



U.S. NUCLEAR INDUSTRY COUNCIL (USNIC)

USNIC Backend Working Group Policy Brief

Charting a Path Forward for U. S. Nuclear Waste Management

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Issue

Today, the Nation's nuclear waste management program stands at an impasse. As a result, there is no available disposal pathway for the Nation's growing inventory of both commercial and defense used nuclear fuel and high-level radioactive waste (HLW). Currently, used fuel and HLW from both commercial and defense activities remain in storage at 113 sites in 39 states. U.S. commercial used fuel inventory now approaches 90,000 metric tons at 56 operating reactor sites (with 95 operating reactors) and at 17 shutdown sites with no operating reactors.

It has been nearly 40 years since enactment of the Nuclear Waste Policy Act (NWPA); more than 20 years since the federal government failed to meet its statutory and contractual obligation to begin removing used fuel beginning January 31, 1998 from nuclear power reactor sites; nearly 12 years since the Yucca Mountain license application review process by the U.S. Nuclear Regulatory Commission (NRC) began; and more than 10 years since the repository program was defunded and the U.S. Department of Energy's (DOE's) Office of Civilian Radioactive Waste Management (OCRWM) dissolved.

The stalled U.S. nuclear waste management program is costing U.S. taxpayers billions of dollars due to damage payments associated with the federal government's partial default on its disposal contracts with nuclear power plant owners. At the end of fiscal year 2018 the government estimated its total projected contractual and court-ordered liability for used fuel storage costs to be \$36.5 billion, of which \$8 billion had already been paid. This liability increases approximately \$800 million each year of inaction. In addition to these mounting costs, failure to bring closure to the back end of the nuclear fuel cycle adversely impacts nuclear energy as a vital component for reliable, affordable and clean electricity – and energy independence, jobs, exports and competitiveness.

Why does this matter? There is a growing recognition that nuclear energy must play a key role in the country's clean energy future. However, for two years, after the U.S. Court of Appeals struck

down its Waste Confidence Rule in 2012, the U.S. Nuclear Regulatory Commission (NRC) placed a moratorium on new nuclear plant licenses and license renewals, explicitly underscoring the connection between continued nuclear power plant licensing and waste management. Moreover, fourteen states have restrictions on the construction of new nuclear energy facilities, in many cases due to the lack of an established disposal pathway for used fuel. Globally, the continued stalemate is damaging America's international standing on issues of nuclear safety, nonproliferation and security. While other nations are moving ahead with HLW management programs, the U.S. is standing still.

Concrete action by the U.S. Congress and the Executive Branch will be required to re-establish the basic foundational elements of a comprehensive program for used nuclear fuel and HLW storage, transportation, and disposal.

USNIC Backend Working Group Recommendations

The U. S. Nuclear Industry Council's Back End Working Group was established in 2012 to follow matters related to used fuel and HLW management and encourage actions to resolve the impasse over the Nation's nuclear waste management program.

It is clear that decisive, swift and tangible action is needed to re-establish a comprehensive program to address the federal government's statutory and contractual obligations for disposition of growing inventories of used nuclear fuel and HLW – as well as to provide a path forward for the back end of the fuel cycle for currently operating reactors and to pave the way for new nuclear energy plants required for U.S. energy independence, jobs, exports, made-in-America clean energy leadership and national security.

However, significant legislative action during the current Congress is very unlikely. Therefore, the U.S. Nuclear Industry Council's Back End Working Group believes that near-term efforts should focus on achievable and necessary measures that will inform the next Congress and Administration and help lay the groundwork for subsequent progress on used fuel. The American Nuclear Society outlined a set of such actions in its February 2020 Issue Brief "A Proposal for Progress on Nuclear Waste Management," summarized below. U.S. NIC endorses these actions, which could be accomplished without authorizing legislation and would not foreclose future policy options.

1. Reestablish the DOE Office of Civilian Radioactive Waste Management (OCRWM).
2. Develop up-to-date, risk-based, generic standards for siting and licensing a geologic repository in the United States.
3. Enhance U.S. used fuel and HLW transportation planning, outreach, and infrastructure development.
4. Mandate the DOE to identify the steps required to restart a repository program and estimate the associated timelines and costs.
5. Assess the ability of advanced reactors and alternate fuel cycles to address waste disposal challenges.
6. Continue research and development supporting long-term storage and subsequent transportation of used nuclear fuel.

7. Commission a National Academy of Sciences study of used nuclear fuel and HLW management case histories in the United States and around the world. Identify best practices for communicating effectively with the public about the real level of risk associated with used nuclear fuel and HLW.
8. Commission a Congressional Budget Office study on sustainable funding for used nuclear fuel and HLW management.

Actions of this type would be helpful but will not, by themselves, restore a credible federal program. For the longer term, the USNIC Back End Working Group believes that Congress and the Administration should address needed program reforms through the adoption of an omnibus approach that advances the repository program, develops supportive consolidated interim storage capabilities as needed, assures the availability of associated transportation infrastructure, and aligns organizational focus and resources behind the effort while looking to recycling and advanced reactor technologies that can optimize the fuel cycle.

Specific features of this multi-faceted approach include:

- ***Repository.*** As a cornerstone to any comprehensive program, the NRC environmental and safety review of the DOE Yucca Mountain license application must be completed, culminating in a final agency decision to authorize (or not) construction of the repository. This action should include immediate action to re-establish the dedicated DOE waste management organization (i.e., OCRWM) and re-engagement by the DOE in the NRC Yucca Mountain review. It is important to note that completing the licensing process does not constitute a commitment to construct and operate a repository at Yucca Mountain, Nevada, but it would inform policymakers about the health and safety impacts of the repository and address concerns raised by repository opponents. As part of the effort, the federal government should make concerted efforts to engage key stakeholders including local and state governments and Indian tribes in the vicinity of Yucca Mountain.

In 2015 a presidential decision was made to develop a separate repository for waste resulting from defense activities; that decision should be stayed pending a thorough evaluation of costs and benefits of a separate repository and evaluation of stakeholder input.

- ***Consolidated storage.*** While completing Yucca Mountain licensing, consolidated interim storage solutions should be pursued, with an emphasis on existing private-sector initiatives. Consolidated storage is not a substitute for a permanent geologic repository but it does offer potential advantages as part of an integrated used fuel management system. First priority for consolidated storage used fuel acceptance should be given to used fuel currently residing at sites with no operating reactor. Federal action related to consolidated storage should not preempt completion of licensing of the Yucca Mountain repository.
- ***Management and funding reform.*** Over the medium term, this action should include the establishment of a separate, politically independent but accountable federal corporation-type organization which is mission-based and structured to execute all necessary steps and activities to design, license, construct, operate and decommission nuclear used fuel and HLW

storage facilities and permanent repositories. In addition, the Nuclear Waste Fund¹ must be restructured so that access to both the fund's current balance and annual receipts are available for expenditure by the new entity, subject to appropriate congressional oversight.

- ***Transportation planning and execution.*** Short-term work should focus on assuring the availability of necessary infrastructure and capabilities (railcars, rail spurs/alternatives, etc.) to move used fuel and HLW. To the maximum extent practicable, the private sector should be utilized to implement these activities consistent with the current provisions of the NWPA.
- ***Research, development and demonstration.*** Continued work must enable development and deployment of advanced reactor and backend technologies that offer the promise of improved economics, enhanced safety, maximized utilization of energy resources and optimization of waste management. For example, the private sector deep horizontal borehole concept offers a disposal alternative that may be suitable for many waste forms. In addition, advanced reprocessing technologies in conjunction with advanced reactors utilizing a fast neutron spectrum offer potential waste management pathways that are currently unavailable.
- ***Engaging host communities.*** The development of facilities for management and disposal of used nuclear fuel and HLW represents a significant investment in nuclear infrastructure and provides a unique platform for economic development and future research, development and demonstration. As a committed partner in assuring the successful siting and operation of these facilities, the federal government should provide the necessary resources for impact assistance along with tailored incentives that support the long-term mission of nuclear waste storage and disposal sites and their value to the host community. Projects should facilitate beneficial engagement with individual members of the community, local enterprises, and affected units of local government.

While the nuclear waste management program has been stymied for years in the executive and legislative branches of government, it cannot and should not be allowed to remain so indefinitely. A viable used fuel and HLW program is necessary to meet the country's obligation to its citizens, particularly those living in the vicinity of nuclear power plants and defense facilities throughout America. Moreover, addressing the waste issue will help ensure the future availability of clean, reliable nuclear energy. Congressional leaders must continue to push for action in both appropriations and authorization bills that will get the country's nuclear waste storage and disposal program moving again.

¹ The Nuclear Waste Fund is the government's accounting of money paid by nuclear power plant operators for management and disposal of used fuel pursuant to the NWPA (i.e., nuclear waste fees), plus accumulated interest on the balance, minus expenditures.

Appendix

Nuclear Waste Management Program Background

The Nuclear Waste Policy Act of 1982 established a legislative, economic, and social framework for nuclear waste management in the United States. The focal point of the policy was establishing geologic repositories for used nuclear fuel and HLW disposal. In 1987 the Nuclear Waste Policy Amendments Act focused repository development solely on a site at Yucca Mountain, Nevada. In 2002 the Secretary of Energy recommended the site for repository development and both houses of Congress overrode the subsequent veto of that recommendation by the Nevada governor.

In 2008 DOE submitted an application for a repository construction authorization to the NRC. The NRC review was well advanced in March 2010 when the Obama Administration sought to withdraw the licensing application and terminate the Yucca Mountain Project. However, the NRC Atomic Safety and Licensing Board denied the DOE motion to withdraw – a decision that was subsequently upheld by a vote of the Nuclear Regulatory Commission. Also in 2010, DOE eliminated OCRWM, the statutorily-established office for carrying out its responsibilities to manage and dispose of used nuclear fuel and HLW.

In the same time frame, Secretary of Energy Chu announced the establishment of the Blue Ribbon Commission on America's Nuclear Future. After receiving recommendations from the Blue Ribbon Commission in 2012, a year later in January 2013, the DOE released a "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste". The Administration's strategy recommended a consent-based approach to siting and developing both pilot and larger-scale consolidated storage facilities² for used fuel to be available in 2021 and 2025, respectively. The strategy also called for the siting and development of a geologic repository other than Yucca Mountain for the disposal of used fuel and HLW with an operational date beginning in 2048. To date, no elements of this strategy have been implemented.

Following the release of its strategy in 2013, DOE undertook a review of the 1985 presidential decision to "co-mingle" defense and civilian waste. The department concluded that development of a separate mined repository for some DOE-managed HLW and used fuel and, potentially, deep borehole disposal of some smaller waste forms offered the potential for more rapid disposal than a single repository. In March 2015 former President Obama issued a memorandum to Secretary of Energy Moniz documenting the president's finding that "... the development of a repository for the disposal of high-level radioactive waste resulting from atomic energy defense

² Utilities are currently storing used fuel safely and securely at reactor sites using a combination of underwater storage in purpose-built pools and dry storage in robust shielded containers. Consolidated storage refers to collecting used fuel and storing it at one or a few locations, rather than scattered around the country at dozens of reactor sites.

activities only is required.”³ In December 2015 DOE solicited public input on how to implement “... a consent-based siting process to establish an integrated waste management system to transport, store, and dispose of commercial used nuclear fuel and high level defense radioactive waste.” In December 2016, DOE released its proposed framework for consent-based siting, but no implementing actions were undertaken.

During this time, the federal courts took three separate actions of importance relative to the federal used nuclear fuel and HLW management program.

1. In 2012, the U.S. Court of Appeals struck down the NRC’s revision of the Waste Confidence Rule, which codified NRC’s conclusion that used nuclear fuel storage and disposal facilities would be available when needed. The Court remanded the rule back to the NRC which responded by initiating a new rulemaking supported by a new generic environmental impact statement. The NRC also placed a moratorium on the issuance of new reactor and independent used fuel storage installation licenses and license renewals until the NRC completed action on the new rule. The NRC’s licensing moratorium on new nuclear plant licenses lasted over two years until the NRC implemented the new Continued Storage Rule which held that used fuel could be stored safely indefinitely on reactor sites or at one or more consolidated storage facilities. The new rule was challenged again in the U.S. Court of Appeals, but this time the court supported the NRC’s new rule and associated environmental impact statement.
2. The U.S. Court of Appeals issued in 2013 a writ of mandamus compelling the NRC to continue the Yucca Mountain license application review as long as there is available congressionally-appropriated funding.
3. Also in 2013, the U.S. Circuit Court ordered the DOE to reduce the nuclear waste fee⁴ to zero, unless and until either the DOE implements the NWPA and therefore continues with the Yucca Mountain Project, or Congress passes an alternative nuclear waste management program.

As a result of the Court’s writ of Mandamus, the NRC, using its prior remaining appropriated funding, issued a Safety Evaluation Report in early 2015 that found a Yucca Mountain geologic repository as designed and presented in the DOE license application was safe and met the NRC’s long-term performance standard for isolating the used fuel and HLW from the biosphere. In 2016 the NRC issued a supplement to the Yucca Mountain Environmental Impact Statement addressing impacts on ground water which found, similar to the Safety Evaluation Report, that any radiological doses from the ground water pathway would be small and well within regulatory limits.

³ The Obama memorandum reversed a 1985 finding by DOE and President Reagan that there was no need to develop a separate defense repository. The 2015 decision was made with no formal solicitation of stakeholder input and did not include a detailed cost/benefit analysis.

⁴ The nuclear waste fee was established by the NWPA and consisted of an ongoing levy on nuclear power reactor operators to cover the government’s costs associated with managing and disposing of used nuclear fuel. A fee of \$0.001 per net megawatt-electric of nuclear electricity was assessed until DOE reduced the fee to zero in 2014 in compliance with the court ruling.

Since DOE terminated its work on Yucca Mountain in 2010, Congress has taken no action to restore program funding. Through fiscal year 2019 the House repeatedly, by large bipartisan majorities, voted to provide funding to the NRC and DOE to complete the NRC Yucca Mountain licensing process. However, for fiscal year 2020 the House failed to include any funding for the continued licensing of Yucca Mountain as requested in the administration's DOE congressional budget request.

While the Senate has not voted to fund the Yucca Mountain project since 2010, the Senate Appropriations Committee has consistently supported provisions for consolidated storage, including consolidated storage at private-sector sites. In 2019, both the House and the Senate for the first time included funding for consolidated storage in appropriations measures, but no funding was included in final DOE FY2020 appropriations which were part of a December 2019 "mini-bus" appropriations measure. In summary, no funding for either Yucca Mountain or consolidated storage has been enacted since 2010.

Similarly, Congress has passed no substantive authorizing legislation related to used nuclear fuel and HLW management. Various bills have been introduced over the past decade but only two progressed out of committee. In the 115th Congress which began in 2017, H.R. 3053, the Nuclear Waste Policy Amendments Act, originally reported by the House Energy and Commerce Committee, was passed by the House of Representatives by a bipartisan vote of 340-72 on May 10, 2018. Sponsored by Rep. Shimkus, H.R. 3053 provisions included authorization for a consolidated interim storage program tied to the Yucca Mountain licensing process; limitations on activities connected to a separate defense waste repository; benefits for state, local and tribal governments hosting a repository or consolidated storage facility; land withdrawal for Yucca Mountain if the NRC issues a construction authorization for a repository there; revisions in the method with which the government collects the Nuclear Waste Fee and funds waste program activities; and a modified tenure for the OCRWM director. Following House passage, H.R. 3053 was referred to the Senate Environment and Public Works Committee. The Senate took no action on the bill prior to the end of the 115th Congress.

In the 116th Congress which began in 2019, the Energy and Commerce Committee favorably reported out H.R. 2699, sponsored by Reps McNerney and Shimkus and essentially same as H.R. 3053. The full House has taken no action on this legislation.

In the Senate, a number of authorization bills have been proposed on used nuclear fuel since 2010 but none have progressed out of committee. In April 2019, Senator Barrasso, chair of the Senate Environment and Public Works Committee, introduced a discussion draft of the Nuclear Waste Policy Amendments Act of 2019, closely patterned after H.R. 3053 and H.R. 2699. Later the same month, Senators Lisa Murkowski, Lamar Alexander, and Dianne Feinstein introduced S. 1234, the Nuclear Waste Administration Act of 2019 (NWAA). The NWAA is based on bills of the same title introduced in the 113th and 114th Congresses. The legislation is generally modelled after the recommendations of the Blue Ribbon Commission; it would establish a new federal agency to implement the nation's nuclear waste management program, institute funding reform providing that agency with increased access to money in the Nuclear Waste Fund, and authorize a consent-based siting process for both consolidated storage facilities and geologic

repository sites. It contains a controversial provision that bars access to consolidated storage for nuclear plant operators that do not settle their used fuel damage claims with the federal government. The NWAA is neutral on the ultimate fate of the proposed repository at Yucca Mountain but it establishes a goal of putting an alternative repository into operation by 2052.

On a different front, in March 2019 Nevada Senators Cortez-Masto and Rosen introduced S.649, the Nuclear Waste Informed Consent Act of 2019. The act would require the consent of the governor, affected local governments and impacted local tribes in order to spend money from the Nuclear Waste Fund for the construction of a nuclear waste repository. Similar legislation was introduced in the 115th Congress and did not progress legislatively.

The Trump Administration included funding to complete Yucca Mountain licensing in its FY2018, FY2019 and FY2020 budget requests but Congress took no action. In its FY2021 DOE Congressional Budget Request, the administration requested no money for Yucca Mountain licensing. During testimony on the administration's budget request, Secretary of Energy Brouillette stated, "We have reached a point where the President has decided that we will not pursue this over the objections of the people of Nevada. So I want to state clearly, for the record the Administration will not pursue Yucca Mountain as a final repository ... We will follow the law but it is our intent to look for alternatives to Yucca Mountain."

Given the extremely abbreviated congressional session before the November elections and other national priorities, the political and legislative stalemate over nuclear waste will almost certainly carry over into the next year, at a minimum.

In contrast to the United States situation, some overseas programs are making good progress on used fuel management. Finland obtained regulatory approval for a used nuclear fuel repository and is in the process of constructing the facility. Sweden is closing in on the governmental approvals needed for its repository. Other countries, notably Canada, Switzerland, and France, have HLW management programs that are active and well-advanced.

For further information contact Caleb Ward: caleb.ward@usnic.org | 202-270-1690

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The USNIC Backend Working Group is a project of the U.S. Nuclear Industry Council (www.usnic.org), the leading U.S. business consortium for new nuclear energy and promotion of the U.S. supply chain globally. The views above represent a consensus of the USNIC's Backend Working Group and the Council, but do not necessarily represent the specific views of individual member companies and organizations.