Energy Communities Alliance

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Disposal Drives Cleanup

Re-energizing Momentum for Disposal Solutions for Radioactive Waste

February 2023

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE or Department) needs to use the tools available to move radioactive waste disposal forward to potentially save hundreds of billions of dollars in taxpayer-funded cleanup costs. The simple truth is that DOE cannot safely and effectively complete its environmental cleanup obligations without clear and achievable waste disposal pathways and locations for ALL of the waste under DOE's responsibility. For some radioactive and hazardous wastes there are pathways and locations for disposal, while in other cases there is no current solution, or lack of progress on a solution.

Identifying and implementing final disposal paths for all waste streams is the largest impediment to completing the DOE mission and is the key to the "cleanup" of the environmental legacy resulting from nuclear weapons and government-sponsored nuclear research activities. This is vital to assuring the communities that host DOE's nuclear missions[1] and played such an important role in U.S. national security and prosperity under the Manhattan Project and during the Cold War that the radioactive waste and spent nuclear fuel will be addressed safely and expediently, and that they will not become or remain *de facto* storage sites facing growing potential health, economic, and environmental burdens.

[1] DOE is responsible for the safe and effective management and disposal of radioactive and hazardous wastes that result from cleanup activities at federal nuclear weapons production and nuclear research sites, as well as spent nuclear fuel from the country's commercial nuclear power plants.

While DOE has made substantial progress across the cleanup complex in creating waste repositories for specific types of waste, they appear to have stalled in developing, implementing, and finalizing disposal locations and plans for all waste, especially for some of the most challenging materials that pose the largest hazards and costs. The Energy Communities Alliance (ECA) has prepared this paper to help re-energize and restore momentum on this vital issue.

While DOE has made substantial progress across the cleanup complex in creating waste repositories for specific types of waste, they appear to have stalled in developing, implementing, and finalizing disposal locations and plans for all waste, especially for some of the most challenging materials that pose the largest hazards and costs.

ECA's goal is for our recommendations to prompt near-term DOE action on some of the most pressing waste challenges DOE faces: effectively and efficiently addressing waste resulting from former reprocessing activities; finalizing a lasting solution for high-level waste (HLW) and spent nuclear fuel (SNF); using the Department's HLW interpretation; and focusing on the remaining activities necessary for disposal of Greater-than-Class-C low-level waste (GTCC LLW)[2], which will benefit federal and commercial nuclear decommissioning efforts, and provide lessons learned for future disposal efforts. While pathways have been identified for some of these wastes, demonstrable progress on implementing them is needed and, in some cases, risk-informed reconsideration of the identified treatment and pathways could open additional and more readily achievable disposal pathways. Equally important is that current disposal pathways remain viable.

Recommendations

To move forward, ECA makes the following recommendations and calls for a new dialogue between DOE, local, state and Tribal governments, federal and state regulators, and stakeholders to develop more efficient and equitable approaches to address the waste management challenges DOE faces today.

1. **Prioritize Use of the High-Level Waste Interpretation.** DOE must use the HLW interpretation. It is an invaluable tool in DOE's waste disposition toolbox. DOE's actions can solidify its commitment to state and local communities to move radioactive material while reducing costs, expediting cleanup activities, and allowing DOE to focus sooner on other high-

[2] This report includes discussion on GTCC and GTCC-like waste. GTCC-like waste is radioactive waste that is owned or generated by DOE and has characteristics similar to GTCC LLW such that a common disposal approach may be appropriate. For more information, please see U.S. Government Accountability Office. *DOE Needs to Improve Transparency in Planning for Disposal of Certain Low-Level Waste*, September 29, 2022, GAO-22-105636.

priority cleanup projects, ultimately reducing higher risks across the complex. DOE should re-energize its use of the HLW interpretation, including pursuing a pilot implementation at Hanford for a single-specific waste stream. This would be intended to help foster broader support for the use of the HLW interpretation at Hanford, which could have significant benefits to DOE and the local communities near the site. DOE has demonstrated that the HLW interpretation can be successfully applied. The Department moved 8 gallons of waste from the Savannah River Site under this HLW interpretation in the last several years, but DOE can and must do better if they are going to save over $200 billion in cleanup costs.[3]

2. **Support and Complete the Consent-Based Siting Process.** DOE should support and complete its latest attempt to utilize consent-based siting to identify interim storage sites, while also applying consent-based siting to identify final disposal for defense- and commercial-SNF and DOE-managed HLW. DOE needs to make the disposal of defense-related SNF and HLW of equal priority, and geological repository siting should proceed in parallel with efforts to develop an interim storage site.[4]

3. **Select a Disposal Site for GTCC Waste.** DOE and Congress should take action to advance the development of a GTCC LLW disposal facility (including completing requirements included in the Energy Policy Act of 2005), and provide DOE funding for access to, or development of, such a facility and financial assistance to communities interested in hosting GTCC LLW disposal. An operating GTCC LLW disposal facility will help ensure DOE can maximize the use and benefit of its HLW interpretation, as well as provide a necessary disposal pathway to allow DOE to complete cleanup work at the West Valley Demonstration Project in New York state and to aid commercial nuclear decommissioning efforts.

4. **Support WIPP and Develop and Issue Long-Term, Integrated Plans for Operations.** DOE should develop and issue a long-term, integrated plan and schedule for the Waste Isolation Pilot Plant (WIPP) that considers the total transuranic (TRU) waste inventory across the

[3] See U.S. Government Accountability Office. *Nuclear Waste Cleanup: Hanford Site Cleanup Costs Continue to Rise, but Opportunities Exist to Save Tens of Billions of* Dollars, July 29, 2022 GAO-22-105809; ECA, *Making Informed Decisions on DOE's Proposed High Level Waste Definition*, May 2019; and Department of Energy*, Evaluation of Potential Opportunities to Classify Certain Defense Nuclear Waste From Reprocessing as Other than High-Level Radioactive Waste (2020).*

[4] For example, due to more than 40 years of shifting politics and policies, lack of funding assurance, and insufficient public engagement, the siting, licensing, design and construction of an interim storage or permanent geological repository for the disposal of HLW and SNF in the United States are still being developed through funding provided by Congress to begin a consent-based siting process. The issue is purely politically and policy driven, as these interim and permanent disposal sites exist in other countries where both the political and technical issues have been addressed. Conversely, a clear path exists for certain waste, like the management and disposal of transuranic waste at the Waste Isolation Pilot Plant near Carlsbad, New Mexico, which is an international model.

complex, disposal space needs, potential upgrades for WIPP, and impacts of current and future National Nuclear Security Administration (NNSA) missions (e.g., pit production at Los Alamos National Laboratory and Savannah River Site), among other factors.

5. **Continue to Emphasize Regular, Meaningful Engagement with Communities.** DOE should continue to prioritize and provide resources for regular and meaningful engagement with local, state and Tribal governments, regulators, and stakeholders representing communities that host, or could potentially host, disposal facilities. This engagement should be proactive and focus on the Administration's commitment to environmental justice. It should also seek to go beyond regulatory requirements, including early discussions on potential locations and approaches, as well as programmatic and strategic planning, for onsite disposal facilities ahead of any public announcement of proposed sites.

6. **Provide Technical Assistance to Communities to Address Waste Issues**. To the extent requested by a community, DOE should proactively provide financial assistance to local communities (like it does for others) where disposal facilities are already sited, or could potentially be sited, to obtain independent technical expertise and to assist with understanding the risks of the site, education and outreach, oversight, environmental sampling and long-term monitoring, and to build capacity and communication channels to ensure citizens are informed.

7. **Re-evaluate the Practice of Incentivizing Contractors to Open a Waste Site in the Contracting Process Prior to Obtaining Community Support and Regulatory Approval**. DOE should re-evaluate cleanup contracts to decouple performance bonuses from the schedule for onsite disposal of waste. The process gives the impression that the decision is made prior to the analysis of the protection of human health and the environment. Incentive-based contracting places too many constraints and excessive pressure on the Department, its contractors, and regulators to make near-term decisions that may not be in the long-term best interests of the community or the federal government.

8. **Maximize the Use of Public and Private Disposal Site Options**. DOE needs to ensure that it is maximizing the use of ALL available options—including commercial disposal sites with federal disposal cells that took years to locate, develop, and open. Cells located at these sites can provide crucial capabilities to DOE that likely would be near-impossible to replicate today. Portions of these sites will ultimately become the federal government's responsibility, as DOE maintains liability for its waste after closure of commercial facilities, so it is in DOE's best interest to ensure these sites are used to aid the Department's cleanup mission for as long as possible, rather than risk premature closure due to underutilization.

9. **Create Tools to Show a Community the Impacts of Waste Decisions**. Providing the community with the real costs - annually - of storing waste, of on-site versus off-site disposal, and a realistic timeline for when work can be accomplished. Introducing this level of transparency is important to gain trust and to facilitate the understanding.

While some of these recommendations are forward-leaning and others are common sense, DOE should (re)commit to working together with state, local and Tribal governments, to prepare for impacts of any funding limitations, shifting timelines, and ever-changing politics that can slow progress, create tension, and lead to additional pressure on the facilities in our communities. There is already discussion about needing new onsite storage at sites across the complex and concern that cleanup dollars will be used to build storage capacity rather than on actual environmental cleanup.

DOE's Role

DOE's responsibility to manage and dispose of radioactive and hazardous wastes is largely carried out by two offices: the Office of Environmental Management (EM) and the Office of Nuclear Energy (NE).[5] EM is responsible for storage of HLW and defense-related SNF until acceptance by NE or another authorized waste management organization. NE is responsible for addressing options for consolidated interim storage and final disposal of SNF and HLW and associated transportation, and also has the primary mission of government-sponsored nuclear energy research.[6] The success of each program directly impacts the other: without paths and location for radioactive waste disposal, there can be no cleanup.

EM has made significant progress in its mission over the past 30 years. While the program appeared at its onset to take a posture of making unilateral decisions on cleanup actions and waste management, EM has shifted its approach to actively engage the local host communities as part of the cleanup mission. This engagement has evolved over time and now takes into account the views (at most sites) of state, Tribal, and local governments, as well as stakeholder views.

EM's development and use of disposal approaches for LLW and TRU provide a model for success. These disposal approaches have been possible, in large part, due to EM working with the communities near its cleanup and disposal sites to gain regulator, local government, and stakeholder support. In addition, both involve federal solutions as well as foster and support commercial disposal options.

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[5] In addition, NNSA, DOE's Office of Science, and other DOE offices manage and continue to create new radioactive and hazardous waste. Additional DOE offices have responsibility for specific types of waste.
[6] See https://www.energy.gov/ne/office-nuclear-energy.

Cleanup Cannot Be Completed Until DOE Addresses All Waste Streams

Today, EM is at a point in its mission where the most technically and regulatorily complex work remains, with high risks and uncertainty regarding final disposition paths for certain waste streams that DOE manages, including HLW, SNF, and GTCC LLW. The lack of progress in developing disposal options and locations for these wastes can negatively impact EM's remaining work and other DOE missions, including:

- Continued delays in addressing radioactive waste generated from SNF reprocessing (known as "tank waste"), which represents DOE's largest environmental hazard and financial liability.[7]
- Delays in completing cleanup at some sites, such as the West Valley Demonstration Project in New York state, due to a lack of a disposal path for GTCC waste.[8]
- Continued delays, and resulting financial costs to the government, due to a lack of interim storage and final disposal sites for both DOE-owned and commercial HLW and SNF.

[7] U.S. Government Accountability Office. *Environmental Cleanup: Status of Major DOE Projects and Operations*, May 4, 2022.

[8] U.S. Government Accountability Office. *Nuclear Waste: DOE Needs to Improve Transparency in Planning for Disposal of Certain Low-Level Waste*, GAO-22-105636 (2022).

- Stressed relationships with state, local, and Tribal governments near certain DOE sites, as well as with other engaged stakeholders.

While many of these challenges are related to the lack of a path forward for a geological repository for HLW and SNF in the United States, progress can still be made if there is a realistic, risk-construed, and equitable waste management plan, and a renewed sense of urgency. EM and NE will need to develop an integrated approach to radioactive waste management and work closely with all affected parties to build collective support.

Without local support, trust that the Department can and will accomplish its mission falters. However, by ensuring there is a framework for meaningful, iterative interaction, and by prioritizing that interaction across the complex, DOE can build trust in future approaches to disposal decisions…

The local communities around DOE's federal facilities have played (and continue to play) a pivotal role in this country's national security, scientific research, and energy development missions. Local elected officials and leaders build trust and support for the cleanup mission on a grassroots level by communicating the health and safety protections, and potential for jobs and economic development opportunities, during and following cleanup. Without local support, trust that the Department can and will accomplish its mission falters. However, by ensuring there is a framework for meaningful, iterative interaction, and by prioritizing that interaction across the complex, DOE can build trust in future approaches to disposal decisions that apply lessons learned from past decades of cleanup activity that would meaningfully factor in what all parties involved in cleanup envision for future decades.[9]

[9] This paper is based upon work supported by the Department of Energy EMCBC under Award Number(s) DE-EM0005284. This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Disposal Drives Cleanup

Re-energizing Momentum for Disposal Solutions for Radioactive Waste

Background

Identifying final disposal paths and locations for all radioactive waste streams is the largest impediment to completing the DOE mission and the key to the cleanup of the environmental legacy resulting from nuclear weapons and government-sponsored nuclear activities. This is vital to assuring the communities that host DOE's nuclear missions[10] and played such an important role in U.S. national security and prosperity under the Manhattan Project and during the Cold War that the radioactive waste and spent nuclear fuel will be addressed safely and expediently, and that they will not become or remain *de facto* storage sites facing growing potential health, economic, and environmental burdens.

For decades, ECA, the association of local elected officials and leaders in the communities hosting DOE sites, has worked collaboratively with DOE and its prime contractors to assist in decisions regarding the disposal of radioactive waste—a key aspect of cleanup. While significant progress has been made, work still remains to safely and efficiently dispose of the remaining legacy waste, including the nation's defense and commercial HLW and SNF destined for a geological repository.

DOE has been successful in launching new policy initiatives to aid disposition, chiefly the Department's interpretation of the term "high-level radioactive waste," which has the potential to help DOE save hundreds of billions of dollars and accelerate its cleanup mission. However, implementation of this

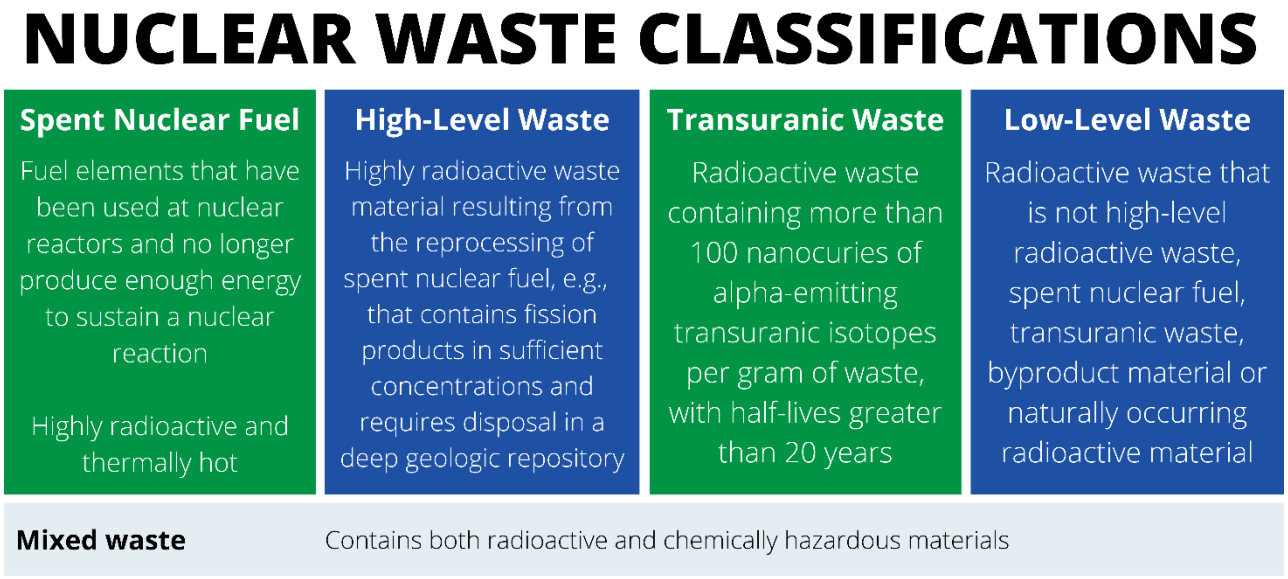
[10] DOE is responsible for the safe and effective management and disposal of radioactive and hazardous wastes that result from cleanup activities at federal nuclear weapons production and nuclear research sites, as well as spent nuclear fuel and GTCC LLW from the country's commercial nuclear power plants.

policy appears to have stalled. The waste streams at DOE sites and under the Department's responsibility include:

- HLW
- LLW and mixed LLW (MLLW)
- TRU waste
- GTCC LLW
- SNF

Detailed definitions of these materials and their current disposition paths are shown in Appendix 1, and their locations are shown in the map on page 12. Additional information on waste types may be found by visiting ECA's online *Guide to Successful Environmental Cleanup*.[11]

Table 1 – Nuclear Waste Classifications



Adapted from DOE Order 435.1

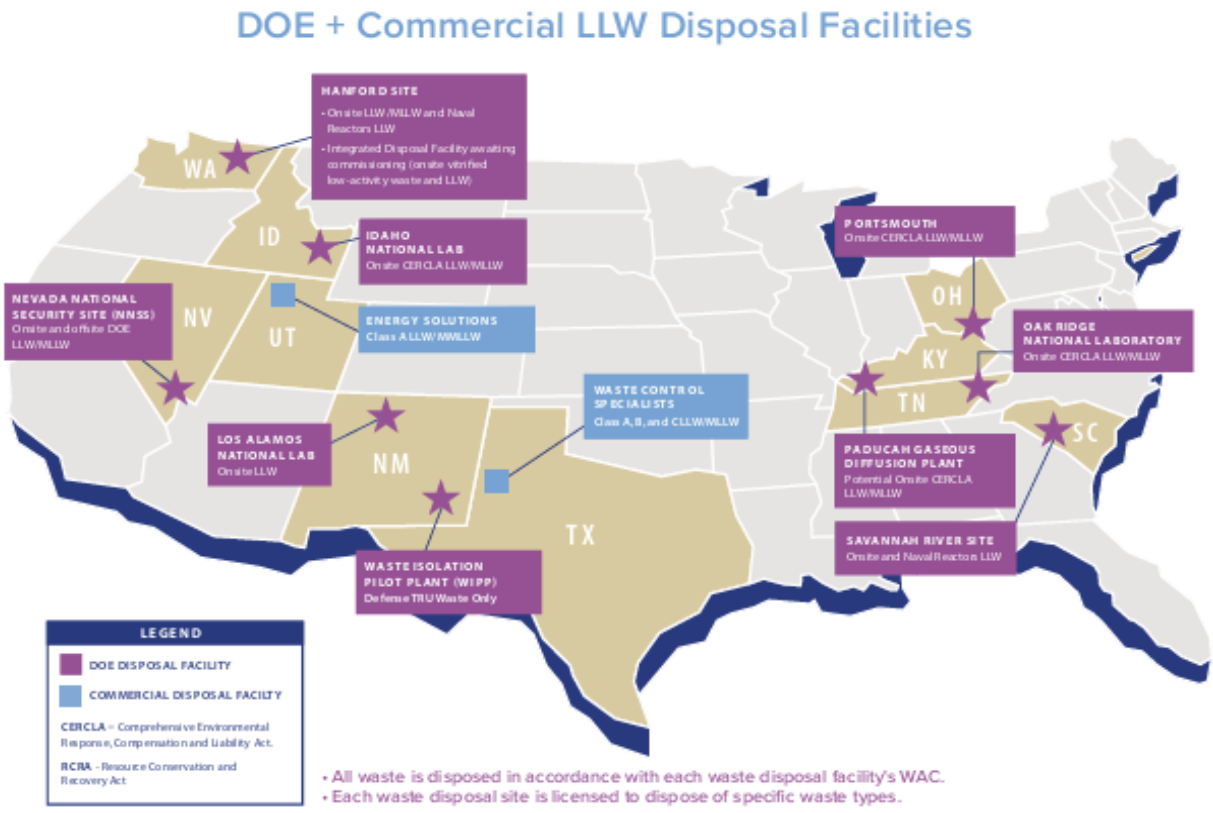
Without a clear path forward for disposal of all of these waste streams, there is no cleanup completion. DOE has the opportunity to safely accelerate the disposition of certain wastes through re-energizing strategies like the HLW interpretation, which enables management according to the waste's radiological characteristics. DOE can also move forward with disposal options and approaches for other types of waste by working with communities on how best to locate necessary disposal sites and ensuring they are a valued partner throughout the entire development and operation process. In the end, DOE can implement strategies that can reduce lifecycle cost, solve legacy liabilities, and ensure

[11] Energy Communities Alliance. "Cleanup Basics." *Guide to Successful Environmental Cleanup*. https://www.energyca.org/cleanup-basics.

generational equity, consistent with the Administration's environmental justice goals, such that future generations do not bear the primary burden of radioactive waste management and disposal.

DOE LLW Disposal Sites—On Site Landfills for Nuclear Waste

DOE has seven sites with one or more onsite operating LLW disposal facilities (commonly referred to by communities as radioactive waste landfills): the Hanford site, the Idaho National Laboratory (INL), the Nevada National Security Site (NNSS), the Los Alamos National Laboratory (LANL), the Oak Ridge Reservation (ORR), the Savannah River Site (SRS), and the former Portsmouth Gaseous Diffusion Plant. ORR is developing a second LLW disposal facility. INL has a remote-handled LLW disposal facility for NE and Naval Nuclear Propulsion Program wastes. EM is also potentially constructing an onsite landfill for an LLW disposal facility to support the disposition of waste generated from cleanup activities at the former Paducah Gaseous Diffusion Plant.



All DOE LLW facilities operate under requirements established by DOE Order 435.1, *Radioactive Waste Management* and DOE Manual 435.1-1, *Radioactive Waste Management Manual*. DOE requirements, performance objectives, and performance measures for LLW are generally equivalent to those of the

Nuclear Regulatory Commission (NRC).[12] Only one of DOE's LLW facilities is presently accepting waste from other DOE sites—the NNSS radioactive waste management sites (Area 3 and Area 5) for LLW, MLLW, and for classified wastes from other sites.[13]

Commercial Low-Level Waste Disposal Sites

LLW disposal also occurs at commercially operated facilities that must be licensed by either the NRC or Agreement States, which are states that have programs that assume NRC regulatory authority. These facilities must be designed, constructed, and operated to meet safety standards and performance objectives. *Licensing Requirements for Land Disposal of Radioactive Waste* (10 Code of Federal Regulations [CFR] Part 61)[14] provides stringent requirements to ensure that land disposal of commercial LLW is managed and disposed of in a manner that is protective of worker and public health and safety, and the environment. The disposal facilities operate within a documented and approved operating envelope that requires a documented safety analysis, specific waste acceptance criteria (WAC), and an approved disposal facility performance assessment.

The commercial LLW disposal sites frequently used by DOE include:

- Waste Control Specialists, LLC (WCS), near Andrews, Texas, which accepts Class A, B, and C LLW and MLLW at its Federal Waste Facility.
- Energy Solutions, which operates a LLW disposal facility, near Clive, Utah, and accepts Class A LLW and Class A MLLW for disposal.

WIPP—The Only US Geological Repository

WIPP is the only operating geological repository in the U.S. and was built to safely and permanently dispose of TRU waste generated by atomic energy defense activities. WIPP began operations on March 26, 1999, after more than 20 years of scientific study, public input and regulatory review. WIPP is in southeastern New Mexico, about 30 miles from the city of Carlsbad. The repository consists of disposal rooms mined 655 meters underground in a 600-meter-thick salt formation. Over 101,000 cubic meters (m^3) of defense-generated TRU waste have been emplaced as of October 2022. Of this total, 72,500 m^3 is counted against the WIPP Land Withdrawal Act (LWA) disposal limit of 176,000 m^3 (about 6.2 million cubic feet), which should be sufficient to handle all legacy TRU waste from the DOE complex. WIPP is considered a success by DOE, the community and the states and communities that rely on the project among others. The process to design, open and operate the site is an international model.

[12] The NRC does not regulate DOE facilities.

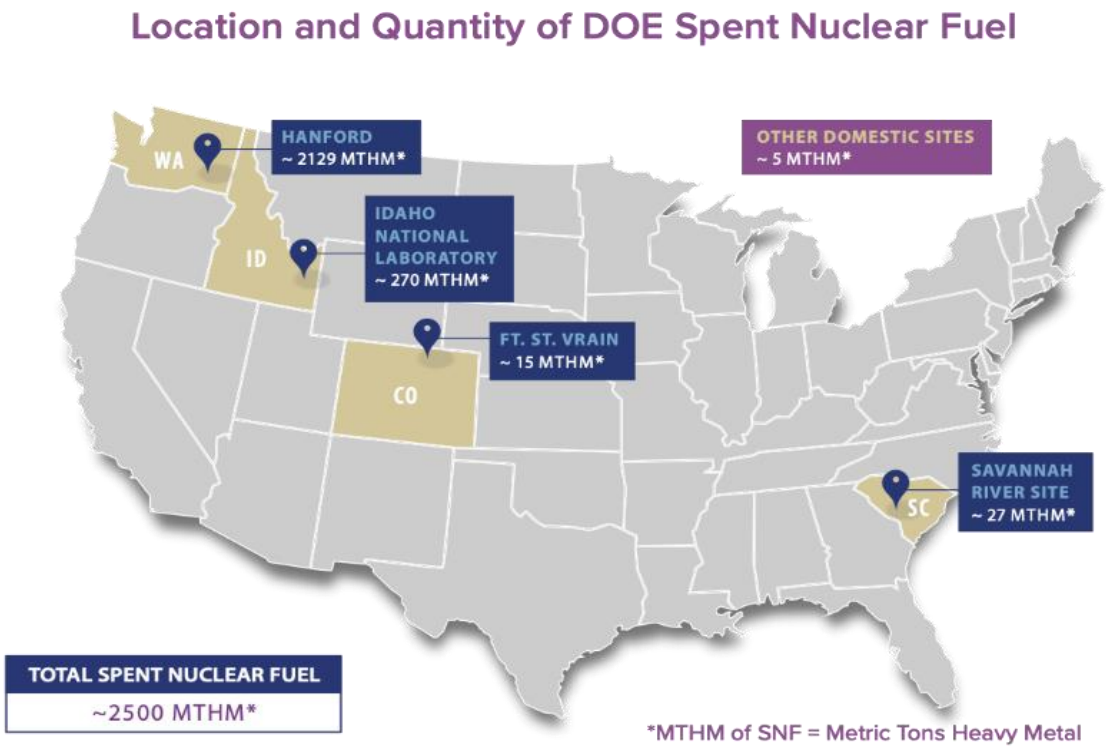
[13] Hanford and SRS do receive out-of-state Naval Reactors components, but these are not considered DOE sites.

[14] 10 CFR Part 61.

GTCC LLW Disposal—Awaiting Action

The federal government is responsible for the disposal of GTCC LWW and GTCC-like waste.[15] This waste consists of material such as activated metals from decommissioned nuclear power plants, medical and industrial sealed sources, and other wastes. Also covered in GTCC LLW/GTCC-like waste is the non-defense TRU waste at EM's West Valley Demonstration Project site in New York State. DOE has estimated a total inventory of GTCC LLW and GTCC-like waste, through 2083, at approximately 12,000 m^3. In addition, an operating GTCC LLW disposal facility is key to DOE maximizing the use, and subsequent benefits, of its HLW interpretation. Such a facility is necessary to provide potential disposal pathways for material to which the HLW interpretation could be applied.

Both DOE and the NRC play a role in GTCC LLW disposal. DOE is responsible for identifying a disposal site and disposing of the waste, while the NRC is responsible for approving a disposal site.[16] DOE has identified a preferred alternative for GTCC LLW disposal that would entail land disposal at generic commercial facilities and/or disposal at WIPP. In a 2017 report to Congress, DOE said, "Full waste emplacement operations at WIPP are not expected until the 2021 timeframe, and therefore the Department is primarily considering disposal at generic commercial facilities at this time."[17] DOE has



[15] For a detailed analysis and summary of the state of GTCC LLW and GTCC LLW-like is set forth in *Nuclear Waste: DOE Needs to Improve Transparency in Planning for Disposal of Certain Low-Level Waste*, GAO-22-105636 (2022).
[16] See, Section 631 of the Energy Policy Act of 2005 (P.L. 109-58).
[17] See, Department of Energy, *Alternatives for the Disposal of Greater-Than-Class C Low-Level Radioactive Waste and Greater-Than-Class C-Like Waste Report to Congress* (Washington, D.C.: November 2017).

not yet made a final decision about which alternative(s) to implement, though WCS is pursuing GTCC LLW disposal at their facility in Andrews, Texas. DOE cannot make a final decision until action by Congress is completed, as legislatively required.[18]

As noted in the definitions in Table 1, it is important to emphasize that GTCC LLW *is LLW*.[19] Hence, in many cases it may be safely disposed of in an LLW disposal facility with an appropriate license or authorization, and suitable site and facility conditions. Some mistakenly assume that GTCC LLW is no different than HLW or SNF that require geological disposal. The NRC has indicated that most of the GTCC waste streams it analyzed are potentially suitable for near-surface disposal.[20]

DOE SNF, Like HLW and Commercial SNF, Must Go Through a Consent-Based Siting Approach for a Disposal Site

DOE is also responsible for SNF from commercial nuclear power plants, as well as 2,450 metric tons heavy metal (MTHM) of SNF created by weapons production and nuclear research and development efforts. The Department is also responsible for defense-related waste classified as HLW. These waste streams are intended for disposal in a geological repository, though the federal government has struggled for decades to establish such a site.

Although there is currently no disposal site identified for commercial and DOE SNF, DOE is actively pursuing a consent-based approach to siting a waste management system that enables broad participation and centers on equity and environmental justice. ECA agrees that a consent-based approach, driven by community well-being and community needs, is both the right thing to do and has the best chance for success.

For the foreseeable future, most of the nation's existing inventory of commercial SNF will remain safely stored at the reactor sites where it was generated, while DOE SNF is safely stored at the Hanford site in Washington, at SRS in South Carolina and at INL in Idaho.

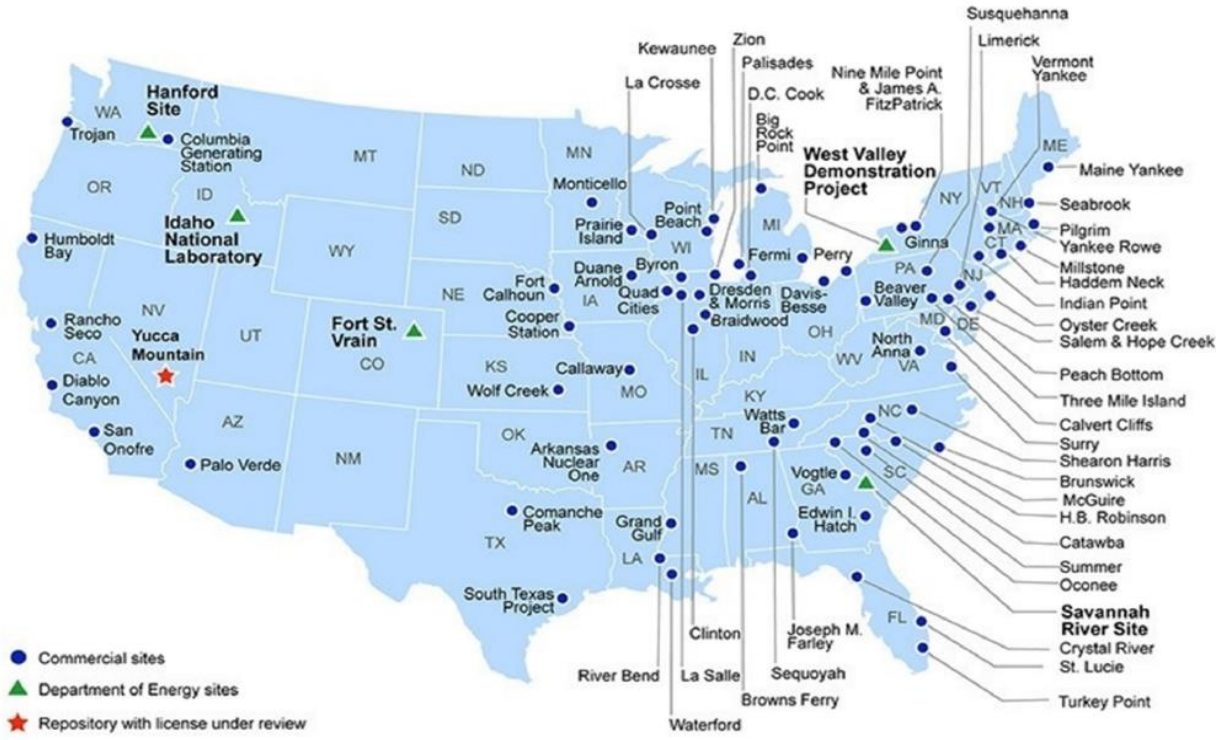
Making Progress or Just Kicking the Can?

To ensure continued cleanup progress, DOE must develop and implement waste disposal policies that are safe, effective, and based on a foundation of equitable treatment for the communities near where the waste is located. Absent a geological repository, DOE HLW and SNF are, in essence, stranded.

[18] Section 631(b)(1)(ii) of the Energy Policy Act of 2005 (P.L. 109-58).
[19] 10 C.F.R. § 61.55(a)(2).
[20] NRC memorandum from Margaret M. Doane. Executive Director for Operations, to the Commissioners, *Path Forward and Recommendations for Certain Low-Level Radioactive Waste Disposal Rulemakings*, October 21, 2020.

Similarly, other "difficult" waste streams, such as GTCC LLW and GTCC-like waste, have no defined disposition path (i.e. with no hurdles). While SNF is currently safely stored, continued delay increases likelihood of potential health risks to the communities and the environment, as well as ever-increasing costs. Prolonged storage of these waste streams will result in adding tens of billions of dollars to DOE's environmental cleanup cost with no risk reduction.[21]

Location of SNF and HLW in the United States[22]



If DOE, Congress, and regulators do not move forward to make hard decisions and choices, but continue to kick the proverbial disposition can down the road, risks and uncertainty for waste management programs – and the communities that host them – will continue to increase.

For example:

- Tanks at Hanford currently beyond design life will continue to corrode, decreasing tank integrity and increasing the risk tank waste poses to the environment;

[21] The estimate to manage DOE HLW and SNF is estimated to be close to $3 billion dollars a year.

[22] Map source: National Academies of Sciences, Engineering, and Medicine 2022. *Merits and Viability of Different Nuclear Fuel Cycles and Technology Options and the Waste Aspects of Advanced Nuclear Reactors*. Washington, DC: The National Academies Press. https://doi.org/10.17226/26500. Page 150.

- GTCC and GTCC-like waste will remain where it is without a disposal path, posing safety risks and delaying decommissioning activities, along with delaying cleanup activities at sites like West Valley, and other negative impacts;
- Processes for review and approval of disposal sites that are not transparent and well explained to the public could decrease confidence in DOE's commitment to cleanup and potentially cripple community support for new nuclear development as a component of state and national clean advanced energy initiatives and strategies.

The communities in states hosting DOE facilities have borne the risks of decades of support for the nation's nuclear research and development activities. To protect future generations from this waste, DOE must work closely today with the host communities, state and federal regulators, Tribes, impacted stakeholders, and Congress. The risk and result of inaction is failure—failure to meet the government's moral and legal obligation to clean up its radioactive waste legacy, and failure to protect and safely return sites back to the host communities and the local leaders that share the responsibility for human health, the environment, and economic opportunity for future growth.

Environmental Justice Necessitates Cleanup Progress

The current Administration has emphasized a commitment to environmental justice across the federal government. This commitment is not only driving good policymaking, it reflects DOE's moral and legal obligation to clean up the radioactive waste legacy quickly and efficiently, and also demonstrates how the federal government intends to work with potential hosts of future federal nuclear missions. It is imperative that DOE integrate the frontline communities into implementation of this policy, because cleanup decisions, especially those related to waste disposition, impact both their near- and long-term interests (e.g., environmental safety, real estate values, economic development projects, and reindustrialization and reuse, among others).

Environmental justice and equity, as applied to waste disposition, means that the communities where this waste has been produced and stored should be given priority—in DOE strategy development, decision-making, planning, funding, and scheduling. Innovative disposal alternatives for all of the waste types for which DOE is responsible must be analyzed and, if there is informed support for an alternative approach, implemented to the fullest extent.

Support can best be built when there is a common understanding of cleanup processes and decisions across affected stakeholders. DOE should establish policy to proactively provide resources to local governments in frontline cleanup communities (i.e., consistent with EM's direct funding for Tribal communities for oversight, air, and water testing). Further, over the next decade, decisions will be made about the Natural Resource Damage Assessment (NRDA) process that will directly impact the cleanup of many DOE sites and specifically frontline communities. DOE should ensure local governments are a formal part of NRDA discussions and identify and document this role.

Stalled Progress in Final Disposal for All Tank Waste

One of the largest challenges facing EM (by environmental risk and expense)—and communities near EM sites—is the safe and effective management and disposition of tank waste. This waste (liquid and vitrified), located primarily at Hanford, SRS, and INL, with some at West Valley, represents DOE's largest environmental risk and financial liability. EM has established the treatment system at SRS to prepare this waste for final disposal and is making progress on the treatment capabilities at Hanford and INL. However, no disposal site or final disposition path for the bulk of the radioactivity associated with this material exists. Hence, the current plan is to construct new "interim" storage or "treatment" facilities in Washington, Idaho, and South Carolina until a repository is selected, designed, constructed, and licensed. DOE does not call them interim storage sites, but without a pathway, they are interim storage sites by default.

Using the HLW Interpretation

One approach DOE has pursued (and ECA communities have supported) with the potential to aid in the cleanup of this waste is its HLW interpretation. Initially issued in June 2019 and reaffirmed in late 2021, this interpretation allows DOE to address some tank waste as non-HLW and dispose of it in accordance with its radiological characteristics. Since issuing the interpretation, DOE has taken action to apply it to specific waste streams at SRS. The first such application involved small amounts of wastewater from the SRS Defense Waste Processing Facility sent to WCS for stabilization and disposal as non-HLW in late 2020.

In December 2021, DOE announced its second HLW interpretation project, reporting the availability of the *Draft Environmental Assessment for the Commercial Disposal of Savannah River Site Contaminated Process Equipment* (DOE/EA-2154) for public comment. The SRS process equipment

included Tank 28F salt sampling drill string, glass bubblers, and glass pumps, all contaminated with reprocessing waste. DOE is currently addressing comments received on the draft Environmental Assessment, and has publicly labeled the completion of the EA as a "priority" for EM in 2023. However, the final schedule for implementation once the EA is completed remains unclear.

HLW Interpretation Benefits

ECA is supportive[23] of the HLW interpretation and recognizes the potential the policy has to reduce risks and costs and to accelerate cleanup without decreasing environmental health or public safety requirements. The advantages are well known:

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[23] Energy Communities Alliance, *Making Informed Decisions on DOE's Proposed High Level Waste Definition*, May 2019. See also https://www.energy.gov/em/high-level-radioactive-waste-hlw-interpretation.

- Avoids projected costs of $87-$229 billion and accelerates cleanup by a decade, according to DOE's estimates.[24]
- Enables EM to better address one of its largest environmental risks/liabilities with a scientific, risk, and data-driven approach that protects the surrounding communities and environment.
- Reduces time that radioactive waste is stored onsite at DOE facilities, increasing safety for workers, host communities, and the environment.
- Enhances safety at DOE sites by using lower-complexity waste treatment and immobilization processes.
- Promotes environmental justice for the communities around the sites by potentially accelerating retrieval and disposition of reprocessing waste.
- Aligns with international practices, e.g., the U.S. with International Atomic Energy Agency guidelines.

A number of external organizations (National Academies of Sciences, Engineering, and Medicine; seven national laboratory directors; NRC staff; and others) have stressed the benefits of the interpretation to EM's cleanup efforts. However, DOE has been very cautious about applying the HLW interpretation as some officials and stakeholders near EM sites, primarily Hanford, have raised concerns over its potential use. Opposition by state officials in Washington state to the HLW interpretation could mean that the tank waste at Hanford, once treated, will remain at the site. Vitrified low-activity waste is intended for onsite disposal and vitrified HLW will remain in storage for the foreseeable future given the absence of a geological repository. DOE and the State of Washington need to work together on retrieving, grouting, loading, shipping, and disposing of tank waste that complies with existing offsite commercial disposal facility WAC. DOE should engage actively with impacted parties around the site and provide as much data as possible on how and where the interpretation can be applied, the safety of grouting, and what the consequences (intended and unintended) will be on cleanup at Hanford and across the complex.

The HLW interpretation is an invaluable tool in DOE's waste disposition toolbox that deserves additional examination and discussion. Expanding implementation can solidify DOE's commitment to state and local communities to move radioactive material out of the generator state while reducing costs, expediting cleanup activities, and allowing DOE to focus sooner on other high-priority cleanup projects, ultimately reducing higher risks across the complex. However, stakeholder buy-in will be required and DOE needs to continue outreach and education efforts on this alternative.

[24] *Evaluation of Potential Opportunities to Classify Certain Defense Nuclear Waste from Reprocessing as Other than High-Level Radioactive Waste* Report to Congress (NDAA Section 3139 Report), December 2020.

Lessons Learned to Date

There are notable lessons learned from DOE's implementation of the HLW interpretation approval process and implementation, to date, for waste streams at SRS:

- The HLW interpretation is legal and valid.
- DOE and most local communities overwhelmingly support the full implementation of the HLW interpretation as a safe, risk-based alternative in line with international and scientific practices and guidelines.
- Low-activity tank waste, as a matter of record, can be successfully dispositioned at an offsite, commercial LLW disposal facility.
- Many external technical, regulatory, and policy organizations, from all political stripes, nationally and internationally, support the policy and its execution at DOE sites.
- DOE can work with regulators to enable disposal of tank waste, if adequate focus, time, and attention are provided (again, a matter of record at SRS).
- Innovative disposition paths can be established for tank waste, and equipment contaminated by tank waste, which are currently stranded in DOE communities— stranded with nowhere to go.

It is also important to note that even with the successful implementation of the HLW interpretation to its applicable waste, additional waste will remain that does *not* fit the definition and that must be disposed of in deep geological repository.

We Can Do Better Than 8 Gallons of Waste

Since the draft HLW interpretation was issued for public comment in October 2018, DOE has spent considerable time and resources on development, solicitation of public input, review, establishment as policy in DOE Directives, and affirmation of the policy. As DOE has noted throughout its evaluation:[25]

> "DOE will continue to evaluate its waste inventories and related management and disposal options and expects to engage openly with stakeholders regarding potential future opportunities to implement the HLWI [HLW interpretation] more broadly. Any decisions…about whether and how the interpretation will apply to other wastes at any specific site…will be the subject of subsequent actions."

[25] Federal Register, Vol. 86, No. 242, 72221, *Assessment of Department of Energy's Interpretation of the Definition of High-Level Radioactive Waste*, December 21, 2021.

Unfortunately, implementation and decisions so far are lacking. All DOE has to show for this hard work, attention, and expense is disposal of 8 gallons of SRS tank waste. Future implementation and scale-up plans are not clear, and regrettably may fall far short of host community expectations, especially at Hanford and Idaho, where there has been zero implementation. The extent of time and effort required to implement the very low volume actions to date is disproportionate to the result. DOE must scale up the program and meaningfully engage communities to review, revise (if needed), and implement more significant disposal campaigns.[26]

Path Forward

Hanford—Start Small to Build Support

Implementing the HLW interpretation at Hanford will have the greatest impact on the cleanup program. At Hanford, 56 million gallons of tank waste is contained in 177 underground waste tanks.[27] More than one-third have leaked, and nearly all the tanks are beyond their design lives. The waste is mixed waste, containing both radioactive and Resource Conservation and Recovery Act (RCRA)[28] hazardous waste components. At least 1 million gallons of tank waste have already leaked into the soil and groundwater.

EM's current plan for the Hanford tank waste involves vitrifying (converting to glass) the low activity portion of the tank waste through the Direct Feed Low Activity Waste (DFLAW) approach at the Waste Treatment and Immobilization Plant (WTP). This vitrified low-activity waste (LAW) would be disposed of onsite at Hanford. The DFLAW approach is not designed to treat all the low activity portion, so a supplemental treatment method will be necessary in any case for the remaining low-activity waste (supplemental LAW). The high-activity waste portion of the tank waste would also be vitrified through WTP facilities that have yet to be completed for eventual offsite disposal at a geological repository that has not yet been identified and developed.

With the currently planned treatment approaches, Hanford will be a disposal site for some material, and likely a *de facto* disposal site for the remainder given the lack of a progress on a final disposal site for HLW. Experts have determined, though, that a significant amount of the tank waste at Hanford (approximately 85 percent of the volume in the 78 tanks in the site's West Area tank farms), could be

[26] In 2019, ECA outlined alternative approaches to the interpretation of HLW to move waste out of host communities more efficiently using a smarter, risk-based decision framework. See Energy Communities Alliance. *Making Informed Decisions on DOE's Proposed High Level Waste Definition*. May 2019. https://bit.ly/3YIFOVK.

[27] State of Washington Department of Ecology and U.S. Department of Energy, *Agreed Order Docket No. 21304*, August 25, 2022. https://www.hanford.gov/files.cfm/Leaking_Tank_AO_FINAL.pdf.

[28] See *The Politics of Cleanup (*https://www.energyca.org/s/The-Politics-of-Cleanup-jhm8.pdf) and *Guide to Successful Environmental Cleanup* (https://www.energyca.org/environmental-cleanup-laws) for discussion on RCRA and CERCLA.

retrieved, grouted, and disposed of as LLW. Hence, existing, fully licensed LLW disposal sites could be utilized for final disposition of this material.

DOE has initiated an effort, known as the Test Bed Initiative (TBI), to examine the use of grout as a treatment for Hanford tank waste, though this initiative has proceeded in a start-stop fashion for several years. Since being launched in 2016, DOE has treated 3 gallons of Hanford tank waste, stabilized the material via grout at a commercial facility, and shipped and disposed of the grouted waste at WCS. DOE has also prepared a draft waste incidental to reprocessing (WIR) determination to cover a total of 2,000 gallons of waste. TBI has received the support of a variety of stakeholders at Hanford, but DOE's schedule for completing the WIR determination and moving forward with the next stage to address the 2,000 gallons of waste is unclear.

As part of a comprehensive evaluation of applying the HLW interpretation, DOE should commit to fully examine what tank waste could be disposed of at a licensed, commercial disposal facility. ECA calls on DOE and Congress to implement a project to pilot the use of the HLW interpretation at Hanford. This pilot would combine the successful elements and implementation of the HLW interpretation at SRS, the Hanford test bed initiative, and the tank-side treatment capability at SRS and Hanford. The pilot would have the following key elements:

- Early, extensive, and continual communications with Washington and Texas regulators and stakeholders, and at all levels of federal, state, and local governments.
- Characterization, retrieval, grouting, package, and disposal offsite under the HLW interpretation:
    - The waste in the Hanford West Area tanks provides opportunity to demonstrate full implementation without interfering with East Area operations and construction.
    - The waste determination would be under the HLW interpretation (Class A-C MLLW) and would demonstrate that the immobilized tank waste is not HLW.
- Processing and disposition of an entire tank (i.e., up to 100,000 gallons or more).
- Use of mature and available commercial facilities, licenses, permits, and regulations, thereby reducing programmatic uncertainty:
    - Compliance with disposal facility WAC must be verified.
- Completion of necessary National Environmental Policy Act (NEPA) analysis and documentation.
- Pretreatment, only if necessary (e.g., filtration, Cesium removal):
    - The DOE HLW interpretation does not require removal of key radionuclides to the maximum extent that is technically and economically practical, as required by the DOE Manual 435.1-1 WIR process

- NRC consultation to provide independent review of characterization data and waste determination and commitment for offsite disposition only, to increase trust among stakeholders.

Advantages Over Other Options

Besides use of the HLW interpretation, there are other processes that allow classification of tank waste as other-than-HLW, namely the aforementioned WIR process, under DOE's AEA authority, as codified in DOE Manual 435.1-1, and "Section 3116," made law by Congress in Section 3116 of the National Defense Authorization Act for 2005 (NDAA). Section 3116 grants authority to the DOE Secretary to determine that HLW does not include radioactive waste resulting from the reprocessing of SNF. The NDAA Section 3116 waste classification determinations are similar in nature to WIR determinations except that they only apply to disposal of waste onsite and only in the states of South Carolina and Idaho.

Some stakeholders prefer addressing Hanford reprocessing waste using the WIR process, or possibly adding the State of Washington as a covered state under Section 3116.[29] However, there are several advantages to using the HLW interpretation at Hanford that can decrease costs and accelerate cleanup schedules. First, it requires no change in law. Second, Section 3116 and WIR are not fully risk-based because they unnecessarily require radioactive radionuclides be removed. Additional treatment of waste that already meets existing legal, regulatory, and technical requirements for safe transportation and disposal offsite or onsite is unnecessarily expensive and inefficient, with no added benefit to safety or human health.

SRS—Keep Building on Success

ECA fully supports completion of the ongoing NEPA process at SRS. ECA urges DOE to move forward and finalize the *Environmental Assessment for the Commercial Disposal of Savannah River Site Contaminated Process Equipment* published in 2021, and issue a final decision and a final waste determination using the HLW interpretation in accordance with all applicable requirements. Safe transportation and disposal of the equipment at the appropriate licensed LLW disposal facility would follow. This would be the second successful project under the HLW interpretation, the only negative aspect being the excessive length of time to complete it without clear cause for the extended schedule.

Given the apparent levels of support for the use of the HLW interpretation among regulators and stakeholders at SRS, DOE should scour the site for other waste and equipment that would comply with

[29] Section 3116 applies to two "covered States"—South Carolina and Idaho. However, Section 3116 does not apply to reprocessing wastes that are transported out of South Carolina or Idaho and disposed of in a different state. Section 3116 also specifies that "nothing in this section establishes any precedent or is binding" outside of South Carolina and Idaho.

existing LLW disposal facility WAC, either under the existing NEPA for the contaminated equipment, or under a future NEPA action if necessary. One interesting part of the tank waste-related inventory that needs further analysis is spent ion exchange media. Typically this material exceeds Class C limits and hence would not comply with existing commercial LLW facility disposal site requirements, but DOE should explore this further as it is a difficult waste that does not have a disposition path and the overall volume will continue to increase for years to come at SRS and Hanford. DOE could consider issuing a consolidated request for information (RFI) for all sites with this media and similar waste to explore ways to dispose of this material within existing requirements and regulations (e.g., exploring treatment and packaging options to enable compliance, or under NRC's waste classification regulations,[30] or using other innovative approaches as proposed by industry in response to the RFI).

ECA encourages DOE to work with industry on innovative approaches leading to disposal solutions for challenging, orphan tank waste. It is notable that in prior decades, DOE's call for industry to provide waste management solutions led to development of numerous commercial treatment capabilities and expansion of commercial disposal options.

Idaho—See What May Be Possible

INL has two types of tank waste from operation of SNF reprocessing activities at the INL Chemical Processing Plant from 1952 until 1992: calcine and sodium-bearing waste (SBW).

Calcine was created through a thermal process that converted the liquid waste generated from SNF reprocessing to a more stable, granular solid. It was transferred to stainless steel storage vessels, which hold approximately 4,400 m^3 of calcine. But these operations ceased before all liquid waste was stabilized. Approximately 850,000 gallons of SBW are stored in 3 underground tanks at the Idaho Nuclear Technology and Engineering Center. Fluidized-bed steam reforming at the Integrated Waste Treatment Unit is the treatment method for the SBW. SBW will be converted to a dry, solid carbonate and aluminate mineral. The resulting granular solids and fine powdered waste will be packaged in 1,200 or so canisters. Both calcine and SBW, when packaged, will exceed LLW Class C limits for near surface commercial LLW disposal, so disposal at an existing facility under current regulations is not possible.

One potential disposal option for the Idaho material is at WIPP. In 2005, DOE issued a Record of Decision (ROD) outlining the Department's preference to use the WIR evaluation process to determine

[30] 10 CFR 61.55(a) (2)(iv) allows for disposal of waste outside of existing licenses, on a case-by-case basis: "Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. In the absence of specific requirements in this part, such waste must be disposed of in a geological repository as defined in part 60 or 63 of this chapter unless proposals for disposal of such waste in a disposal site licensed pursuant to this part are approved by the Commission."

if the treated SBW and calcine can be disposed of as TRU. However, disposal at WIPP would first require permit changes. Even so, ECA recommends that DOE move forward expeditiously to evaluate this alternative, or other strategies as appropriate, and engage with impacted stakeholders whose support will be needed for disposal decisions.

Idaho may potentially have other waste streams that could be safely and expeditiously addressed using the HLW interpretation. Similar to the steps SRS has taken to evaluate waste streams with no current disposition path, DOE should work with industry to evaluate the inventory of Idaho waste streams and associated equipment (including those generated from Idaho Cleanup Project, INL, and NE activities) that would comply with, or could be treated and/or packaged to comply with, existing LLW disposal facility requirements. As an example, driver and blanket cladding hulls from the Experimental Breeder Reactor-II sodium-bonded project should be evaluated for near-term disposal at an existing LLW disposal facility.

Completing Consent-Based Siting

It is a long-standing federal *responsibility* to manage and dispose of the nation's defense and commercial HLW and SNF. With no geological repository on the horizon, local communities are, and have been for decades, hosting *de facto* storage sites for this waste. But ECA is encouraged by recent Congressional and DOE actions to re-engage and move forward with a consent-based approach for siting interim storage, and potentially permanent, disposal facilities.

ECA appreciates the renewed momentum and will continue outreach to all impacted parties, with the goal of increasing understanding of the opportunities and challenges related to radioactive waste missions, to drive measurable progress on defining "consent" and identifying potential host communities. ECA continues to fully support all DOE efforts to find a solution for communities storing HLW and SNF, both defense and commercial. As DOE now recognizes, the consent-based siting process must be driven by communities, in close collaboration with the public, interested groups, and governments at the Tribal, state, and local level. There should be a phased approach supported by sound science, and recognition that no one-size-consent-agreement will fit all.

ECA's positions and comments on consent-based siting are a matter of record and remain unchanged.[31,32] However, in the context of disposition of DOE wastes without a permanent solution, ECA emphasizes these points:

[31] Public Comments on DOE's Draft Consent-Based Siting Process (January 2017): https://www.energy.gov/sites/default/files/2021-12/ne-comments-2017-draft-consent-based-siting-process.pdf.
[32] Public Comments on the Request for Information (December 2021): https://www.energy.gov/sites/default/files/2022-06/Responses%20to%20RFI%20on%20Consent-Based%20Siting%20and%20Interim%20Storage%20Updated.pdf.

- The Administration and Congress must follow through and commit the resources and political will to reach the goal: safe, operating interim storage facility(ies) and, *in parallel, a geological repository*.
- DOE must prioritize the management and disposal of DOE's materials as part of any process to develop interim storage facilities, and a permanent geological repository. The government's legacy defense HLW remains orphaned at SRS, INL, and the Hanford Site, and DOE is as responsible for this waste as it is for commercial spent nuclear fuel. DOE cannot only focus on the disposal of commercial SNF from decommissioned nuclear power plants, but must pursue a holistic solution and take actions to demonstrate that commitment, especially for the safety of our frontline communities, but also in the interest of advanced nuclear development.

ECA continues to stress the importance of EM and NE to work together in pursuit of an integrated approach to waste management and the consent-based siting process. NE can learn significant lessons from EM's experiences to date in siting disposal locations, including the significant effort to build and maintain stakeholder support for WIPP, which helped ensure the successful launch of the first, and to date only, geological repository in the United States. For its part, EM can learn from what appears to be a thoughtful and multi-faceted approach NE is conducting to engage with stakeholders as part of the effort to define, develop, and maintain "consent" for new SNF and HLW interim storage and permanent disposal sites. Collectively, each office needs to understand that, outside of DOE, few people can differentiate between the offices and their joint responsibility.

ECA frontline communities bear the brunt of the waste created by the development of nuclear weapons and government-sponsored nuclear research. The federal government has shipped to and stored waste in our communities and entered into binding legal agreements to move the HLW from our communities. DOE must demonstrate a commitment to meeting this legal and moral obligation. After 75 years of supporting, and contributing to, the country's national security mission, these communities cannot be given any impression that the most dangerous waste stored at the sites in their communities will not be addressed.

West Valley Cleanup, Other Projects, Depend on GTCC LLW Disposal

There is currently no disposal capability in the United States for GTCC LLW. DOE is responsible for identifying a disposal site and disposing of any GTCC LLW, whether commercially generated or DOE-owned GTCC-like waste, under the *Low-Level Radioactive Waste Policy Amendments Act of 1985*. Under the NRC's current regulations, GTCC LLW must be disposed of in a geological repository unless a proposal for disposal of such waste in a land disposal facility licensed under 10 CFR Part 61 is approved by the NRC. However, the NRC has stated, "…Most of the GTCC waste streams analyzed are

potentially suitable for near-surface disposal."[33,34] The 2016 Final Environmental Impact Statement (FEIS) identified land disposal at generic facilities and/or WIPP as preferred options for the disposal of GTCC LLW and GTCC-like waste.

GTCC/GTCC-like LLW is still being generated and is currently stored across the United States, impacting commercial and DOE sites in multiple states. GTCC LLW/GTCC-like waste is stored at the West Valley Demonstration Project (WVDP) in New York, ORR, INL, and LANL. Notably, approximately half of the projected inventory of 12,000 m^3 of GTCC LLW/GTCC-like waste currently is or, once generated, will be stranded at West Valley, which is characterized as a non-defense site. WIPP is not an option for the WVDP GTCC LLW because WIPP is only authorized to accept defense-generated TRU waste pursuant to the WIPP Land Withdrawal Act (LWA).[35]

In addition, DOE's use of the HLW interpretation will be dependent on having a GTCC LLW disposal capability, given that some of the material that could be covered by the interpretation will require such a disposal pathway. However, WIPP is currently not an option for some of this potential GTCC LLW waste, as its permit does not allow the disposal of material designated as tank waste.

In addition to the FEIS, DOE issued two other documents related to GTCC LLW: the 2017 *Alternatives for the Disposal of Greater-Than-Class C Low-Level Radioactive Waste Report to Congress*, which indicated DOE is primarily considering disposal in generic commercial facilities, and the 2018 *Environmental Assessment for the Disposal of Greater-Than-Class C Low-Level Radioactive Waste and GTCC-Like Waste at Waste Control Specialists, Andrews County, Texas*, which evaluated disposal of the GTCC LLW inventory at WCS in Andrews County, Texas. In summary, it appears that DOE has completed all their NEPA actions except the final ROD on GTCC LLW disposal.

While DOE is responsible for identifying a GTCC LLW disposal site, the NRC is responsible for approving a site that can dispose of commercially generated waste. In April 2022, the NRC approved the proposal for issuance of a new rule that consolidates and integrates criteria for licensing the disposal of GTCC LLW.[36] The new proposed rule would provide for Agreement State licensing of those GTCC LLW streams that meet the regulatory requirements for near-surface disposal and do not present a hazard such that the NRC should retain disposal authority.

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[33] Disposal of Greater-than-Class C (GTCC) and Transuranic Waste Draft Regulatory Basis – For Public Comment. NRC Docket ID: NRC-2017-0081.

[34] See footnote 2.

[35] Recognizing that the community around West Valley has been working to change the definition of the waste at WVDP to be classified as defense waste.

[36] NRC memorandum from Brooke P. Clark, Secretary, to Daniel H. Dorman, Executive Director for Operations, Staff Requirements-SECY-20-0098–*Path Forward and Recommendations for Certain Low-Level Radioactive Waste Disposal Rulemakings*, April 5, 2022.

WCS has expressed interest in GTCC LLW disposal. Assuming that WCS obtains support from Texas (consistent with consent-based principles and processes), the regulator (Texas Commission on Environmental Quality), the host community, and other stakeholders, WCS could move forward with licensing GTCC LLW disposal. The other option identified in the FEIS is WIPP, which would require a change to the WIPP Land Withdrawal Act (or new legislation) to allow disposal of non-defense TRU, a legislative clarification to the Low-Level Radioactive Waste Policy Amendments Act of 1985 to address the NRC's role in licensing WIPP, and a change to the state-issued WIPP Hazardous Waste Facility Permit.

Steps to Move Forward on GTCC

DOE should move forward expeditiously on GTCC disposal, working with Congress, regulators, and industry. If WCS is approved and licensed, it would remove a major hurdle to closure of the WVDP site and provide a disposition path for GTCC-like waste from other DOE sites and GTCC LLW from commercial sites as well. It also could provide a disposition path that would allow DOE to maximize the use of the HLW interpretation. This would translate to new customers for WCS, assisting in viability of a key waste disposal asset of the nation. All options, public and private, should be on the table.

The remaining actions that need to be completed before a GTCC LLW disposal site can be established include:

- Gain support of Texas, local community, and other stakeholders affected by a potential GTCC LLW disposal site.
- Congress addresses the "await action by Congress" requirement as specified in 2005 Energy Policy Act (EPACT).

Congress can be proactive in solving the remaining actions concerning GTCC LLW disposal facility development and take specific steps to meet this responsibility assigned to the federal government over 37 years ago. Actions include:

- Subsequent to securing state and local support, Congress should provide clear direction regarding the requirement to "await action by Congress," consistent with EPACT and the recent finding of the Government Accountability Office (GAO).
- Congress, working with DOE, should provide funding for development of a GTCC LLW disposal facility and provide financial assistance to communities interested in hosting a GTCC LLW disposal facility.

Until local community, state, and associated stakeholders are supportive of a GTCC LLW disposal facility and Congressional action is taken, substantial progress cannot be made. In a September 2022

report, GAO stressed the importance of working with communities and stakeholders on this issue, stating, "Successful disposal of GTCC and GTCC-like waste will require clear, transparent communication between DOE and various stakeholders, such as governments and citizens of states and localities with disposal sites that DOE is considering."[37] As mentioned above, the state and local community hosting the GTCC LLW facility should be rewarded financially and economically, as it provides benefits to all Americans. Successfully completing these actions would allow DOE to issue a NEPA ROD and would pave the way for planning and development of the GTCC LLW disposal facility.

Provide Communities with the Full TRU Waste Disposal Picture

DOE uses TRU waste inventory information to support strategic decisions related to waste retrieval, treatment, repackaging, characterization, shipment, and disposal initiatives. Sites develop and update site-specific project plans and schedules, which detail approaches for disposal at WIPP. EM's Carlsbad Field Office, which manages WIPP, uses several tools for planning and stakeholder benefit, including:

- Annual Transuranic Waste Inventory Report, which provides the projected and potential TRU waste inventory estimate is updated each year by the waste generators.
- Semi-Annual Shipment Notification, which provides estimates for the number of shipments of TRU waste to WIPP during the next twelve-month period.
- Eight-week rolling schedule, which notifies selected stakeholders of planned, near-term TRU waste shipments, which is updated as needed.
- TRU Waste Transportation Plan, which defines the requirements for managing the transportation of TRU waste from a generator/storage site to WIPP or to another generator/storage site.
- Waste Data System/WIPP Waste Information System Public Access Page, which provides information regarding emplaced containers of TRU waste at WIPP.
- WIPP Status Report, which provides TRU waste shipments received at WIPP and volume emplaced at WIPP.

As informative as these products are, none provide long-term scheduling plans that would provide confidence that TRU waste will be removed from EM and NNSA sites and communities in a timely fashion and within the WIPP LWA capacity limit of 6.2 million cubic feet of TRU waste. To ensure that all communities, regulators, and the public have a full understanding of the Department's long-term TRU waste disposal needs and the capability of WIPP to meet those needs, ECA recommends that DOE develop and issue a long-term, integrated plan and schedule for WIPP that considers the following:

[37] U.S. Government Accountability Office. *Nuclear Waste: DOE Needs to Improve Transparency in Planning for Disposal of Certain Low-Level Waste*, September 29, 2022.

- Total expected inventory from each waste generator by year (e.g., TRU waste generation from pit production activities at LANL and SRS).
- Requirements for additional disposal space beyond that already permitted (e.g., scope of expansion, timeframe and regulatory actions and approval times).
- WIPP infrastructure upgrades and maintenance actions (near-, mid-, and long-term).
- Legal and site cleanup commitments.
- Expansion of DOE's national security missions, such as increased plutonium pit production, and nonproliferation commitments. These missions will increase TRU waste production and require increasing portions of WIPP disposal capacity.
- WIPP LWA capacity limitation and plans for exceeding this amount, if necessary.
- Contingency plans for unknowns.

DOE is facing increasing calls for this type of information. The New Mexico Environment Department has included a requirement for an inventory of remaining waste that would go to WIPP as part of renewing the facility's hazardous waste operating permit. By providing the full picture of what remains to be disposed of at WIPP, DOE can help ensure continued long-term support for an asset not just vital to the Department's cleanup mission, but ongoing national security and scientific research initiatives as well.

Ensure Local Support for DOE's Onsite Landfills for Effective LLW Disposal

Overview

DOE's current policy is to prioritize disposal of LLW and MLLW on the DOE site where cleanup is occurring and where DOE generates the radioactive waste. However, DOE needs to recognize that this is different than what may have been portrayed to the local community in the past.

Building landfills to dispose of LLW pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA)[38] on a DOE site is not always supported by the community, but can be accepted by the community and state and federal regulators if DOE engages and responds to the local government and community concerns. DOE must look for ways to inform and engage with the community about the potential location of the landfill, as well as what it expects to put inside and the level of nuclides that will be disposed of in the landfill (the Waste Acceptance

[38] 42 U.S.C. § 9601, et seq.

Criteria or WAC). For the communities, the WAC play a critical role in the selection and successful implementation of a preferred DOE alternative, based on these CERCLA[39] decision making criteria:

- Overall protection of human health and environment;
- Compliance with regulations;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- Regulatory acceptance; and
- Community acceptance.

In many cases, ECA notes DOE has done a good job working with impacted communities and building regulator support; however, these landfills and the type of waste to be disposed of, in the words of one local government official, may be "pushed through despite concerns of local governments." DOE needs to recognize and address the history, the risk profile, the priorities, and concerns of the community. Further, adding incentives to construct a landfill for the same contractors that will actually do that work *prior to* the landfill being permitted or accepted for a specific location highlights the duplicative nature of the decision being made prior to starting the engagement process (and can appear to negate the latter).

While the vast majority of DOE's waste is disposed of onsite, disposal at another DOE facility is used only when onsite disposal is not available or only if a specific waste stream does not comply with the onsite WAC. DOE should consider that LLW and MLLW waste can also be disposed of at a commercial facility if the facility is compliant with DOE and regulatory requirements and the waste meets the WAC of that commercial facility. DOE makes the decision on where to dispose of LLW and MLLW on a project-by-project basis, determined by the characteristics of the waste. DOE (through the EM field managers) analyzes available disposal options, the political landscape, cost, risk, and other issues, then selects the "best value" to the government based on full cost, potential long-term liability, protection of the public health and the environment, politics, community acceptance, and other appropriate factors.[40]

Multiple options promote competition and best value pricing to the Department. Commercial disposal facilities operate in a difficult market. They are continually striving for more waste from DOE to

[39] 40 CFR § 300.430.
[40] See 42 U.S.C § 9621 and the nine remedy selection criteria of the National Contingency Plan which includes community acceptance.

maintain their market viability. It is important to DOE environmental cleanup, and for the nuclear industry at large, for these disposal sites to remain available and cost-effective.

Struggling With Support on Landfills

EM has experienced challenges in recent years with obtaining state and local government and stakeholder support for new onsite disposal facilities. These challenges, and the continued need for onsite disposal capabilities for the foreseeable future, necessitate EM working to improve relations with local communities and stakeholders, and to develop policies and approaches that facilitate their early and continued engagement in the disposal decision-making process.

Key issues that DOE needs to better address to gain support for the sites include:

- Technical basis documents including the Performance Assessments use advanced modeling for future landfill performance and are based on site data and assumptions that can be complex.
- It is often difficult to communicate WAC attainment for risk-reduction to governments and stakeholders.
- A set of effective WAC must be grounded in comprehensive waste characterization to enhance public confidence in onsite disposal.
- The timing and process for how EM will transition disposal facilities to the Department's Office of Legacy Management is unclear.
- Providing independent technical support for the local government to ensure that it has the capacity to analyze the issues and *engage* with DOE and state regulators is critically important for gaining acceptance. The fact that meetings are held does not mean that substantive dialog occurred.
- DOE should not use the CERCLA process as an excuse for not engaging on WAC discussions and potential parameters of what will be disposed of onsite or to limit discussion on the WAC and other issues. Several local governments have identified non-communication on the WAC as a key impediment to community acceptance of the landfill and understanding of what will be disposed of in the landfill.

Next Potential Challenge … or Opportunity—Paducah

The next site where EM will need to engage with the state and local governments and stakeholders on constructing a new landfill and how best to dispose of waste is the former Paducah Gaseous Diffusion Plant (GDP) in Kentucky.

EM has not made a formal decision on disposition of waste and excess material generated over the next several decades from cleanup (which occurs under CERCLA) activities at Paducah. DOE will generate a large amount of CERCLA radioactive waste—as much as 4.6 million cubic yards from decontamination and decommissioning of plant buildings and other cleanup activities.

DOE has established the Paducah CERCLA Waste Disposal Alternatives (WDA) project to evaluate disposal options for CERCLA waste that will be generated as a result of implementing removal and remedial actions. The evaluation will be conducted using the CERCLA remedial decision-making process. Options include construction and operation of an onsite waste disposal facility (OSWDF), offsite waste disposal in commercial waste disposal facilities, a hybrid approach that specifically addresses waste streams separately, and an incremental (one-step-at-a-time) approach for utilizing a new onsite disposal unit allowing for unit expansion. Due to significant public interest, frequent interactions with the public are expected throughout the project life cycle.

Based on DOE's recent reprioritization and proposal to focus near-term cleanup efforts on the C-400 Complex, preparation/finalization of the decision documents (e.g., Proposed Plan, ROD) and construction of any OSWDF (if selected as the preferred option under the WDA project) have been re-sequenced to an out-year activity to coincide with the timing of when waste generation from decommissioning of GDP facilities and remediation of the burial grounds is projected to occur.[41]

Encouraging – or at least Analyzing Publicly – Offsite Disposal of DOE Waste

DOE emphasizes that 90% of LLW is disposed of at the DOE site where it was generated (onsite). Further, DOE and NNSA cleanup projects frequently use NNSS for disposal. As a result, there is relatively little volume disposed at commercial facilities. At some point, commercial disposal site sustainability could be a DOE cleanup risk, which would reduce the options of DOE (and other agencies conducting environmental cleanup, such as Department of Defense) in disposal of LLW and MLLW. If this is to occur, the only alternative to onsite disposal will be at NNSS—the only DOE regional disposal site currently accepting waste from other DOE sites.[42]

It is understood that best value to the government is an underlying goal in DOE decision-making, but the process, options considered, "other appropriate factors," and criteria used to make the decision,

[41] Site Management Plan Paducah Gaseous Diffusion Plant Paducah, Kentucky Annual Revision—FY 2022, (DOE/LX/07-2473&D2), December 2021.

[42] The Final Waste Management Programmatic Environmental Impact Statement identified NNSS and Hanford as the two regional disposal sites for offsite LLW. DOE deferred the decision on importing wastes from other DOE sites for disposal at Hanford at least until the waste treatment plant is operational. NNSS continues to carry the full burden of out of state waste

cost input data, and final decision need to be clear, transparent, reproducible, and well communicated—at every step of the process. Construction, regulatory approval, and operations of any disposal facility is costly and national interests should always be considered. The use of commercial disposal facilities should be an evaluated option for all waste that meets their WAC, and their use should be considered to the extent appropriate, to maintain their viability, which provides DOE added options and flexibility for waste disposal well into the future. As is the case with any radioactive disposal site, the state and local community hosting the facility should be positioned for economic opportunities and resources (e.g., serious consideration for new government projects, facilities, etc.) to offset any environmental burden.

Obtaining Community Support

To minimize the risks of the development of future disposal facilities, it is recommended that DOE redouble their efforts to engage local governments and stakeholders appropriately. As stated in the 2019 case study of onsite and offsite disposal at DOE's ORR[43]:

> "…DOE needs community support and community acceptance to successfully implement the agency's cleanup mission. Ongoing dialogue with the community saves both time and money, but more importantly, cooperation helps ensure that effective long-term cleanup occurs."

These dialogues will pay dividends to all in safely accelerating schedules and therefore decreasing the cost of these facilities. From lessons learned at Portsmouth and Oak Ridge, ECA offers the following to be considered for future DOE disposal facilities:

- Engage first on location of the proposed site, prior to making public announcements. Find out what the impact on the local community will be versus other potential locations on the DOE site.

- Provide technical resources to permit the local governments to engage on technical issues related to the proposed site (e.g., review of complicated performance assessment models). This allows for identification of key community issues and enables local governments and their constituents to be informed.

- Allow, at least semi-annually, a meeting with the local government representative and the regulators with DOE on the primary issues for regulatory review and approval. The successful

[43] WM2019 Conference, March 2019. *Why Cleanup Acceptance Is Running into Conflicts - Offsite Disposal Versus On Site Disposal*, Amy S. Fitzgerald, City of Oak Ridge TN.

cleanup and closure of both Mound and Rocky Flats included regular stakeholder engagement opportunities often led by the regulators and inclusive of local governments.

- Engage the communities early, regularly, and meaningfully with state and local government stakeholders. Briefings on status and paths forward are not engagement. Involve local government leaders at every major point in the process, and more so early in the process (e.g., during the definition of mission/project requirements). DOE should commit to a dialogue with local government and community on a regular basis, beyond regulatory requirements.

- Use the CERCLA process to engage. Do not hide behind excuses for not meeting and engaging directly with the local government and stakeholders on technical issues. Section 120(f) of CERCLA identifies that local governments must be allowed to participate in the planning and selection of the remedial action (including but not limited to the review of all applicable data as it becomes available and the development of studies, reports, and action plans) at a federal facility site that is being cleaned up pursuant to a "remedial action." Too many times, local governments are told DOE needs to engage with them as part of the larger public process and not directly. This only builds mistrust and frustration, and slows the processes.

- Review the potential socioeconomic and opportunity costs of onsite disposal and solicit current cost estimates from contractors who could transport the waste off-site to licensed disposal facilities.

- Understand the nuances of "technical" and "perceived" risks in communication efforts. "Decisions, even technical ones, are not solely technically based. For that reason, the federal government and the regulators also must be educated about the perceptions among local governments and others within the neighboring community regarding risk (which generally vary from community to community and even within communities), because such perceptions may not be consistent with technical risks."[44]

- Re-evaluate cleanup contracts to decouple performance bonuses from the schedule for onsite disposal of CERCLA waste. Considering the lack of technical information and site characterization early in the process, incentive-based contracting places too many constraints and excessive pressure on DOE, its contractors, and regulators and can lead to near-term decisions that may not be in the long-term best interests of the community or the federal government.

[44] Energy Communities Alliance, *The Politics of Cleanup*. (2007). https://www.energyca.org/s/The-Politics-of-Cleanup-jhm8.pdf.

In addition to the detailed information that DOE provides to a community on any disposal decision, DOE should also use tools that provide the community an easier-to-understand summary analysis of the options for nuclear and hazardous waste disposal in a community. An example of some of the questions that DOE can answer are set forth below (recognizing that each community, remedy options, regulatory issues, and engineering feasibility will have different drivers at each proposed site).

In summary, it is imperative for DOE to continue to turn to stakeholders for input, as the local communities are the most affected by decisions. The communities have a strong record of responding with immediate interest and comment.

Disposal Options – Community Education and Decision-Making Matrix

Issues	Waste Disposal Location	Comment
Potential Remedy Alternatives for the Waste Project	On-site storage On-site disposal Off-site disposal Off-site storage	All potential methods for cleanup being considered at a site are referred to as remedy alternatives. All alternatives included in the matrix should meet both engineering and legal requirements. What are the benefits and concerns for each potential remedy?
Estimated Cost	On-site storage On-site disposal Off-site disposal Off-site storage	The cost of each remedy alternative should be estimated. The cost should include all aspects of the alternative, including design, construction, transportation, short and long-term monitoring, and operation and maintenance.
Estimated Time to design, build, ship and complete the project	On-site storage On-site disposal Off-site disposal Off-site storage	The time to implement each remedy alternative should be estimated. The times should include all aspects of the alternative, including public engagement, regulatory approval and process, transportation, design, construction, short and long-term monitoring, and operation and maintenance and each component should be separately identified with an estimated schedule.
Potential Risk Scenarios and Issues to human health and the environment and the community economy	On-site storage On-site disposal Off-site disposal Off-site storage	Indicates that the site or a portion of the site is not feasible for a particular remedy because of the identified remedy. Indicates that there are some restrictions on a particular remedy due to the site, transportation, engineering feasibility or other issues of the site or a portion of the site for the identified remedy. DOE should also identify risk mitigants. Historic impacts and releases should also be addressed to the extent the remedy is similar to a remedy that caused a past release in the community. Each of these items may also impact the community and its economy based on the action of DOE.
Feasibility	Regulatory Drivers Laws utilized for each option	Is the project implementable under current law or state agreement and what will need to change for the project to be implementable? Identify the law is being implemented for the project and other legal options. Also identify the required public engagement process of each remedy.

For more information on community engagement in minimizing risk, visit *ECA's Guide to Successful Environmental Cleanup*.[45]

Enhance Regulatory Engagement

Local governments recognize that the federal government has cleanup problems to solve and that DOE sites are subject to federal environmental laws, such as CERCLA, RCRA, the Clean Water Act, Clean Air Act, NEPA, AEA, and state environmental regulations.[46] Site-specific requirements are codified in binding regulatory compliance documents, such as Federal Facility Agreements, consent decrees, and other legal arrangements that may contain enforceable milestones for specific cleanup actions. ECA has seen schedule delays and increased costs at some sites due to disputes and disagreements between regulators and stakeholders relating to these myriad technical, policy, and program issues. Areas of particular challenge include: dispute resolution methods, levels of protectiveness standards, integration and understanding of overlapping requirements (e.g., CERCLA/RCRA), risk-based decision-making, future land-use, roles and responsibilities (e.g., removal authority), substantive requirements versus administrative requirements, performance metrics, and how to regulate within a constrained budget.

Local governments want to help with solutions, but in some cases regulatory processes do not provide them a formal seat at the table. Decisions are typically made that affect the local communities for hundreds of years into the future. Hence, local governments must be consulted and engaged in the regulatory processes. Community and stakeholder engagement early in the decision-making process is essential. The initiative taken by a local community to systematically evaluate DOE's proposals and technical documents has been instrumental to determining whether community acceptance can be achieved, but requires moving beyond established regulatory processes.

DOE can help build trust in the communities by creating and participating in various forums with Tribes, local non-governmental organizations, local government coalitions, and site-specific advisory boards. The best way to undermine public confidence is through a "decide, announce, and defend" approach to public engagement. DOE and the regulatory agencies should instead establish substantive conversation early in the process to educate interested parties and avoid mistrust and controversy.

To develop and implement innovative solutions and identify safe, efficient disposal paths, transparency, communication, knowledge-sharing, and relationships need to be improved with state and federal regulators, and local governments should be assured of a seat at the table throughout the

[45] Energy Communities Alliance. "Managing Risk." *Guide to Successful Environmental Cleanup.* https://www.energyca.org/managing-risk.
[46] Please see "Environmental Cleanup Laws" in ECA's *Guide to Successful Environmental Cleanup* for a detailed summary of the laws and how they work: https://www.energyca.org/environmental-cleanup-laws.

process. DOE should consider leveraging relationships with experienced regulatory experts across the complex who have worked in the environmental cleanup industry, have a familiarity with host communities, and a historical track record of success in solving real-world regulatory challenges (such as exploring the capabilities of DOE's national laboratory network, including EM's corporate laboratory, the Savannah River National Laboratory, and its recently established Regulatory Center of Excellence). The diverse network of experts and researchers could support DOE interactions with regulators and community leaders, offer best practices and technical assistance, assist in developing effective regulatory and stakeholder engagement strategies, and build upon existing community interactions to strengthen communication and mitigate stakeholder concerns.

Regulatory compliance and interactions could be improved at all DOE sites, but specific attention is needed in Nevada, New Mexico, Texas, and Washington, where relationships suffered as challenges arose over the last decade. Improvements are needed in (1) building relationships with decision-makers, (2) developing a complex-wide plan with a forward-thinking regulatory strategy, and (3) improving day-to-day tactics of management and disposal of specific challenging waste streams.

For more information on improving community engagement, visit ECA's *Guide to Successful Environmental Cleanup*.[47]

Recommendations

The following are ECA's recommendations for DOE to move the waste disposal process forward:

1. **Prioritize Use of the HLW Interpretation**. DOE must use the HLW interpretation. It is an invaluable tool in DOE's waste disposition toolbox. DOE's actions can solidify its commitment to state and local communities to move radioactive material while reducing costs, expediting cleanup activities, and allowing DOE to focus sooner on other high-priority cleanup projects, ultimately reducing higher risks across the complex. DOE should re-energize its use of the HLW interpretation, including pursuing a pilot implementation at Hanford for a single-specific waste stream. This would be intended to help foster broader support for the use of the HLW interpretation at Hanford, which could have significant benefits to DOE and the local communities near the site. DOE has demonstrated that the HLW interpretation can be successfully applied. The Department moved 8 gallons of waste from SRS under this HLW interpretation in the last several years, but DOE can and must do better if they are going to save over $200 billion in cleanup costs.

[47] Energy Communities Alliance. "Community Engagement." *Guide to Successful Environmental Cleanup.* https://www.energyca.org/engagement.

2. **Support and Complete the Consent-Based Siting Process.** DOE should support and complete its latest attempt to utilize consent-based siting to identify interim storage sites, while also applying consent-based siting to identify final disposal for defense- and commercial-SNF and DOE-managed HLW. DOE needs to make the disposal of defense-related SNF and HLW of equal priority, and geological repository siting should proceed in parallel with efforts to develop an interim storage site.

3. **Select a Disposal Site for GTCC Waste**. DOE and Congress should take action to advance the development of a GTCC LLW disposal facility (including completing requirements included in the Energy Policy Act of 2005), and provide DOE funding for access to, or development of, such a facility and financial assistance to communities interested in hosting GTCC LLW disposal. An operating GTCC LLW disposal facility will help ensure DOE can maximize the use and benefit of its HLW interpretation, as well as provide a necessary disposal pathway to allow DOE to complete cleanup work at the West Valley Demonstration Project in New York state and to aid commercial nuclear decommissioning efforts.

4. **Support WIPP and Develop and Issue Long-Term, Integrated Plans for Operations.** DOE should develop and issue a long-term, integrated plan and schedule for WIPP that considers the total TRU waste inventory across the complex, disposal space needs, potential upgrades for WIPP, and impacts of current and future NNSA missions (e.g., pit production at LANL and SRS), among other factors.

5. **Continue to Emphasize Regular, Meaningful Engagement with Communities.** DOE should continue to prioritize and provide resources for regular and meaningful engagement with local, state and Tribal governments, regulators, and stakeholders representing communities that host, or could potentially host, disposal facilities. This engagement should be proactive and focus on the Administration's commitment to environmental justice. It should also seek to go beyond regulatory requirements, including early discussions on potential locations and approaches, as well as programmatic and strategic planning, for onsite disposal facilities ahead of any public announcement of proposed sites.

6. **Provide Technical Assistance to Communities to Address Waste Issues**. To the extent requested by a community, DOE should proactively provide financial assistance to local communities (like it does for others) where disposal facilities are already sited, or could potentially be sited, to obtain independent technical expertise and to assist with understanding the risks of the site, education and outreach, oversight, environmental sampling and long-term monitoring, and to build capacity and communication channels to ensure citizens are informed.

7. **Re-evaluate the Practice of Incentivizing Contractors to Open a Waste Site in the Contracting Process Prior to Obtaining Community Support and Regulatory Approval**. DOE should re-evaluate cleanup contracts to decouple performance bonuses from the schedule for onsite disposal of waste. The process gives the impression that the decision is made prior to the analysis of the protection of human health and the environment. Incentive-based contracting places too many constraints and excessive pressure on the Department, its contractors, and regulators to make near-term decisions that may not be in the long-term best interests of the community or the federal government.

8. **Maximize the Use of Public and Private Disposal Site Options.** DOE needs to ensure that it is maximizing the use of ALL available options—including commercial disposal sites with federal disposal cells that took years to locate, develop, and open. Cells located at these sites can provide crucial capabilities to DOE that likely would be near-impossible to replicate today. Portions of these sites will ultimately become the federal government's responsibility, as DOE maintains liability for its waste after closure of commercial facilities, so it is in DOE's best interest to ensure these sites are used to aid the Department's cleanup mission for as long as possible, rather than risk premature closure due to underutilization.

9. **Create Tools to Show a Community the Impacts of Waste Decisions**. Providing the community with the real costs - annually - of storing waste, of on-site versus off-site disposal, and a realistic timeline for when work can be accomplished. Introducing this level of transparency is important to gain trust and to facilitate the understanding.

Conclusion—DOE Needs New Energy for Disposal Success

The communities hosting and adjacent to DOE's federal nuclear facilities look to DOE to ensure safe, effective, and equitable waste disposition as it carries out its mission, and obligation, to manage and dispose of the environmental legacy of nuclear weapons development and nuclear energy research. Without disposal, there can be no successful cleanup and, as this paper shows, without successful local, state and Tribal government and stakeholder engagement and support, there can be no successful disposition.

DOE has made substantial progress in dealing with some of the waste streams generated through cleanup, primarily LLW and TRU. However, the Department's momentum in addressing some of its most challenging waste appears to be lagging, and renewed energy and focus are now necessary to identify and implement final disposition strategies for all of the waste for which the Department is responsible. DOE also needs to take new actions with the local communities that host, or may potentially host, federal nuclear disposal facilities, along with state governments, Tribal nations, and other stakeholders to help rebuild relations and ensure they can be effective partners with DOE in building support for safe and effective disposal pathways.

Cleanup decisions will impact generations of people working and living in frontline communities. Ongoing dialogue with the community saves both time and money, but more importantly, cooperation helps ensure that effective long-term cleanup occurs.

Based on the experience and lessons learned over the last three decades, there are opportunities for DOE to streamline and accelerate cleanup by improving the engagement with local governments and communities; enhancing communications and transparency; and pursuing technologies and strategies that are more cost-effective, more technically sound, and that would reduce risk to workers, the public, and the environment by addressing challenges sooner. Risk-based decisions are inherently uncertain and must be made at the community level, as each site is different. The community must be provided the science, technology, tools, and resources to understand the human health and environmental risks, both in the near-term and long-term.

EM and NE have an opportunity to learn from each other's programs and to work together in an integrated fashion, where appropriate, to develop and implement a holistic approach to waste management and the consent-based siting process for nuclear waste storage and disposal facilities. There are lessons learned from both programs, especially in establishing transparent processes for siting, building, and maintaining stakeholder support, and reaching consent.

DOE's cleanup liability is one of the largest in the nation, and delay or lack of expediency could easily overwhelm available funding. It is DOE's responsibility to abide by its legal and moral obligations to achieve waste treatment and disposal safely and efficiently for long-term protection of the environment, workers, and public.

We should take advantage of the lessons learned and the years of DOE, states, Tribes, and local governments working together and resolving conflicts to engage the difficult waste disposal issues and create a path forward for the cleanup of DOE sites in communities that have long supported the nation's national security and nuclear energy missions.

Appendix 1:

Definitions and current disposal paths for DOE radioactive waste types

Waste Class	Definition	Current Disposition Path
High-Level Radioactive Waste (HLW)	(A) The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (B) Other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation. (Nuclear Waste Policy Act of 1982, as amended and the Atomic Energy Act (AEA) of 1954, as amended) Consistent with DOE's interpretation of the statutory definition of HLW, as explained in the Supplemental Notice (84 FR 26835; June 10, 2019), spent nuclear fuel reprocessing plant waste is not high-level radioactive waste if the waste: (a) does not exceed concentration limits for Class C low-level radioactive waste as set out in section 61.55 of title 10, Code of Federal Regulations, and meets the performance objectives of a disposal facility; or (b) does not require disposal in a deep geological repository and meets the performance objectives of a disposal facility as demonstrated through a performance assessment conducted in accordance with applicable requirements.	No Existing Path Forward until Congress and the Administration takes action Future federal deep geological repository and Interim storage facility
Transuranic Waste (TRU)	DOE defense waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for— (A) high-level radioactive waste; (B) waste that the Secretary of Energy has determined, with the concurrence of the Environmental Protection Agency Administrator, does not need the degree of isolation required by the disposal regulations; or (C) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with part 61 of title 10, Code of Federal Regulations. (Waste Isolation Pilot Plant [WIPP] Land Withdrawal Act, as amended)	WIPP (subject to current regulatory and not technical limitations)
Low-Level Radioactive Waste (LLW)	LLW (i) Is not high-level radioactive waste, spent nuclear fuel, or byproduct material (as defined in section 11e.(2) of the Atomic Energy Act of 1954 (42 USC 2014(e)(2))); and (ii) The Nuclear Regulatory Commission, consistent with existing law and in accordance with paragraph (A), classifies as low-level radioactive waste (Low-Level Radioactive Waste Policy Amendments Act of 1985)	DOE near-surface, onsite disposal, and offsite facilities or commercial facilities Communities call the LLW facilities "landfills"
Greater-than-Class C (GTCC) LLW	GTCC LLW *is LLW – this is very important to understand*. The Nuclear Regulatory Commission (NRC) Commissioners approved moving forward with issuing a new proposed rule that consolidates and integrates criteria for licensing the disposal of GTCC LLW and 10 Code of Federal Regulations (CFR) Part 61, "Low-Level Radioactive Waste Disposal," rulemaking activities, and provides for Agreement State licensing of those GTCC LLW waste streams that meet the regulatory requirements for near-surface disposal and do not present a hazard such that the NRC should retain disposal authority.	No Existing Path Forward until Congress takes action DOE is currently in the process of developing a disposal pathway for GTCC LLW

	LLW that has radionuclide concentrations exceeding the limits for Class C LLW established in Title 10, Section 61.55. (10 Code of Federal Regulations [CFR] 61.55) The Department of Energy also owns waste that is similar to GTCC LLW, "GTCC-like waste" for which there also is no disposal capability. Most of this waste is located/will be generated from cleanup activities at the West Valley Demonstration Project in New York.	
Spent Nuclear Fuel (SNF)	Spent nuclear fuel means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing. (Nuclear Waste Policy Act of 1982, as amended)	No Existing Path Forward Future federal deep geological repository