COLUMBIA GLOBAL ENERGY DIALOGUE

Weighing Whether the United States Should Dispose of Defense HLW and SNF First: Roundtable Summary

By **Lavanika Bahuguna, Dr. Matt Bowen,** and **Rama T. Ponangi**

On March 31, 2025, the Center on Global Energy Policy (CGEP) at Columbia University SIPA hosted a private virtual roundtable under the Chatham House rule to discuss the advantages and disadvantages of the United States pursuing disposal of defense high-level nuclear waste (HLW) and spent nuclear fuel (SNF) before commercial SNF. The roundtable was organized in response to the US HLW and SNF disposal program's ongoing lack of momentum. The one disposal site designated by law and approved by Congress—Yucca Mountain—has not received appropriations from Congress to move forward since 2010. While the United States does have one operational deep geologic disposal facility in the Waste Isolation Pilot Plant (WIPP) in New Mexico, its mission is limited to transuranic nuclear waste generated by defense activities.

The US Department of Energy (DOE) has published reports in the past stating that a defense HLW repository could be developed (i.e., sited, licensed, constructed, and opened) more quickly than a repository for both defense and commercial waste disposal, and that such an effort could pave the way for one or more commercial waste repositories.[1] The roundtable brought together a group of experts, including current and former national laboratory staff, former federal government staff, nonprofit stakeholders, and members of industry, to discuss and debate this possibility, which also prompted views on both what the United States government should do about HLW and SNF

management more broadly and community perspectives on hosting nuclear waste management facilities. This roundtable report summarizes the conversation that took place.

Context for Considering Defense and Commercial Waste Disposal Separately

At the outset of the roundtable, participants discussed relevant differences between the defense and commercial inventories.

One speaker highlighted the history and progress of the DOE's Environmental Management (EM) mission, which, since its inception in 1989, has become the world's largest environmental cleanup initiative. The speaker described how the EM program is responsible for cleaning up 107 sites across the United States, of which it has already completed 92, and underscored the critical role that WIPP has played in this effort. They observed that while the EM program has made substantial strides, environmental liabilities still exceed $416 billion, and three sites—Hanford, Idaho National Laboratory, and Savannah River—cannot be fully closed until the United States establishes a disposal facility for the defense HLW and SNF that they host. As the speaker pointed out, the clean-up mission at these three sites will ultimately generate approximately 24,000 canisters of defense HLW, and in total 14,500 metric tons of defense-related HLW and SNF (about 12,000 metric tons of HLW and 2,500 metric tons of SNF).

Participants also discussed the US commercial SNF inventory, which totals more than 90,000 metric tons and, as of February 2023, was stored at 84 sites across 36 states.[2] One participant noted that the quantity of SNF is much greater than other countries' commercial SNF inventories and compared it to the correspondingly smaller disposal capacity at facilities now under construction in other parts of the world: Finland's Onkalo site (6,500 metric tons SNF disposal capacity) and Sweden's Forsmark site (12,000 metric tons SNF disposal capacity). As the participant observed, the storage of commercial SNF has also become a significant financial burden, with taxpayers shouldering the cost of storing SNF at each site thanks to lawsuits against the federal government.

Another participant weighed the significant liability for cleaning up defense waste over the next ten years against resurgent interest in new nuclear and the possibility of problems arising with standard contracts for advanced reactor SNF due to lack of progress or even a narrative of progress. They felt that the advanced nuclear industry needs a way of explaining how the SNF will be dealt with to make progress toward commercial scale deployment. They also noted interest from Congress on the back end of the fuel cycle, though around recycling, not repositories. The participant invoked past challenges related to accessing the money in the Nuclear Waste Fund (NWF) used to pay for the commercial program and pointed out that the availability of dry

storage casks has helped avoid an exigent safety issue that would otherwise incentivize Congress to take action on repository development.

A different participant felt that the urgency to dispose of defense waste was not due to the difficulty of managing it compared with commercial SNF, but due to the time-bound legal agreements to which the federal government is committed (e.g., to remove naval SNF out of Idaho by 2035).

Differing Views on Disposing of Defense Waste First

Participants had varying opinions on the advisability of disposing of defense waste first. The options under discussion were a defense waste–only repository starting operations before a commercial waste repository or a shared repository where defense waste disposal starts earlier than commercial waste disposal (with the host state consenting to the latter at the same time as or after it consents to defense waste disposal) and disposal operations for the two inventories are "decoupled," meaning they take place independently of each other in two different regions of the repository.

Some participants highlighted the advantages of disposing of the defense waste first. These included the relative ease of making progress on this type of waste, with its smaller inventory and lower radioactivity compared with commercial SNF, and its potential to serve as a trial or demonstration project that could inform a larger process for commercial waste.

Another speaker suggested that licensing a defense repository would also be quicker because the DOE already has the relevant legal authority through the Nuclear Waste Policy Act (NWPA) and the repository development would be funded by defense appropriations and therefore not be dependent on the NWF. But they cautioned that delays could still occur from the Nuclear Regulatory Committee's (NRC) lack of experience licensing a deep geologic repository. Another participant stated that a defense repository could make accessible potential sites not otherwise likely to be open to commercial waste (e.g., already-owned US government sites and military sites) or that are a heavy lift for commercial SNF. A different participant added that while a defense repository would still be subject to the same processes in the NWPA and associated regulatory schemes, defense waste could move ahead more quickly.

One participant noted that the United States has been working on a model of tightly interspersed disposal of defense and commercial waste at emplacement areas in the Yucca Mountain repository, meaning that the disposal of the two inventories had to be done simultaneously. From their perspective, under this model, if the United States was not ready to dispose of commercial waste, it could not dispose of the defense waste. The participant did not think this makes sense anymore. On the commercial side, as the participant pointed out, the dual-purpose canisters holding commercial

SNF might not be suitable for direct disposal in a given repository environment—analysis would be needed to confirm whether this was the case and, if not, the SNF would need to be transferred into disposal packages. On the other hand, the defense waste is ready for disposal and there is no reason that the United States cannot design a repository where the commercial and defense systems are decoupled. The participant cited the example of French repositories that have separate zones for intermediate and high-level waste. The participant felt the burden of proof was actually on people to make the argument that it made sense to keep the defense and commercial waste coupled.

Another participant suggested it might be worth switching the authority that is responsible for disposing of defense waste. Specifically, the individual proposed moving it from the DOE to the Army Corps of Engineers under the rationale that the latter's culture and approach to project execution could bring greater efficiency to repository development, and that withdrawing responsibility from the DOE could have political benefits since the defense waste is tied to national security, although any such change would require amendments to the NWPA.

A different participant suggested that if the DOE or another entity ran a defense waste repository reasonably well, this could generate interest within the host community in potentially taking responsibility for the much larger—and more lucrative—commercial repository.

Other participants opposed the idea of disposing of defense waste first or decoupling strategies out of concern that this could delay the process of setting up a commercial repository program by decades.

One speaker felt that all options need to be kept open, and that the primary issue is that the United States needs a hosting agreement—i.e., a politically and socially acceptable site, which the country does not have in Yucca Mountain. This speaker assessed that while the United States will hopefully have a better implementation organization in the next few years, the DOE is currently in charge and it should try to find a repository for both commercial and defense waste without trying to clarify first whether that repository would be separate or combined.

Another participant opined that the United States must plan for disposing of defense waste and commercial SNL in parallel rather than sequentially. The individual did not believe that disposing of defense waste first would make it easier to dispose of commercial waste later.

A different participant stated that even finding a defense site will be hard, so the US government may want to pick a site that can handle both defense and commercial waste and thereby avoid multiple searches. They worried that otherwise the United States may never get around to commercial waste.

Another speaker cautioned that it was important to consider when decisions are needed and

not make them before it is necessary. The speaker felt that a decision on whether to commingle defense and commercial waste needs to be thought through systematically.

One participant contended that if the United States decides to pursue a separate defense repository, and nothing more was accomplished, this would be a regrettable situation 30 years from now.

Another emphasized that the DOE should not be overly rigid in its approach and should remain open to both separate sites and a combined facility.

General Views on the US Program

Speakers also weighed in more generally on the US HLW and SNF management program.

One speaker noted that regardless of which waste was disposed of first, any repository would take 25 to 30 years to develop and so the United States must focus on concrete action items for Congress or the administration to get the process underway.

Another speaker stressed the need for flexibility since the process of siting and developing a repository is complex, with local political, social, and environmental variables that evolve over time. Pointing to Canada as an example, the speaker observed that the country took over 20 years to identify a site for a nuclear waste repository after the associated legislation was passed, and that this repository is still at least 10 to 15 years away from being fully characterized, licensed, and built. In the speaker's view, the DOE needs to take the initiative now and start approaching communities about siting a repository.

Multiple speakers noted that new regulations from the Environmental Protection Agency (EPA) and the NRC that apply to future repositories are needed, regardless of any determinations regarding defense and commercial waste. One participant emphasized the need for public protection safety standards that could be presented to potential host communities to help address safety concerns they may have.

Another participant stated that a new implementing organization outside of the DOE was needed for the waste management program to be successful.

A different speaker emphasized the need to make progress to show that the government takes finding a repository seriously. As they pointed out, no legislation is needed to do this—Congress can simply instruct the DOE to start planning for a consent-based repository program today—and it would not require actually starting a repository search process. The speaker observed that the United States lacks a plan for HLW and SNF disposal and emphasized the need for one.

Another participant stated that if a new repository is sited at or near the WIPP site in the future,

it should be developed in a manner that does not inadvertently disrupt WIPP's functioning. The individual suggested that, in this scenario, an entirely separate facility would be advisable.

Community Perspectives on Nuclear Waste

Attendees also discussed how legacy defense waste has been stored for decades in communities that did not originally agree to host the waste. One speaker highlighted the frustration felt by these communities, which feel neglected in favor of commercial waste concerns.

Several participants emphasized the importance of transparent communication and meaningful engagement with communities when considering nuclear waste disposal sites. One participant noted that communities need clear and accurate information to be able to make informed decisions about hosting such sites. One speaker felt that a repository or interim storage facility project in a community's backyard would not generate support unless it was clear the project was safe and would bring benefits, such as new jobs or involvement in research and development projects related to waste management.

Some participants raised concerns about the prospect of funds currently earmarked for cleaning up defense sites being redirected toward building storage facilities for commercial spent fuel, slowing down progress on site cleanup, undermining local trust, and making it more difficult to move forward with waste management initiatives.

One speaker noted that the most important message they had heard from defense communities was that it was critical to show progress. Through conversations with these communities, the speaker came to understand that they are generally interested in new nuclear development and potentially a waste mission, but not necessarily in solely having a repository or an interim storage facility in their backyard. The speaker felt that others' prioritization of commercial SNF is attributable to nobody wanting to continue to pay out of the US Judgment Fund (which is the source of money when the US government loses or settles a lawsuit), and that the point of commercial SNF waste being "safe where it is" was not necessarily the case with the tanks at Hanford.

Conclusions

Participants generally agreed that the US government could and should take several actions in the near term to advance the US HLW and SNF management program, such as issuing new regulations that would apply to future disposal facilities. They felt that progress towards nuclear disposal capabilities broadly is what is needed most, regardless of debates over defense and commercial waste being treated differently. Multiple participants emphasized the need to have a plan that can help drive progress on nuclear waste disposal in the United States.

Notes

1. DOE, "Report on Separate Disposal of Defense High-Level Radioactive Waste," March 2015. https://www.energy.gov/sites/prod/files/2015/03/f20/Defense%20Repository%20Report.pdf.
2. NRC website, "NRC Maps of Independent Spent Fuel Storage Installations," accessed May 8, 2025, https://www.nrc.gov/reading-rm/doc-collections/maps/isfsi.html.

About the Authors

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Dr. Bowen has written reports on federal and state policies to encourage advanced reactor development, and has also published papers on reforming U.S. nuclear export controls. During the Obama Administration, he was an Associate Deputy Assistant Secretary in the Office of Nuclear Energy and a Senior Advisor in the Office of Nonproliferation and Arms Control at the U.S. Department of Energy (DOE). Previous to working at DOE, he was an AAAS/APS Science Fellow for Senate Majority Leader Harry Reid.

Dr. Bowen received a Bachelor of Science degree in physics from Brown University and a Ph.D. in theoretical physics from the University of Washington, Seattle. He has held positions at the National Academies with the Board on Physics and Astronomy, the Board on Energy and Environmental Studies, and the Division on Engineering and Physical Sciences. Dr. Bowen has also done work outside of Columbia University as an independent consultant for EFI Foundation and Third Way.

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In the past, Rama interned at the Office of Legal Affairs, International Atomic Energy Agency (IAEA), Vienna, Austria, where he primarily assisted its Legislative Assistance activities such as reviewing the draft nuclear legislation of Member States and assisted in conducting bilateral and multilateral meetings such as Role of a Legal Advisor in a Regulatory Body and International Nuclear Liability Expert (INLEX). Rama also undertook research on the topic of safety, security and liability aspects of Transportable Nuclear Power Plants (TNPPs).

Rama has completed his Bachelors in Law – B.A.,LL.B. (Specializing in Energy Laws) from University of Petroleum & Energy Studies, Dehradun, India. He has completed a diploma in International Nuclear Law from the International School of Nuclear Law (ISNL), University of Montpelier, France organized by Nuclear Energy Agency, OECD. Rama has completed his Masters in Law – LL.M. in Energy and Environmental Laws from The George Washington University Law School as GW Merit Scholar and Randolph C. Shaw Environmental Graduate Environmental Fellow. Rama has completed several other niche certifications in nuclear energy and law.

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