

Communities Seeking Solutions to the Spent Nuclear Fuel Crisis

Executive Summary

The nation's vision for addressing spent nuclear fuel produced by commercial reactors has failed. Requirements detailed in federal law enacted some 40-plus years ago remain unmet, among them the 1998 contractual deadline for the government to begin picking up spent fuel from reactors. Spent fuel can be safely stored at reactor sites for 100 years or more¹. But it can be stored even more effectively if moved to a few interim storage sites and, eventually, put into deep geologic repositories where it can be isolated from the biosphere, essentially forever.

Today, the US spent fuel management program suffers from a crisis of confidence due to a lack of urgency and the government's failure to comply with its own laws. This must change. The spent fuel challenge should not be left for the next generation to solve. Failure has not only eroded confidence in the government, but it is also expensive. Taxpayers have been left to pick up the tab—\$2m per day and \$9b+ total—to cover at-reactor storage costs that were not part of the original vision. Plus, the communities around nuclear plants in 34 states never consented to the long-term storage of spent fuel.

That's why, in 2023, a group of communities on the front lines of the spent fuel crisis got organized. Communities from California to Maine are represented by more than two dozen people (see appendix) with a shared interest in viable solutions to the spent fuel crisis. This document is a chairman's summary of the discussions; it does not opine on the wide array of elements that feed into legislation that ultimately might be hundreds of pages long. Rather, it focuses on six priorities that our deliberations have revealed as essential:

1. Congressional authorization to form a single-purpose, autonomous federal organization to assume management of the program from the US Department of Energy.
2. Reliable and adequate funding with early emphasis on federal consolidated interim storage (CIS).
3. Authorization for the US government to expand the application of federal title to and liability for spent fuel to include private interim storage.
4. Authorization for the prompt pursuit of multiple permanent geologic repositories in addition to Yucca Mountain.
5. More flexible linkage between CIS and permanent disposal.
6. Actively engage states, tribes, and local entities affected by transportation beyond the NWPA's scope by adding public information program and emergency preparedness, including modest funding where appropriate.

We call on Congress to act with urgency, starting with a public hearing at which communities on the front lines can have their voices heard. We also ask for these six priorities to be reflected in federal law in the current session of Congress and end this crisis.

Appendix

The challenge

The nation faces a slow-moving crisis with its spent fuel. It isn't a crisis of safety—essentially all the best analysis shows that the spent fuel is safely stored at reactor sites. Rather, it's a crisis fueled by a lack of urgency and commitment. For decades, the nation has neglected the need to address the stockpiles of fuel that has been used in commercial reactors. The federal government made a deal with the public that it would take and remove spent fuel. Due to shortcomings of the NWPA, no federal repository is available, and confidence is low.

Back in 1982, Congress passed the Nuclear Waste Policy Act (NWPA) based on the vision of building permanent repositories for disposing of spent commercial nuclear fuel deep below ground. In tandem it collected substantial funds—\$46b so far, including interest of \$1b+ per year—to pre-pay for disposal. This year marks the 25th anniversary of the date when the government was, per the original vision, required to start collecting that fuel from reactor sites. That vision has failed.

The US government largely has focused on one site: Yucca Mountain in Nevada. That site's capacity is currently limited by law to a quantity less than the nation's current inventory of spent fuel. Despite [\\$15b](#) in spending, Yucca Mountain remains unlicensed; some experts think it will never open. Meanwhile, other countries facing nearly identical needs have found ways to make substantial progress in siting permanent repositories—among them, Finland, Sweden, Switzerland, and Canada. Finland will open the world's first repository in the next year or so.

The failure to open a US repository has created strong pressure for interim solutions, such as moving spent fuel to “consolidated interim storage” (CIS) facilities—whether federal or privately owned—where it can await disposal. “Interim” is not ideal, but it's better than leaving all the fuel distributed at commercial reactor sites in 34 states. Although three private CIS facilities have advanced and two are fully licensed, all are stalled or dead for lack of clear pathways by which they could legally and politically open for business. A revitalized federal CIS program, described in law as “monitored retrieval,” is advancing thanks to \$27.5m from Congress. In time, some form of CIS facility might open. However, the road is long and filled with sociopolitical obstacles and the nation still has no credible legal and political strategy for solving this problem for which solutions were mandated by an act of Congress more than four decades ago. It is time—past time—to solve the problem.

Our working group

In the spring of 2023, a group of communities on the front lines of the spent fuel crisis got organized. Our communities, represented by 26 people including progressives and conservatives, community and industry representatives, who have a common interest in finding

solutions. Because our communities are dispersed over the American landscape, we did not know each other, and we could not speak with a common voice. This report is a summary of what we learned in the form of six principles for policy action—things that “must” be included in a federal strategy if it is to be successful. The report aims to help us find a common voice: it reflects our deliberations but, by design, is not anchored to consensus. We speak to Congress because we see no viable solutions that don’t involve appropriations and amendments to the NWPA or new legislation.

Principles for action and why they are important

Many other groups have devoted massive resources to studying this problem. In our deliberations we benefitted from looking at the 2012 report from the *Blue Ribbon Commission on America’s Nuclear Future* (BRC) co-chaired by US Representative Lee H. Hamilton and General Brent Scowcroft.² We also benefitted from the existing organized group of public service commissions, electric utilities, local governments and tribes that have been addressing this crisis: the Nuclear Waste Strategy Coalition.³ We have learned from the Spent Fuel Solutions coalition, a group of organized communities in southern California.⁴ We have learned from frontline communities in the vicinity of US Department of Energy activities.⁵ And we are encouraged by the formation of the bipartisan Spent Nuclear Fuel Solutions Caucus in Congress that, today, is co-chaired by Representatives Mike Levin (D-CA) and Chuck Fleischmann (R-TN).

We view these principles as interlocking. Each advances the common goal of making sure that diverse options for permanent repositories are advanced while a concrete program for interim storage is put into place quickly. Each of is important as outlined here:

1. Congressional authorization to form a single-purpose, autonomous federal organization to assume management of the program from the Department of Energy.

Current law places responsibility for the spent fuel program with the Office of Nuclear Energy in the Department of Energy. That office has performed well, but it has many other responsibilities and is led by a Presidential appointee. Long-term strategic solutions to the spent fuel crisis requires a singular focus on that mission and not blow in shifting federal political winds. While there are often calls for multi-year appropriations and novel offices needed to address long-term national problems, spent fuel is one that actually rises to the standard needed for a durable, long-term approach.

This new organization would be located outside the Department of Energy (and its Office of Nuclear Energy), dedicated solely to executing a high-level radioactive waste program and empowered with the autonomy, authority, and resources to succeed. It would need an initial appropriation to continue work on interim storage (see principle #2). More importantly, it must be empowered to access dedicated funds—ideally, the full \$46b in the Nuclear Waste Fund—sufficient to implement a comprehensive, integrated program. This access would reduce, possibly to zero, the need for annual appropriations from Congress yet still can preserve Congressional oversight.

The new organization would be responsible for the siting, design, and construction of CIS facilities and multiple deep geologic repositories for the permanent disposal of spent fuel. It also logically would assume responsibility for the “Standard Contract” between nuclear utilities and the federal government that also, at present, resides with the Department of Energy.

In time, we believe the Standard Contract could be revisited by the new organization. At present, that contract operates under the “oldest fuel first” (OFF) concept, albeit with latitude available to utilities to exchange acceptance rights and authority for the DOE to prioritize spent fuel from shutdown plant sites that no longer producing spent fuel. Taken literally, OFF would create a scattered and inefficient process of moving clusters of spent fuel from disparate sites all around the country. Plus, shutdown sites cannot be used for other purposes until the spent fuel is removed. The question of which fuel moves first is one that may benefit from community input—including from communities that never gave their consent to become permanent long-term storage sites. Clarity on how to prioritize acceptance among shutdown sites in order could ensure efficiency and instill confidence. For now, it’s more important to form a single-purpose organization and get the spent fuel program back on track.

2. Reliable and adequate funding with early emphasis on federal consolidated interim storage (CIS) facilities.

After more than a decade of inaction on siting one of the first concrete steps toward solutions has been the appropriation of funds by Congress in the Consolidated Appropriations Acts of 2021 and 2022 to the Department of Energy to help advance interim storage—referred to as “monitored retrieval” in federal law—using a consent-based approach. Some ask for a definition of consent or for framing in federal law. The organization running the Canadian spent fuel program defines consent as an “informed and willing” host community and consent was a central idea in the final BRC report. Conversely, Yucca Mountain was established as the site for the US repository by politicians, without the pursuit of consent.

So far federal appropriations has been used to support a variety of activities, including an initial \$26m funding opportunity to help local communities build capacity and spark conversations about the opportunities and risks in hosting interim storage facilities. Annual Congressional appropriations alone can’t fix the nuclear fuel crisis—that requires reliable funding spanning decades—but it can point the nation in the right direction.

Our front-line communities subscribe to the idea of informed consent, certainly for CIS facilities. There is no solution for moving spent fuel that is viable unless the communities at each major step along the way—the communities that host interim storage and also the communities where permanent repositories are located, if different—see value in their participation. It should be noted that not one of the current *de facto* long-term storage sites near commercial nuclear sites consented to indefinite on-site storage. Consent as defined by the host community is central. Indeed, every other nation that has advanced with its siting of nuclear fuel storage and disposal solutions has done so because it put consent at the center.

Eventually, there may be private sector solutions such as sites for consolidated interim storage. But the private sector, given all the uncertainty today about the future American strategy on spent nuclear fuel, is not positioned to invest in broad-based community consent. Hosting a spent fuel facility should help a community attain its vision for the future. It's up to the US government to make those investments for both private and federal storage.

3. Authorization for the US government to expand the application of federal title to and liability for spent fuel to include private interim storage.

Our communities have a strong interest in moving spent fuel to locations—interim and permanent—where communities have given their informed consent. As a practical matter, building repositories will take decades longer. Thus, CIS is essential in the near term. We don't know what blend of government and private sector CIS will ultimately offer the right solutions. We do know that optionality is important, and that means encouraging the private sector.

At present, private sector interim storage seems increasingly impractical without clearer rules for federal liability. Under the NWPA the federal government contemplated federal repositories and federal "monitored retrieval" and thus the only liability regime was one where liability passed from nuclear reactor owners to the federal government when the fuel left the plant site. After years of inaction by the federal government, private entities with experience designing and constructing interim storage facilities at reactor sites stepped forward to fill the gap. The same liability rules that apply to federal CIS facilities need to be aligned with a new reality that includes private interim storage. Specifically, the federal government should take liability (or share liability with operators of interim storage facilities) when spent fuel leaves a nuclear reactor even if it is headed to a private CIS facility. Failure to do so would shift hundreds of millions of dollars for transportation and related costs to utility customers. Absent this approach, uncertain liability will hamper—maybe kill—the private interim storage option.

4. Authorization for the prompt pursuit of multiple permanent geologic repositories in addition to Yucca Mountain.

The original vision under the NWPA was for multiple repositories—at least one in the west and one in the east. Then, the approach was cut back to just Yucca Mountain in Nevada, which has been in limbo for more than a decade and may never get back on track. Our communities don't have a view on the right geographical locations for repositories, but we do have a strong interest in prompt, diverse solutions as part of a vibrant repository program. All the eggs must no longer be in one basket. We are mindful that building multiple repositories is costly—especially when they fail, as may be the outcome at Yucca Mountain. Thus, the US might pursue multiple options in stages, narrowing a list as some options become more viable.

Pursuing multiple options is the approach being taken in Canada, where about two dozen communities began the process of selection—in effect, the communities were highly informed and competing for the right to host spent fuel and gain benefits such as jobs and

investment. Over time, that list was narrowed as the Canadian selection process advanced with a decision on an informed and willing host community set for 2024. For the US, a similar process might be followed—but it is vitally important that it not focus on a single community, not least because the US has much larger volumes of spent fuel to be stored and also probably more challenging political barriers to action. Diverse locations are essential, and likely more cost effective. Just as with interim storage, consent-based siting for repositories is essential. The federal agency must be empowered to negotiate with potential host communities in good faith and without undue burdens of budget, political influence, or reputation.

5. More flexible linkage between CIS and permanent disposal.

At present, the NWPA requires construction authorization on a permanent repository before breaking ground on a federal CIS facility. That may have made sense in theory when the NWPA was being written in the early '80s. Today, our communities favor more flexible linkage. CIS offers the best, near-term solution for removing spent fuel from communities that, in the spirit of environmental justice, never consented to the long-term storage of spent fuel. There must be credible advances for siting repositories (see above) to give host communities for CIS facilities that interim will not become permanent by default. But milestones in that process must not bind interim storage for what likely would be decades, because the two processes will advance with their own local political challenges and opportunities—at distinct pacing.

We should not create incentives to rush the siting of permanent repositories when the lessons from failures at Yucca and successes in Canada and Finland, and other places illustrate that effective long-term siting takes time. In fact, the siting, design, and construction of deep geologic repositories will take decades longer than for CIS facilities built at ground level.

6. Actively engage states, tribes, and local entities affected by transportation beyond the NWPA's scope by adding public information program and emergency preparedness, including modest funding where appropriate.

Moving spent nuclear fuel safely is not rocket science. A variety of railcar and other methods have been developed, tested, and used safely. The federal government has an extensive planning system in place to identify the capabilities of local infrastructures to move spent fuel—when that opportunity actually arises. In addition, there are well-established mechanisms for regional, state, and local coordination of first responders and planners needed to support shipments of spent fuel. And this whole system has been tested, extensively, with the numerous shipments of spent fuel from Naval reactors whose properties are similar to spent commercial nuclear fuel, as well as routine shipments of spent fuel from some commercial nuclear sites. (As will be the case with commercial nuclear fuel, most of the shipments actually occur on privately owned rail networks—the backbone of heavy freight transportation in the US.). In short, the system works safely. Sustained funding is vital.

What's needed is the continued, ongoing active engagement of states, tribes and local entities that may be affected by the transportation of spent fuel. Also important is the

identification of the type of equipment and funding that would be needed for these entities to respond to a potential transportation upset. All of this must be timed so that all the support and apparatus needed for spent fuel shipments is “ready” when fuel can be shipped.

Ancillary issues

The group’s discussions touched on related matters, namely the prospect of the US government revisiting the prospect of reprocessing (essentially, recycling) commercial spent fuel and next-generation small modular reactors. Both hold promise for reducing the volume of spent fuel that must be permanently disposed, although it is clear that the need for CIS and disposal facilities remain.

Working group participants

The following individuals participated in a working group session on 20 March 2023 to discuss the US spent fuel management program and related policy issues. Participants are united in the view that the amending federal law is a priority. Note: participants do not necessarily concur with the policy principles listed above.

Name	Affiliation
Alan Ahn	Senior Resident Fellow for Climate and Energy Program at Third Way think tank
William Almas	Diablo Canyon Decommissioning Engagement Panel
Doug Bauder	Vice President and Chief Nuclear Officer, Southern California Edison/SONGS
Manuel Camargo	Principal Manager, SCE/SONGS
Bob Capstick	Finance Officer for Nuclear Waste Strategy Coalition/Director of Government, Public & Regulatory Affairs for 3 Yankees
Terry Concannon	Chair, Connecticut Yankee Power Plant Spent Fuel Storage Advisory Committee
Supervisor Jim Desmond	San Diego County CA/Spent Fuel Solutions coalition Co-Chair/SONGS CEP
Pine duBois, Vice Chair	Pilgrim Nuclear Decommissioning Community Advisory Panel/Jones River Watershed Association
Supervisor Katrina Foley	Orange County CA/Spent Fuel Solutions coalition Co-Chair/SONGS CEP
Philip Hult	Generation Atomic
Tom Isaacs	Advisor to Southern California Edison and Spent Fuel Solutions coalition
Theresa Knickerbocker	Indian Point Community Advisory Board
Tony Leshinskie	Vermont Public Service (communities around Vermont Yankee)
Jessica Lovering	Co-Founder and Executive Director of Good Energy Collective
David Victor	Chair, Spent Fuel Solutions coalition Advisory Council/SONGS Community Engagement Panel/UC San Diego
Dan Stetson	Vice Chair, SONGS CEP/Nicholas Endowment
Kristal Jabara	Director of Community Affairs to Supervisor Desmond
Brad Jenkins	Vice President of Utility Operations for Portland General Electric/Trojan Nuclear Power Plant
Katrina McMurrian	Executive Director of Nuclear Waste Strategy Coalition/Commissioner Emeritus, Florida Public Service Commission
Bruce Montgomery	Nuclear Energy Institute

Name	Affiliation
Alyssa Napuri	Deputy Chief of Staff to Supervisor Katrina Foley, Orange County
Doug Ower	Former member of Zion Community Advisory Panel/Sierra Club
Amy Pressler	Edison International Federal Public Affairs
Pam Gorman Prochaska	Director of Nuclear Regulatory Policy & Strategy, Xcel Energy/Prairie Island Nuclear Generating Plant
Lorraine Sandstrom	Senior Specialist for Community Affairs, SCE/SONGS
Bruce Severance	Diablo Canyon Decommissioning Engagement Panel
Philippe Soenen	Pacific Gas & Electric/Diablo Canyon Power Plant
Pete Strickland	Connecticut Yankee Power Plant Spent Fuel Storage Advisory Committee
Heather Westra	Prairie Island Indian Community

Notes

¹ The service life of multipurpose canisters to store spent nuclear fuel was studied by the US Nuclear Regulatory Commission and is cited in the NRC's [generic environmental impact statement](#), NUREG-2157.

² In 2012, the BRC released a [final report](#) with eight strategic recommendations:

1. A new, consent-based approach to siting future nuclear waste management facilities
2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed
3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management
4. Prompt efforts to develop one or more geologic disposal facilities
5. Prompt efforts to develop one or more consolidated storage facilities
6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available
7. Support for continued US innovation in nuclear energy technology and for workforce development
8. Active US leadership in international efforts to address safety, waste management, non-proliferation, and security concerns

³ The [Nuclear Waste Strategy Coalition](#) was organized some time ago to represent the interests of member state-level officials, tribal governments, local governments, electric utilities, and other stakeholders.

⁴ In 2021, Southern California Edison (SCE) published a [Strategic Plan for the Relocation of SONGS Spent Nuclear Fuel to an Offsite Storage Facility or a Repository](#). SCE also partnered with local governments to form the [Spent Fuel Solutions](#) coalition.

⁵ In 2014, the Energy Communities Alliance (ECA) published [A Community Handbook on Nuclear Energy](#). ECA is an organization of local governments adjacent to or impacted by US Department of Energy activities.