

Deep Time: The End of an Engagement

For all its flaws, US nuclear waste policy at least relied on a sense of a moral responsibility toward the present and future. That may now be changing.

Nuclear power plants in the United States have produced approximately 83,000 metric tons of spent nuclear fuel, stored at more than 70 sites in 34 states. Each year, the 96 power plants that remain operational generate another 2,000 metric tons of waste.

In its 1987 amendments to the Nuclear Waste Policy Act, Congress selected Yucca Mountain, in Nevada, to be investigated for suitability as a geological repository for the nation's high-level radioactive waste. If the site proved suitable, the shipment of waste from reactor sites to the repository was to start by 1998. From its inception, however, the Yucca Mountain site faced strong opposition. In 2010, the Obama administration abandoned it.

At that time, and to this day, no alternative sites have been under consideration. National nuclear waste policy has been deadlocked. The federal government has no operational plan for managing the waste, which will remain highly toxic for tens of thousands of years. In the absence of an ongoing geological repository project, the current legislation actually bans the Department of Energy from building, owning, and operating interim storage facilities, to prevent them from becoming alternatives to geological disposal.

With the government in absentia, private-sector firms involved in nuclear energy are increasingly seeking options to manage spent nuclear fuel on their own terms. Their incentive to do so will only grow as an increasing number of reactors enter the decommissioning phase, and nuclear power stations transmute into nothing more than spent nuclear fuel sites.

License to operate?

This trend is well illustrated by two license applications for consolidated interim storage facilities now before the Nuclear Regulatory Commission (NRC). Interim

Storage Partners (a joint venture between the firms Waste Control Specialists and Orano USA) has applied for a license to store up to 40,000 metric tons of spent nuclear fuel, for 40 years, at a site in Andrews County, Texas. Meanwhile, Holtec International, working with the Eddy-Lea Energy Alliance, a partnership of two New Mexico counties, has applied for a license to store 8,680 metric tons of spent fuel for a 40-year period in New Mexico. The company plans to request further amendments to the license to store an additional 95,000 metric tons of spent fuel over 20 years—more than the entire current national inventory of waste. In 2021, one or both of these license applications is expected to be approved by the NRC.

Both proposals require spent nuclear fuel canisters from numerous, geographically dispersed reactor sites to be consolidated at a small number of remote locations. The license applicants argue that the consolidation does not require major technical changes in how the waste is stored. They also argue that, in comparison with continued storage at multiple reactor sites, consolidation reduces overall storage costs, reduces safety and security risks, and facilitates the cleanup of decommissioned reactor sites. But such cost-benefit reasoning and probabilistic risk assessment consolidates all expected “risks” and “benefits” into a single scale of valuation. It cannot account for differing geographic, historical, or cultural contexts and sensibilities. Should this placeless analytical technique automatically trump a host of other values that figure into democratic discussions about siting of this unique form of hazardous waste?

For those who oppose the proposed facilities, the answer is clearly no. The governors of New Mexico and Texas submitted letters to the NRC opposing the licensing of these facilities, arguing that the transportation and storage of spent nuclear fuel within their borders expose their citizens, communities, first responders, economy, and environment to “unnecessary”

risks. Oil and gas producers view the proposed facilities as a threat to their local economic activities, and have submitted a motion to NRC opposing the project. The All Pueblo Council of Governors, representing the 20-member sovereign Pueblo nations of New Mexico and Texas, also opposes the license application. The group points to the lack of federal tribal consultation about transport routes, and the need for resources, training, and infrastructure for tribal emergency preparedness, response, and risk-management capabilities in the event of accidental radiological release during transport.

Opposition to the proposed consolidated interim storage facilities cannot be dismissed as just another *not in my backyard* movement. Dozens of civil society organizations from around the country jointly submitted a letter to NRC asserting: “We do not give our own government license to allow a private industry to further contaminate New Mexicans’ home or to expand the massive nuclear burden New Mexicans already bear.” Underlining that communities in New Mexico have already been subject to decades of contamination from radioactivity generated by the US nuclear weapons complex, Deb Haaland, then a US senator from New Mexico who is now secretary of the interior, also joined in opposing approval of the sites.

In another letter sent to the NRC, a group of national, state, and local civil society organizations (including the Union of Concerned Scientists, Public Citizen, Natural Resources Defense Council, Sierra Club, Southwest Research and Information Center, Coalition on Waste Valley Nuclear Wastes, and the Nevada Nuclear Waste Task Force) suggest that spent nuclear fuel should be stored in low-density, hardened, monitored, and retrievable storage facilities at reactor sites. While these groups highlight the risks of moving large volumes of waste across the country, they implicitly raise a principle of geographical and environmental equity and justice: spent nuclear fuel should be stored where it is used.

Such concerns, embodied in the notion of consent of the governed, are central to the legitimacy of democratic decision processes. Decisions that involve the future of communities and the environment should not be settled based on the results of cost-benefit analyses that collapse all values into a single ratio. The consequences of trying to do so have been made clear by the Yucca Mountain story. Congress, relying on majority vote, disregarded the opposition of the state of Nevada, the Western Shoshone Indian Nation, and other concerned stakeholders in the region, while at the same time failing to seriously consider other, equally plausible repository locations. After two decades, billions of dollars spent on characterizing risks, and endless litigation and political dispute, Yucca Mountain was abandoned. Subsequently, the Blue Ribbon Commission on America’s Nuclear Future, put in place by the Obama administration, concluded that such choices should rely on a “consent-based” decisionmaking process. According to the commission, the terms of consent

are best determined through ongoing negotiations at national, regional, and local scales. Such negotiations involve concerned stakeholder groups whose interests go beyond those of the communities in the immediate vicinity of disposal facilities, and are likely to evolve over time.

Consolidated interim storage facilities currently under consideration are subject to no such consent-based process. Their approval solely involves public comments on draft environmental impact statements (EIS) produced by the NRC on each individual license application. The NRC decides whether and how to account for (or not account for) the public comments before finalizing the EIS. The process allows for no extended negotiation or deliberation and requires no reasonable definition of consent. To the extent that consolidated interim storage is likely to become the de facto national strategy for managing nuclear waste, the EIS process fundamentally alters how Congress defined, through the Nuclear Waste Policy Act, the roles and responsibilities of government and the citizenry for handling the hazardous legacy of nuclear energy, transferring them to private companies and regulatory procedures intended for entirely different purposes.

Not your average EIS

Three decades after Congress selected Yucca Mountain as the only candidate for a geological disposal site, and a decade after it was taken off the table, no options for long-term management are in play. Indeed, the NRC, in a 2014 analysis addressing the timing of a repository’s future availability, developed a “generic environmental impact statement” that considers three possible timeframes within which geologic disposal becomes possible: 60 years, 160 years, and never. Meanwhile, existing approaches for safe interim storage require that spent radioactive material be stored in dry storage casks (sealed metal cylinders enclosed within a metal or concrete outer shell), and that the casks be replaced at 100-year intervals. No institutional, legal, or regulatory mechanisms are in place to address this possibility. Environmental impact statements for the proposed interim facilities cover only the licensing period of 40 years.

During the formulation of the national nuclear waste policy in the late 1970s and 1980s, both the Department of Energy and government-commissioned expert groups had approached the issue of interim storage facilities with great care and caution. Storage of spent nuclear fuel at interim storage facilities for extended periods was considered undesirable because it risked creating a disincentive for private nuclear utilities to use—or finance—federally built, owned, and operated geological repositories. To assess this risk, in 1977 DOE even sent out surveys asking utilities about their willingness to use federal nuclear waste management services.

To avoid such a risk, in the original Nuclear Waste Policy Act of 1982, Congress required DOE to contract with private

nuclear utilities and start collecting a “nuclear waste fee” to finance the nuclear waste program. This measure was intended to ensure both that utilities would contractually commit to using future federal geological repositories as soon as they became available, and that “those benefiting from nuclear energy” would be “financially responsible for their waste.”

The Nuclear Waste Policy Act and standard contracts signed with the nuclear utilities committed the Department of Energy to having an operational geological repository project in place by January 1998. Because Yucca Mountain had not been approved by that time, private nuclear utilities started turning to federal courts, asking DOE to compensate them for the costs of storing their waste in the years since. Each time a court rules for the plaintiffs, they are compensated through the US Treasury’s Judgment Fund, and therefore, by taxpayer monies. Furthermore, in 2013, following the abandonment of the Yucca Mountain project, federal courts, at the industry’s request, decided to suspend the fee that DOE had been collecting from nuclear utilities. In 2018, DOE estimated its potential liabilities toward private nuclear utilities at no less than \$34.1 billion for its failure to complete a long-term

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repository, including \$6.9 billion already paid in settlements and final judgments. American taxpayers are now paying—and will keep doing so for the foreseeable future—private industry to store spent nuclear fuel.

The average age of American reactors now approaches 40 years. Most of them have already had their operating licenses extended for 20 years, and the majority of these extensions will expire in the 2030s. Even with additional 20-year extensions, most of the current US nuclear fleet will have reached its decommissioning stage by the 2050s, if not earlier. Yet even under a very optimistic scenario, a geological repository is unlikely to become operational before most US reactors are shut down. Once consolidated interim storage facilities are operational, and all the operating nuclear power plants are shut down, who will be willing to bear the costs of a geological repository? Who will be willing to exercise the political leadership necessary for a more comprehensive and long-term policy framework for the governance of nuclear waste? The EIS process for interim storage sites provides no meaningful avenue for democratic decisionmaking about the location of stored waste for periods that could be measured in centuries. Instead, it allows the very long-term responsibilities associated with nuclear waste to be managed by private industrial firms

with short-term interests. With no guidance from consent-based democratic process, siting decisions are unlikely to take into account the consequences for a wide range of politically, environmentally, and socioeconomically disempowered stakeholders, today or in the future.

Moreover, if DOE has to wait until it implements a viable repository program to resume the collection of a nuclear waste fee, and if the nuclear industry is at that point operating few or no reactors, to whom can the federal government turn for financing its future nuclear waste program? Before the suspension of the fee, in its last official fee adequacy evaluation, DOE had concluded that the already collected fees would not be sufficient to cover the overall cost of a nuclear waste program. In the absence of a comprehensive revision of the nuclear waste legislation, whether spent nuclear fuel is stored at reactor sites, in hardened onsite storage, or at consolidated interim storage facilities, it is future taxpayers who will be covering most of the costs of nuclear waste management.

The idea of human intervention into geological time is now familiarly captured by the concept of the Anthropocene. But before that idea became an accepted part of environmental thinking, US nuclear waste policy relied on an engagement with deep time—a commitment to trying to steer a course toward more desirable distant futures. That engagement, though flawed, even presumptuous, came with a sense of moral obligation to present and future generations.

But the evolution of the nuclear waste problem in the United States has brought with it an end of engagement with deep time. In light of this apparent disengagement, do the consolidated, private, away-from-reactor storage facilities constitute a politically and morally desirable way to handle nuclear waste that will remain hazardous for thousands of years? Answering yes to this question is a politically legitimate option, if that answer were explicitly arrived at through politically legitimate means. But right now the question is being answered only by default, and without any meaningful consent-based process that can give citizens a voice in defining what constitutes a desirable and morally defensible way to govern nuclear waste in the present and future—and by extension, to care for the present and future of humans and the planet. Political institutions are backing into a decision, one that future generations could reasonably characterize as marked by a lack of political responsibility and accountability, a toxic political legacy to accompany thousands of tons of toxic waste. Congress and the Biden administration should formulate a political process that can put the decision back where it belongs: with the consent of the governed.

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