriate. The implementing organization and the community work together to engage potentially affected communities—at the local, tribal, and state levels—in the analysis of health, safety, environmental, social, economic, and cultural effects of the potential facility. This engagement with surrounding communities should include efforts to address environmental justice concerns, if any. A detailed site assessment involves data collection activities that would likely be quite extensive for a repository. Some surface-based testing, including boreholes, would likely be required to provide data related to surface facilities and operations—for both repositories and storage facilities. A repository would also require a substantial additional amount of work (referred to as site characterization in repository regulations) to establish geologic conditions and the ranges of those parameters of a particular site that are relevant for evaluating whether a repository at the site will be able to provide safe long-term isolation of the waste. This work may include subsurface investigations from boreholes, exploratory shafts, and tunnels; laboratory research; and modeling of long-term repository performance. The implementing organization then determines if any sites that have been the subject of a detailed site assessment are suitable for preparation of a license application for the type of facility in which the community has expressed interest. The decision-making process and bases for the decision are discussed clearly and openly with the community prior to, during, and after the assessment.
Step 10	**Community with suitable site(s) decides whether they may be willing to host.** If a site within the community is confirmed to be suitable in Step 9, the community decides whether to pursue the possibility of hosting a nuclear waste management facility. The decision to take this step is based on information gathered in all previous phases; considerations of community well-being and community planning; collaboration with surrounding communities at the local, state, and tribal levels; and a mutual learning process between the community and the implementing organization.

Phase IV	**Agreement** *Rough estimate of schedule (note that times overlap with the prior phase): 1–2 years for interim storage facility; 2–5 years for repository.*
Step 11	**Community offers the terms and conditions on which they would like to proceed.** Following an affirmative decision to pursue hosting a facility, the community drafts and proposes the terms and conditions of an agreement with the implementing organization to host the facility. This includes what types and amounts of SNF and/or HLW the community would consent to accepting at the proposed facility, the type of facility (storage, disposal, or both) that would be considered, and under what terms and conditions.
Step 12	**The community and the implementing organization negotiate and ratify an agreement.** The community and the implementing organization discuss, collaborate, and negotiate to achieve a workable, durable agreement. The implementing organization and the community determine whether to enter into a formal agreement.
Step 13	**The community and the implementing organization finalize the agreement.** The community determines the method to be used to ratify the agreement that the community considers suitable. The implementing organization and community accept terms of the agreement, and all required parties sign. Agreement is approved by necessary parties and finalized.
Phase V	**License, Construct, Operate, and Close** *Rough estimate of schedule:* *Licensing Process: 2–3 years for interim storage facility; 3–5 years for repository* *Construction: 18–24 months for interim storage facility; 7–10 years for repository* *Operation: 40–100 years for interim storage facility; 30–150 years for repository*
Step 14	**License facility.** The implementing organization and the community work together to finalize the facility design, safety analysis, and license application for the proposed facility (or facilities). The license application is submitted to the NRC for review and decision. The NRC considers the application under the regulations applicable to the specific type of facility proposed with opportunities for involvement by other parties as provided in those regulations.
Step 15	**Construct and operate the facility.** Assuming receipt of the required authorization from the NRC and other agencies and in accordance with the formal agreement, the implementing organization constructs and then operates the facility. Preparation for transportation and other logistical and infrastructure steps are finalized prior to start of operation. The implementing organization continues to work collaboratively with the community to ensure commitments to the community are maintained and upheld throughout the lifetime of the facility.
Step 16	**Close and decommission the facility.** The implementing organization and the community work together to close and decommission the facility under the terms agreed to in the formal agreement and consistent with applicable statutory and regulatory requirements.

Step 17	**Monitor the site post closure and maintain communication.** The implementing organization and the community continue to monitor the site to ensure safety and protection of people and the environment. The program implementer and the community maintain open, two-way communication.

5.3 Issues to Be Addressed Throughout the Siting Process

As the above sequence of phases and steps indicates, potential host communities and the implementing organization will confront multiple decision points where expressions of interest (early in the process) and more formal statements of consent and agreement to continue (later in the process) are needed to proceed to the next phase. Timely and frequent engagement with stakeholders will be critical to navigate each of these decision points in a way that is tailored to the local and regional contexts of potential host sites. In particular, key questions about the nature of consent and about mechanisms for registering consent will need to be discussed throughout the process, up to the point where a final agreement to move forward with a license application is signed.

In addition, the siting process will need to address a number of important issues and questions that cannot be specified in advance, but that will have to be resolved through active consultation, dialogue, and engagement between the implementing organization and affected parties, including Tribes, states, regional and local authorities, and congressional representatives. Examples of such issues include how to address the concerns and interests of neighboring states and Tribes; how to identify and engage other key stakeholders; how proposed agreements, including benefits and incentives, will be reviewed and evaluated; and what type of cooperation and/or oversight role host jurisdictions have in the development, operation, and closure/decommissioning of the proposed facility.

5.4 Key Role of Tribes and States

Many of the comments received in response to the Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities stressed the central role of elected officials at the tribal or state level in consent-based siting.[17] Unlike local governments, Tribes and states have recognized powers that will require special attention throughout such a process. The federal government consults with tribal governments[18] and has a trust responsibility to protect tribal sovereignty and self-determination, as well as tribal lands, assets, resources, and treaty and other federally recognized and reserved rights. In general, federal Indian reservations are not subject to laws of the states in which they are located.[19] In addition, Tribes retain treaty rights and tribal interests in large areas beyond reservations.

[17] U.S. Department of Energy, *Designing a Consent-Based Siting Process: Summary of Public Input Final Report*, December 29, 2016, p. 11-21, 28-30.
[18] The federal government's responsibilities to consult government-to-government with Tribes are found in Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (2000).
[19] A federal Indian reservation is an area of land reserved for a Tribe or Tribes under treaty or other agreement with the United States, executive order, or federal statute or administrative action as permanent tribal homelands, and where the federal government holds title to the land in trust on behalf of the Tribe. For more information, see: https://www.bia.gov/FAQs/.

States are the fundamental building blocks of the U.S. federal system, and retain powers that are not delegated to the federal government, or prohibited to the states, by the Constitution. States are responsible for ensuring the health and safety of their citizens, and have jurisdiction over local authorities.

All major nuclear waste legislation over the past four decades has recognized the fundamental and distinct roles of Tribes and states in the U.S. federal system, and defined explicit mechanisms for involving tribal and state governments in the process of siting, constructing, and operating repositories and storage facilities. In the case of the federal government's government-to-government relationship with Indian Tribes, the siting process will follow DOE's American Indian and Alaska Natives Tribal Government Policy and implementation guidance, as well as broader federal guidance (including Executive Order 13175 concerning "Consultation and Coordination with Indian Tribal Governments").

DOE will seek to initiate and maintain communications with host Tribes and states, as well as other affected jurisdictions from the outset in accordance with relevant Executive Orders, statutes, and regulations.

6. SITING CONSIDERATIONS

6.1 The Role of Siting Considerations in a Consent-Based Siting Process

Siting considerations play a role in the early stages of the siting process by helping communities evaluate the potential suitability of sites in the community for a nuclear waste management facility and ensuring that time and resources are not invested in exploring sites that are unlikely to support the mission these facilities need to serve. As already noted in Step 5 of Phase 1 in the draft process, the implementing organization will evaluate applicants' prospective sites against broad, exclusionary factors such as proximity to major population centers, national parks, or other areas of special significance and award grants to learn more to those applicants not excluded by these factors. Of course, later steps—including the preliminary and detailed site assessments—require increasingly detailed and rigorous analysis of the total system performance at specific potential sites.

Ultimately, the safety and appropriateness of any potential site for a particular type of facility will be assessed against a number of factors, both technical and social in nature. Regulatory standards developed and enforced by an independent regulator(s) will play an essential role in protecting the public and the environment, and holding the implementer accountable. Prior to construction and operation, the Nuclear Regulatory Commission will consider the license application to determine that the facility will meet the regulatory standards established to ensure the health and safety of the public.

The specific considerations outlined below are not exhaustive and do not preclude the consideration of other factors.

6.2 Siting Considerations

Major federal actions related to a federal proposal to site, construct, operate, and ultimately close storage or disposal facilities for SNF and HLW, including associated transportation, would be subject to NEPA (42 USC 4321 et seq.), which establishes requirements for proposed major federal actions that could significantly affect the quality of the human environment. NEPA requires federal agencies to consider potential environmental consequences of and reasonable alternatives to their proposed actions. Council on Environmental Quality (CEQ) implementing regulations for NEPA (40 CFR Parts 1500-1508) and applicable agency-specific regulations, establish the requirements for involving the public in the evaluation process, including making environmental information publicly available before making a decision or taking action.[20] The licensing of a facility by NRC would also be subject to NEPA review.

Federal agencies must integrate other planning and environmental review procedures and consultation requirements with NEPA to the fullest extent possible, including, for example, the *Fish and Wildlife Coordination Act* (16 U.S.C. 661 et seq.), the *National Historic Preservation Act* (54 U.S.C. 300101 et seq.), the *Endangered Species Act* (16 U.S.C. 1531 et seq.), and other laws and executive orders pursuant to 40 CFR 1502.25. Through NEPA, the implementing organization would consider all potential direct, indirect, and cumulative effects of the proposed facility on the human environment, including air quality, geology and soils, land use, water resources, human health, biological resources, socioeconomics, environmental justice, and cultural resources.

Proposed nuclear waste management facilities would be subject to federal, state, local, and tribal land use protected area considerations and prohibitions. This would generally exclude from consideration land designated as part of a national park, national wildlife refuge, or wilderness area. Proximity to and effects on components of the National Parks System, the National Wildlife Refuge System, the National Wild and Scenic Rivers System, the National Wilderness Preservation System, and National Forest System, as well as proximity to or impacts on sacred tribal lands, would also be given special consideration.

Social and economic considerations are also important in siting a nuclear waste management facility, since hosting such a facility could affect a community in many ways. Ideally, a community interested in learning more about potentially hosting a facility would feel empowered to investigate options and engage its citizens in such a way that most members of the community feel this exploration was a positive experience regardless of whether they choose to proceed or withdraw. One option along these lines is to conduct a community planning, economic development, or visioning activity separate from or in parallel to investigations into the risks and benefits of hosting a facility. This exercise would help a community articulate what type of future it wants before deciding whether a proposed facility or facilities might align with or enable that vision. Such as exercise could also provide a mechanism for addressing equity and environmental justice concerns and mediating different views. With a clearer vision of its long-term objectives, a community can more easily evaluate the different outcomes of a facility, including impacts on local economic development, labor supply, transportation infrastructure, public safety infrastructure, utilities,

[20] In addition to CEQ regulations, the implementing organization would likely need to promulgate and comply with its own NEPA implementing regulations. For DOE, these are the *National Environmental Policy Act Implementing Procedures* promulgated at 10 CFR Part 1021.

energy, and community services, and reach a conclusion about whether those impacts align with the community's values and priorities.

6.3 Regulatory Framework for Siting Interim Storage Facilities

The U.S. Nuclear Regulatory Commission (NRC) is responsible for regulating the storage of commercial spent nuclear fuel. The regulations that will apply to a federal interim storage facility include:

- 10 CFR Part 20 – Standards for protection against radiation
- 10 CFR Part 72 – Licensing requirements for the independent storage of spent nuclear fuel, high-level radioactive waste, and reactor-related greater than class C wastes
- 10 CFR Part 73 – Physical protection of plants and materials

6.4 Regulatory Framework for Siting Geologic Repositories

EPA's 40 CFR 197 and NRC's 10 CFR 63 were developed specifically for a geologic repository at the Yucca Mountain site in Nevada, and would not apply to a repository at any site other than Yucca Mountain. EPA's 40 CFR 191 and NRC's 10 CFR 60 regulations date from the mid-1980s, but in the absence of new rulemaking, would apply to any proposed geologic repository at a site other than Yucca Mountain, Nevada.

As noted in the Administration's Strategy, "the Administration understands the need for the Environmental Protection Agency to develop a set of generic, non-site-specific, repository safety standards to gain public confidence that any future repository will protect public health and the environment. This will be an important early step in any repository siting effort." Thus, there is an expectation that the existing disposal regulations for geologic repositories (40 CFR 191 and 10 CFR 60) will be updated at a future date to reflect the evolution of regulatory thinking during and since the development of the Yucca Mountain-specific regulations (40 CFR 197 and 10 CFR 63). In issuing 10 CFR 63, the NRC stated that the more risk-informed, performance-based approach adopted therein provides a better regulatory framework for geologic disposal than the approach in 10 CFR 60. At that time, the NRC stated that the "generic Part 60 [10 CFR 60] requirements will need updating if applied to sites other than Yucca Mountain" (66 FR 55732, p. 55736). The NRC has not yet begun rulemaking to effect this update, although the NRC continues to recognize that 10 CFR 60 needs updating if applied to geologic repositories at sites other than Yucca Mountain (Rubenstone 2016).

The early phases of a siting process can be initiated based on readily available information that does not require site-disturbing activities. These early stages can also go forward in parallel with regulatory action by the EPA and NRC to develop updated regulations for a geologic repository at a site other than Yucca Mountain.

6.5 Site Assessment Considerations

As noted above, the first step of the site assessment phase will focus on a few high-level, readily detectable factors that could exclude a site from further consideration, such as proximity to major population centers, national parks, or other areas of special significance. During the next step, more

detailed, site-specific information will need to be collected. The information collected during detailed site assessment will provide greater insights into the performance of a total system at a specific site. Such information could include:

- The current and future distribution of the population near the proposed site
- The availability of sufficient surface land area to accommodate needed capacities and functions, including facilities for the transfer and storage of waste and for associated support services, as well as sufficient area around the facility to ensure that radiation doses from all pathways resulting from facility operations are within regulatory limits and there is an adequate controlled area in accordance with applicable NRC regulations
- The potential for strong near-field ground motion from historical earthquakes on large capable faults
- The potential for seismicity induced by human activities, such as explosive blasts, subsurface fluid withdrawal or addition, mining activity, or the ground loading effects of dams or reservoirs
- Surface faulting that could cause differential ground displacement that might affect proposed facility structures or operations
- Soil or bedrock conditions that have the potential to create ground movement from liquefaction, subsidence, or landslides and the potential of such conditions to adversely affect the proposed facility structures and performance
- The potential soil-bearing capacity to support foundation loading
- The potential for long-term and short-term adverse effects from floods (from surface-water bodies or surface runoff) or the need for extensive modification of floodplains in site selection and facility design
- The potential for natural phenomena or severe weather that could adversely affect the design and safe operation of the facility
- The potential for local and regional industries to affect the proposed facility's site and design
- Proximity to transportation infrastructure

In addition to the considerations above, additional site-specific factors would have to be considered when assessing a potential host site for a geologic repository. These additional factors relate to the ability of the site to provide the required, long-term isolation of high-level radioactive wastes and spent nuclear fuel after a repository has been closed and decommissioned. They include:

- *Geohydrology*— the geohydrologic setting of the site
- *Geochemistry*—the geochemical and hydrochemical conditions of the host rock
- *Rock characteristics*—the geologic and geomechanical characteristics of the site
- *Erosion*—the structure, stratigraphy, and geomorphology of the site
- *Dissolution*—the stratigraphy, structure, hydrology, and geochemistry of the site

- *Tectonics*—the tectonic setting of the site
- *Potential for future human interference*
    - *Natural resources*—presence of mineral and energy resources at the site
    - *Site ownership and control*—arrangements for the long-term ownership and control of land at the site

7. CONCLUSION AND OPPORTUNITIES FOR PROVIDING FURTHER INPUT

The draft consent-based siting process described in this document has been informed by the Department's engagement with the public, Tribes, stakeholders, and other interested parties and by numerous other sources of information and input. Following the release of this draft document, the Department plans to continue to provide opportunities for public dialogue. Future engagements with the public, and stakeholders, as well as communities, states, and Tribes will aim to better understand, respond to, and more fully incorporate input that is reflective of expressed values and interests.

The Department welcomes public comment on the contents of this document, including comments on specific aspects of the draft process and siting steps outlined in Section 5, as well as on the siting considerations discussed in Section 6. Instructions for submitting comments are included in the Federal Register Notice accompanying this document and titled *Request for Public Comment on Draft Consent-Based Siting Process and Siting Considerations for Nuclear Waste Storage and Disposal Facilities*.

Examples of the kinds of issues and topics that the Department believes would benefit from further input and suggestions include the following:

1. What specific design elements and implementation steps should be included to ensure that the siting process, as a whole, reflects the principles discussed in Section 4 and produces outcomes consistent with those principles?
2. What provisions are needed to assure potentially interested communities of adequate opportunities for information sharing, expert assistance, and meaningful participation?
3. How can the process be improved to maximize opportunities for mutual learning and collaboration between potentially interested communities and the implementing organization?
4. How can the process ensure communities have adequate opportunity to demonstrate interest in continuing in or opting out of the siting process?
5. How can the process ensure that regional concerns and interests, including the concerns and interests of neighboring Tribes and states and any transboundary issues or impacts, are adequately addressed?
6. How can the Department best engage with local, state, regional, and tribal entities in the review of this draft siting process?
7. Are there other issues that should be considered in the siting process?

In conclusion, the Department wishes to express appreciation for the insights, suggestions, and feedback that many individuals and organizations have already provided to inform this effort. The Department looks forward to continuing an active dialogue with all stakeholders and interested communities, Tribes, and states as it seeks to refine and implement a new approach to siting that—by reflecting the best expertise and core values of a broad cross-section of participants—offers real promise for producing safe, durable, and widely accepted solutions to our nation's nuclear waste challenges.