Lake H. Barrett-House Energy and Commerce Committee- April 10, 2024

American Nuclear Energy Expansion: Spent Fuel Policy and Innovation Hearing Testimony Summary

The United States nuclear spent fuel waste geologic disposal program is currently non-functional and incapable of appropriately supporting the nation's crucial clean, safe, dependable, secure, and environmentally protective nuclear energy programs for our society now and is burdening our grandchildren with unfulfilled legal and moral obligations and growing debt liability.

An integrated spent fuel management plan, which includes a meaningful geologic disposal component, is an immediate necessity.

The Nuclear Waste Policy Act (NWPA) implementation experience with Yucca Mountain was successful from a scientific, regulatory, and legislative perspective, but has been indefinitely halted politically by the objecting host state, Nevada. Creation of any nuclear spent fuel waste related facility in the United States will likely require a workable mutually acceptable host state relationship.

Due to the lack of DOE meeting is legal obligations, taxpayers are being automatically burdened (without congressional oversight or appropriations) with rapidly growing liability cost payouts that are now estimated at $51 billion and will likely again soon increase substantially. Thousands of temporary large spent fuel canisters, that the taxpayers have to pay for, are being built across the country being stranded on our seasides, lakes and rivers where they were never intended to be. Although temporarily safe, these serve no useful societal purpose other than compensating for federal inability to perform and are blocking the reuse of shutdown reactor sites.

Advanced nuclear technologies, such as new reprocessing approaches, may somewhat be able to assist in geologic disposal, but they are not a substitute for a geologic disposal facility.

Recommendations to consider for moving forward are:

- Developing a new independent dedicated waste management organization to implement this program outside of DOE that is held accountable and empowered.
    - Preferred is a partnership corporation construct where the ruling Board of Directors are composed of federal, industry, academic, and most importantly, host state appointees.
    - Ensure access to at least the interest from the Nuclear Waste Fund initially.
    - DOE should be directed to dialogue actively with all parties to help establish such a new entity within their consent based siting activities and prepare a flexible future transition plan.
    - The new organization should be directed to try to facilitate as many agreements as possible with the Department of Justice, utility contract holders, and waste management facility (storage or disposal) hosts that could reduce net future Judgement Fund taxpayer costs while providing benefits to hosts that could expedite spent fuel removal from reactor sites for eventual disposal.
- DOE should assist in the creation of the new organization and:
    - Start a consent based second repository siting program immediately working with Congressional support.
    - Restore the Office of Civilian Radioactive Waste Management to its proper role within the DOE, as clearly required in the NWPA to properly implement its lawful duties until it is transferred.
    - Prepare an adaptive flexible integrated waste management plan.
- Learn from the past to build for the future while maintaining bi-partisan unity.
    - A good method is to develop a contractual durable partnership agreements that empower host states and communities with shared authority and benefits that can be constructed for the benefit of all.

It is time for the federal government to step up, in a thoughtful forward looking bi-partisan manner, and take responsibility for decisions we made eight decades ago to produce nuclear fuel and four decades ago to develop a functional geologic repository system for the ultimate disposition of our spent nuclear fuel wastes.

Submitted Testimony From

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House Energy and Commerce Committee

Energy, Climate and Grid Security Change Subcommittee Hearing

American Nuclear Energy Expansion: Spent Fuel Policy and Innovation

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Chairman Duncan, Ranking Member DeGette, and distinguished members, it is an honor to testify before you today on the importance of moving our country forward with a functional, sustainable federal nuclear waste management program. We need a program that can support our Nation's necessary growth in nuclear energy. Nuclear energy that is clean, safe, dependable, secure, affordable, and environmentally protective for our society now and for our grandchildren in the future.

I speak to you today from the perspective of a former Department of Energy (DOE) civil service executive and independent person who has spent nearly six decades trying to implement the laws of the United States in this area and incorporate the best scientific capabilities to meet our nations' current and future critical clean energy needs in a safe environmentally protective manner. And more importantly, as a grandparent who does not want to unnecessarily burden our grandchildren with unfulfilled obligations and debts.

Much has been accomplished in many areas, such as recent advances in nuclear energy technologies. Sadly, however, our nation currently, and for the past 14 years, has no realistic program for the disposal of spent nuclear fuel from our critical commercial nuclear energy sector and high-level radioactive wastes (HLW) from the cleanup and operation of our national nuclear defense facilities.

Under the Nuclear Waste Policy Act of 1982 (NWPA), even with challenges, we made significant scientific, regulatory, and statutory progress, with the site designation of the Yucca Mountain geologic repository in 2002 (Public Law 107-200). The Nuclear Regulatory Commission (NRC) staff also approved the construction authorization request with their independent very comprehensive review. But starting in 2010, at the urging of the State of Nevada, the project has not received any funding and nothing meaningful toward geologic disposal has taken place since. Thus, without a federal disposal program, we are left with no alternative now except constantly building more spent fuel storage facilities spread across the country at our existing reactor sites. While these forced storage facilities are temporally safe, they were never planned to be permanent disposal or long term storage sites.

In my view, our Yucca Mountain experience, although often challenging, was a major scientific, regulatory, and legislative success following the processes stipulated in the NWPA and amendments. And on those aspects alone, Yucca Mountain would have been operational today solving our spent fuel and high level waste issues.

However, that is not what happened. The State of Nevada, due to a complex social political history with the federal government, continually strongly objected to the Yucca Mountain project and was politically skillful enough to be able to stop any funding through the federal appropriations process. This experience clearly shows that for spent fuel management success, science and technology is necessary, but insufficient in our societal democratic system. There must also be a workable social political relationship established between any host state with the federal government, or the federal government's agent, which is acceptable and sustainable for both sides.

The host state blocking spent fuel management facilities is not only a Yucca Mountain isolated situation. The State of Tennessee was successful in blocking the DOE proposed Monitored Retrievable Storage facility there in 1986. The State of Utah was successful in blocking the NRC licensed Private Fuel Storage interim storage in 2005, And currently, the States of Texas and New Mexico are blocking the development of NRC licensed (although those licenses are legally suspended now) interim storage sites in those states.

The Waste Isolation Pilot Plant for the geologic disposal of defense transuranic wastes in New Mexico was started at a much earlier time and did eventually have an acceptable outcome after years of challenges. It was successful only after a complex federal state statutory relationship was created that was satisfactory to both parties with considerable concessions empowering the state. Once consummated, it has functioned well.

In my view, the record is fairly clear that for the development of a significant federally purposed spent fuel waste facility, there is going to have to be an effective functional relationship with the host state in the United States.

Over the past 80 years of the nuclear age, we produced nuclear waste that will need permanent geologic disposal. In this nation we currently have over 92,000 tons of commercial spent nuclear fuel stored at 75 sites in 35 states. About 50,000 tons is in thousands of dry storage systems deployed at reactor sites because we have no functional national spent fuel management program to remove it for disposal. Importantly, there are 12,000 tons of stranded fuel at 21 permanently shut down reactor sites, preventing the reuse of those sites for other useful purposes. The inventory growth of spent nuclear fuel is about 2,000 tons every year, and that will increase if new reactors become operational. Our national inventory of nuclear waste destined for a repository also includes spent fuel from naval reactors, university research reactors and various special purpose materials that will likely never be candidates for recycling.

The Nuclear Waste Policy Act of 1982 required that reactor owners, by legal contract, pay the federal government a fee into a Nuclear Waste Fund in return for the federal government removing their spent fuel for safe disposal, with such removal starting in 1998. The current value of the Nuclear Waste Fund has increased to approximately $48 billion dollars; however, it is now only accessible via an exceedingly difficult appropriations process. It is basically not being used now because DOE has had no disposal program since 2010.

Due to institutional delays in developing any federal receiving facility, DOE could not meet its 1998 contractual obligations. Instead, for more than twenty years the American

taxpayers have paid damages for the additional at-reactor storage costs incurred by the utilities via the Department of Justice judgement fund. Payments from the Judgment Fund are automatic and exempt from Congressional oversight and the appropriations process.

So far, the American taxpayers have paid over $10 billion in claims and the projected future liability costs is currently estimated by DOE as $34-$41 billion. This current total liability estimate of $51 billion is based on DOE creating a new interim storage facility in about fourteen years, which in my view is extremely unlikely, based on current progress. Thus, taxpayer costs will likely soon rise to well in excess of the existing $51 billion estimate. In the past 5 years, the taxpayer liability has grown by an average of $2.5 billion per year which indicates a growing problem that is likely to accelerate. Such growth certainly indicates additional debt being passed on to our grandchildren that they will have to eventually pay for even though it is our generation that reaped the national security and electricity production benefits that created the waste burden. None of this is their responsibility; it is ours, and it is immoral to just hand it off to them.

The longer there is no realistic integrated spent fuel management program with a geologic disposal end point, these substantial taxpayer costs will just continue growing paying for the installation, security, and maintenance of thousands more temporary storage canisters that serve no long-term useful benefit to society.

The good news is that our nation is now seriously looking into developing advanced clean nuclear energy sources with the passage of recent forward-looking legislation. Some of these advances in the field of reprocessing and recycling of spent nuclear fuel can assist in converting spent fuel into easier to dispose of forms and with possible volume and toxicity reductions. But they cannot eliminate all high level nuclear wastes - there is still an absolute need for geologic disposal.

It is possible however, that these innovative technology facilities may also be an attractive component to a community interested in possibly volunteering to host an integrated advanced nuclear research facility combined with a waste management facility function. Thus, they could become a value in possible future hosting agreements for a mixed use facility.

The role of evolving advanced nuclear technologies, such as reprocessing and recycling, has a long history regarding spent nuclear fuel management, and geologic disposal programs. It seems that every generation evaluates this interface looking for easier answers.

In the late 1970s, the federal government performed an in-depth evaluation of pathways forward for spent fuel, including advanced reprocessing. A special Interagency Review Group was established that reported to the President and Congress that geologic disposal was the necessary endpoint. In 1996, The National Academies issued their ***Nuclear Wastes: Technologies for Separations and Transmutation*** report which also determined that advanced technologies would “not eliminate the need for a geologic repository.” In 2023, the National Academies again revisited this issue in their ***Merits and Viability of Different Nuclear Fuel Cycles and Technology Options and the Waste Aspects of Advanced Nuclear Reactors*** report where they also concluded

that “Advanced reactors and their associated fuel cycles would not eliminate the requirement for geologic repositories for some radioactive wastes, because even advanced reactors will require disposal of radioactive fission products.”

So, the record is very clear that advanced technologies such as next generation reprocessing and recycling may have a place in future fuel cycles, but do not alleviate the need for meaningful geologic disposal.

Regardless of future nuclear development or not, we need a responsible geologic disposal program in this country now for the wastes we have already generated over the past 80 years and for the material we will generate in the future.

While DOE is to be commended for preparing for the day they might be able to site an interim storage facility with their current Consent Based Siting effort, this effort is being hamstrung by the lack of any meaningful geologic disposal program. The Consent Based Siting process, a good approach (especially internationally where there are no state level governments), is engaging communities for a dialogue that everyone hopes will lead to a state level consent to host a federal Monitored Retrievable Storage facility. However, when DOE requested public input on the initiative, the most prevalent public and community response was a concern that so-called interim storage would be indefinite because DOE has no final permanent geologic disposal program. This obvious fact drastically reduces the social acceptability of hosting an interim storage facility.

Under the Nuclear Waste Policy Act, DOE is responsible for geologic disposal of its legacy spent fuel and other historical HLW. The remediation of the environmental consequences of our Nation's nuclear defense program will also require a successful DOE integrated waste management program including geologic disposal for defense waste currently stored at multiple DOE sites. In addition, DOE has specific spent fuel and waste legal obligations, such as the 1995 Settlement Agreement with the State of Idaho, which are especially important to all parties.

For advanced nuclear energy to play a significant future clean energy role in this country, we must have the trust and confidence of the public that we are environmentally responsible in our actions. Some concerned members of the public fairly ask where will the spent fuel or radioactive wastes from recycling from new reactors go if new reactors are built? Currently, based on stranded spent nuclear fuel building up at all existing reactor sites, our answer to this simple question now is wanting.

The NWPA Section 302 (b) requires the Nuclear Regulatory Commission (NRC) to confirm in their licensing process that spent fuel wastes generated under the reactor operating license will be properly disposed of by the DOE by confirming the existence of a waste disposal contract between the reactor licensee and DOE. Thus, for any new advanced reactors to be able to successfully operate and produce needed clean energy, there will have to be such contracts legally consummated before reactor startup. I expect that for any responsible DOE, or alternative federal official to be able to sign such a new disposal contract there will have to be in existence an underlying realistic geologic disposal program that will actually be able to perform this essential

function when needed. NRC licensing proceedings are rigorous where parties must demonstrate that they can perform their duties and commitments. For geologic disposal, this will be challenging when there is no functional geologic disposal program now and for the past 14 years. The Yucca Mountain project was to have been that foundation, but DOE is not pursuing that as Secretary Granholm clearly stated in a recent Senate 2025 budget hearing when questioned by Nevada Senator Rosen. In my view, operating new advanced reactors are vitally needed and DOE needs to take immediate action to have a sufficient credible foundational geologic disposal program to support that.

The United States has traditionally been an international leader in nuclear technology and its appropriate safe, secure, and environmentally protective utilization globally. Today this international market is extraordinarily complex and competitive. Potential international customers look at supplier countries' total infrastructure and experiences, including the back end of the fuel cycle. Some of our competitors offer complete fuel cycle proposals which can make it more challenging for our initiatives to be successful in comparison. Reestablishing a workable domestic final disposal program should assist us in this important global nuclear area.

We are currently at a crossroads concerning our clean energy future and the value that existing and future nuclear energy facilities can provide. This Committee plays an important leadership role in deciding our future national direction. As a part of that process, I recommend that you consider the lessons from the successes and failures of the past 50 years of spent nuclear fuel management and include enabling direction for a responsible, realistic, durable, integrated spent fuel management program that incorporates advanced technologies, but more importantly addresses the social/political challenges of creating a workable geologic disposal facility in our United States of America style democracy.

I firmly believe that by learning from the past, and preparing for the future, we can overcome current blockages and successfully implement an integrated adaptive flexible spent fuel management program in a socially and politically acceptable manner that can support our future clean nuclear energy needs while meeting our legal and moral responsibilities to future generations.

Responsible federal management of spent fuel is a complex relationship of science, engineering, safety, far future environmental protection, finance, and importantly social/political acceptance as embodied in the Nuclear Waste Policy Act of 1982. Much can be said about the pros and cons of the NWPA and its amendments since then, but its intention to do the right thing was clear: responsible safe disposal of nuclear wastes for the societal good. For example, NWPA Section 111. (a)(3) states: "Federal efforts during the past 30 years to devise a permanent solution to the problems of nuclear waste have not been adequate." And that was written 42 years ago. Additionally, Section 111. (a) (6) states: "State and public participation in the planning and development of repositories is essential in order to promote public confidence in the safety of disposal of such waste and spent fuel." Although old, these are still today

good foundation points that we should keep in mind as we continue to face this challenge..

I, and my many DOE colleagues, did the best we could under the legal and policy constraints that we had to work within. I am proud of the scientific and technical progress that we achieved. However, I always wished we could have had increased flexibility to work more effectively with the State of Nevada.

Since leaving government service, many good suggestions for Legislative improvements, such as those recommended by the Blue Ribbon Commission on America's Nuclear Future, have been made available. Also, many positive bipartisan additions have been debated here in Congress as well for moving forward in this important area.

These include moving this important program out of DOE into a special purpose independent organization that is held accountable and empowered to not only continue world class science, but to be able to more effectively obtain and maintain public trust and confidence. Such an organization should be better able to accommodate social and political concerns through a variety of mechanisms, such as meaningful partnerships with host states and communities for the greater good of all.

One fact is crystal clear – a viable spent nuclear fuel and HLW management program must have a viable geologic disposal component, which the U.S. has not had for nearly a decade and a half. We watch with envy as geologic disposal programs in Finland, Sweden, Switzerland, France, and Canada make great progress, but currently we are going nowhere.

In 2008 DOE reported to Congress that a second repository would not be needed because Yucca Mountain, with an increase in the statutory limit on waste disposal there, could handle all U.S. waste for the foreseeable future. It was a valid finding then, but political circumstances have changed dramatically, and it is now clear the country cannot rely on that outcome. Therefore, DOE should propose to reinitiate a second repository program and Congress should support them consistent with the letter and spirit of the Nuclear Waste Policy Act as it was passed in 1982. As an important enabling factor, Congress should direct and fund the Environmental Protection Agency to promulgate modern, transparent, generic public health and safety standards for geologic repositories in the U.S., as the American Nuclear Society recommended in a special report I helped produce last year.

Based on my experiences, here are some suggested principles for the Committee to consider for moving forward.

- Continue bi-partisan unity that focuses on the real facts and works toward consensus improvements to meet our national spent fuel management responsibilities and needs.

- Learn from the past to build for the future.

    - Recognize the fact that host states in our democracy do have the power to block federal agency progress and that a sustainable mutually supportable

state level relationship must be established. A good method is to develop a contractual durable partnership agreement that empowers hosts with shared authority that can be constructed for the benefit of all.
    - Build upon the progress and lessons from the past while preserving as many options as possible, and
    - incorporating good historical recommendations like those from the Blue Ribbon Commission on America's Nuclear Future

- A new independent dedicated waste management organization should be created to implement this program that is held accountable and empowered.

    - A good approach is a federal corporation which would have a federal-state partnership construct where the ruling Board of Directors are composed of federal, industry, academic, and most importantly host state appointees serving fixed terms to assure fairness and continuity of operations.
    - Ensure access to at least the interest from the Nuclear Waste Fund initially.
    - The organization would be required to have a stable leadership structure that has the necessary safety culture that is a requirement for obtaining and holding a Nuclear Regulatory Commission license.
    - The organization would have to have a caring culture to be a good neighbor with the surrounding communities and host state to assist them in whatever areas they care about, e.g., openness, transparency, participation opportunities, safety understanding, economic development, and infrastructure enhancements in education, healthcare, public safety, transportation, culture, and environment.
    - DOE should be directed to work actively with all parties to help establish such a new entity within their consent based siting activities and prepare a future transition plan.
    - The new organization should be directed to try to facilitate as many agreements as possible with the Department of Justice and utility contract holders, and waste management facility (storage or disposal) hosts that could reduce net future Judgement Fund taxpayer costs while providing benefits to hosts that could expedite spent fuel removal from reactor sites for disposal.

- DOE should expand and continue important long term work and not wait for the creation of the new organization. Specifically, DOE should:

    - Start a socially sensitive consent based second repository siting program immediately working with Congressional support.
    - Restore the Office of Civilian Radioactive Waste Management to its proper role within the DOE, as clearly stated in the NWPA, to be able to properly implement its lawful duties.
    - Continue and expedite ongoing interim storage facility consent based siting and development. Keep priority for shutdown reactors.

- Prepare an adaptive flexible integrated overall waste management strategy plan that outlines specific actions DOE can take toward spent fuel receipt for disposal with costs and schedule options for various possible interim storage and geologic disposal siting developments including the nature and timing of necessary legislative actions.
- Continue spent fuel transportation readiness preparation,
- Continue and expand spent fuel safety confirmation R&D work.
- Prepare for eventual accommodation of advanced nuclear technologies.

On June 13, 2019, I testified before this Committee regarding nuclear waste bills that were then under consideration. Although that was nearly 5 years ago, our situation has not changed much except our challenges have grown further due to inaction by DOE and lack of clear Congressional direction as none of those bills ever became law. However, most of my recommendations then are still applicable today, and are referenced for your information.

Speaking as a grandparent, as well as an engineer, it is simply irresponsible to continually saddle our children, grandchildren, and future generations with spent nuclear fuel sitting in thousands of canisters in dozens of temporary storage locations scattered across the country with no place to go, while the financial liabilities grow and grow. It is time to act to remove spent fuel from the coasts of Maine to the coasts of California and from our Great Lakes and river systems in between. It is time for the federal government to step up, in a thoughtful forward looking bi-partisan manner, and take responsibility for decisions we made eight decades ago to produce nuclear fuel and four decades ago to develop a functional geologic repository system for the ultimate disposition of our spent nuclear fuel.

Thank you.