

**OPTIONS FOR THE INTERIM AND LONG-TERM
STORAGE OF NUCLEAR WASTE AND S. 1234,
THE NUCLEAR WASTE ADMINISTRATION ACT**

HEARING
BEFORE THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
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OPTIONS FOR THE INTERIM AND LONG-TERM STORAGE OF NUCLEAR WASTE AND S. 1234, THE NUCLEAR WASTE ADMINISTRATION ACT

THURSDAY, JUNE 27, 2019

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The Committee met, pursuant to notice, at 10:07 a.m. in Room SD-366, Dirksen Senate Office Building, Hon. Lisa Murkowski, Chairman of the Committee, presiding.

OPENING STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

The CHAIRMAN. Good morning, everyone. The Committee will come to order.

We are meeting to examine an issue that effectively we have been at a stalemate for quite some time—what we should do with the used nuclear fuel that is accumulating at our nation’s nuclear reactors.

As a starting point, I think we should recognize that nuclear energy is an important part of our country’s electric generation mix. I believe it is a vital part of our mix. The large reactors that dot the landscape provide reliable, emissions-free power to communities across our country. Our nation’s nuclear industry is critically important but it also faces a number of challenges, and one that has impacted it since the first reactors began operation is nuclear waste disposition.

Beginning with the passage of the Nuclear Waste Policy Act in 1982, Congress has attempted several times to address the back end of the fuel cycle. In an effort to resolve an earlier stalemate, the Federal Government was supposed to begin taking title to used fuel and moving it to a repository at Yucca Mountain in Nevada, beginning in 1998. The Federal Government’s failure to deliver on this promise is now costing taxpayers up to \$2 million per day.

This hearing is an opportunity for us to consider our next steps on nuclear waste. Do we continue to delay in the face of stalemate over Yucca, or do we try to find another path forward for used fuel storage, especially for communities that are maintaining sites with only used fuel casks left on hand, with the rest of the plant decommissioned?

In 2010, then Secretary of Energy, Steven Chu, convened the Blue Ribbon Commission on America’s Nuclear Future to conduct a comprehensive review of policies for managing the back end of

the fuel cycle. The Commission's report included a number of recommendations and led to the introduction of the Nuclear Waste Administration Act. Over the years, this legislation has been led by a number of members, including Senators Wyden and Alexander, both on this Committee. I have been a sponsor of the legislation all along with Senators Alexander and Feinstein, my partners on the Energy and Water Appropriations Subcommittee, for multiple Congresses, now.

We have been at this for a while, and I think it is probably fair to say we would like to put something behind us at some point in time here sooner rather than later. Our legislation aims to move the process forward so that we can finally move used fuel to a permanent repository. Our bill creates a Nuclear Waste Administration to oversee consent-based siting for interim storage and an additional repository that could be located in states and communities that want it. Our bill also prioritizes the removal of orphaned used fuel at decommissioned reactor sites for temporary storage at consolidated sites.

Our bill is S. 1234. I wish it was as easy as one, two, three, four. We know it requires some updates and that there are a number of ideas to improve specific sections, so I welcome those. I look forward to the testimony from our distinguished panel this morning, but I would also welcome thoughts and comments from others.

Ultimately, I hope we can all agree that it is long, long, past time to figure this out and the sooner we find a path forward, the better. It has been six years now since I and others cosponsored this legislation. We are in the same place. We are effectively in the same place when it comes to the back end of the fuel cycle as when we introduced that legislation six years ago. But in that time we have seen tremendous progress in the area of nuclear with our advanced nuclear reactors. The United States has the ability to lead the world on some of these technologies, but without a solution on nuclear waste, I believe that we are less likely to realize our full potential there. We are here today to start, or perhaps we need to say restart, the conversation.

I know that Chairman Barrasso has a bill on nuclear waste in his EPW Committee. He is keen to move forward on it. I am glad to see that we have some renewed interest across Congress to address the challenge.

It is a good thing that we have multiple options on the table. I think this is a positive development, and I sincerely hope that we can move forward on nuclear waste after decades of inaction.

With that, I turn to my Ranking Member and friend, Senator Manchin.

**STATEMENT OF HON. JOE MANCHIN III,
U.S. SENATOR FROM WEST VIRGINIA**

Senator MANCHIN. Chair Murkowski, thank you for having a hearing on the Nuclear Waste Administration Act, and I want to thank all of our witnesses for being here today who will provide us with ideas of how to move forward and break our nuclear repository impasse.

Nuclear energy will continue to be an important part of our nation's energy mix. It is reliable, especially in adverse weather. The

fact is, it is the nation's largest zero emission power source which means that it is a powerful tool in our fight to mitigate climate change and move toward a zero emissions economy.

We will continue to rely on nuclear, thus we must work on a solution to dispose of nuclear waste. I believe this bill provides a solid foundation to work from which originated with the bipartisan Blue Ribbon Commission on America's nuclear future.

But I think there is an agreement among us that changes must be made to the current text before moving forward. Providing an equitable policy path forward for site selection is something that I support as the inequity in the site selection is a large part of the current impasse.

Since the National Academy of Sciences 1957 report recommending deep geologic disposal for highly radioactive waste, it is clear what we need to do with the nuclear waste. The prudent and responsible thing to do is to bury this waste deep in the earth to protect the environment and public for generations to come. Unfortunately, the path to achieve this is not entirely clear.

I look forward to hearing from our panel today and from my colleagues, many of whom represent constituencies that deal with nuclear waste on a day-to-day basis.

In particular, I want to thank Chairman Murkowski and Senator Cortez Masto for their ongoing leadership on this issue. If we have learned anything in the past 30 years, it is that social and political concerns need to be taken into account to site and construct a repository. That is not to say that technical considerations are not important, but I trust the highly skilled individuals at the national labs and their partners to solve issues that we will face in constructing storage solutions at whatever site or sites that are selected.

What Congress should focus on are the mechanisms that can drive buy-in from communities. Other countries in the world have success by creating an organization that is separate from an agency or governing body but still regulated by the government to work with communities to build a repository in their respective backyards.

In 1987 Congress decided to not go with the original Nuclear Waste Policy Act language that directed the Department of Energy to characterize several sites and then make a recommendation. Instead, due to the price tag associated with the characterization of several sites, Congress instead legislated this site choice. This action politicized the site selection process while simultaneously discrediting the Federal Government.

It is my hope that following the markup of this bill, it will be equitable in how it considers all sites so when a site or sites are selected, we know it was a fair process and can move forward accordingly.

Let us not forget that there is urgency to this issue. Spent fuel pools such as reactors are at capacity and in need to mitigate carbon emission and ensures that reactors will continue to operate in this country for decades to come. On top of that, failing to act means that the Federal Government is racking up more liability to be paid to the utilities to store this waste in their own private storage facilities adjacent to the reactors.

So the taxpayer is on the hook here to the tune of about \$2 million a day with an estimated overall liability of \$34.1 billion. Like it or not, this means that we already have a de facto interim storage program in this country that is inefficient and lacks cost-effectiveness.

While we don't have any nuclear waste in West Virginia, nor do we have nuclear reactors, I am invested in working with my colleagues on this issue because preserving and growing nuclear power is key to addressing the climate crisis.

I want to share with you. The Chairman and I had an opportunity to spend some time with Bill Gates and he went through boom, boom, boom, country, by country, by country that has nuclear power, all going to zero in a time and era when we want to have zero emissions. Something has to be done, and we need to act urgently.

Once again, I would like to thank Chairman Murkowski for holding this hearing at the most appropriate time and I think much needed, not just for the United States of America, but for the world.

Thank you.

The CHAIRMAN. Thank you, Senator Manchin.

Let's turn now to our panel. We have a very distinguished panel, as I mentioned.

We are joined this morning by Maria Korsnick, who is the President and CEO of Nuclear Energy Institute, NEI. You have been before the Committee many times. We welcome you back.

Mr. Wayne Norton is the Chair for the Decommissioning Plant Coalition Steering Committee, also President and CEO of the Yankee Atomic Electric Company. We appreciate you being here this morning.

Steven Nesbit is the Chair of the American Nuclear Society, Nuclear Waste Policy Task Force. We thank you for your leadership with that important task force.

Geoffrey Fettus is the Senior Attorney at the Nuclear, Climate and Clean Energy Program for the Natural Resource Defense Council, NRDC. We welcome you to the Committee.

And Dr. John Wagner is with us from one of our national labs. He is the Associate Laboratory Director for Nuclear Science and Technology Directorate at the Idaho National Lab (INL). We appreciate your leadership in these spaces as well.

We will begin with you, Ms. Korsnick. If you can provide your comments to the Committee, we ask that you try to keep your comments to about five minutes. Your full statements will be included as part of the record. When the full panel has concluded, we will have an opportunity for questions. Thank you.

**STATEMENT OF MARIA KORSNICK, PRESIDENT AND CHIEF
EXECUTIVE OFFICER, NUCLEAR ENERGY INSTITUTE**

Ms. KORSNICK. Great, thank you very much.

I'm Maria Korsnick, President and CEO of the Nuclear Energy Institute.

Chairman Murkowski and Ranking Member Manchin, I greatly appreciate the opportunity to provide testimony of the Nuclear Waste Administration Act of 2019. NEI sincerely appreciates the

Committee's deliberate effort to develop an effective federal used fuel management program.

Since this bill was first introduced in 2013, several things have changed. Because of a court order, the Department of Energy has reduced the nuclear waste fee fund to zero. The Nuclear Regulatory Commission technical staff has also completed reviews of the Yucca Mountain licensing application concluding that Yucca Mountain complies with all regulation. Finally, private initiatives are now underway to develop consolidated storage facilities into states.

Nuclear energy is the largest and most efficient source of carbon-free electricity in the United States. Currently, 97 commercial nuclear power plants in 29 states provide nearly 20 percent of America's electricity and more than half of the emissions-free electricity. These reactors are carbon-free workhorses essential to addressing climate change in any realistic manner. That said, the advanced reactors of tomorrow in the U.S. operating fleet at large are continually subjected to reputational damage because Congress, for two decades now, has played politics with the issue of used fuel.

It's vitally important that the U.S. remain a global leader in the commercial nuclear arena, and yet we are the only major nuclear nation without a used fuel management program. The U.S. nuclear industry has upheld its end of the bargain at sites in 35 states around the country, commercial used fuel is safely stored and managed awaiting pick up by the Federal Government which was scheduled for 1998.

In addition, the nuclear waste fund, which was set up to finance the development of a national repository, currently has over \$41 billion in its coffers which has been contributed by electricity consumers and nuclear generation companies. Each year over \$1.5 billion more in interest accumulates in the fund. And finally, each day we don't have a solution, does cost taxpayers \$2.2 million in damages, the single largest liability paid out of the judgment fund year after year. It's really time to solve this, and I'm excited to talk about how that can be achieved.

We need a durable used fuel program. We must allow the science, not the politics, to guide us forward. But let me be clear, Congressional action is necessary and three important points must be addressed.

First, we need to answer on the Yucca Mountain license application. DOE submitted the application to the NRC more than a decade ago, and Congress directed the NRC to issue a decision in 2012. This deadline, like too many, was missed because DOE, without basis, shut down the Yucca Mountain project. For the sake of the communities holding stranded used fuel wishing to redevelop their sites, we must move forward and allow Nevada's concerns with Yucca Mountain to be heard by NRC's independent administrative judges. This will allow a licensing decision to be determined based on its scientific merits rather than politics.

Second, as a licensing process of Yucca Mountain moves forward, interim storage can play an important role in helping move spent fuel away from reactor sites. Moving interim storage in parallel with the Yucca Mountain project helps to alleviate state and local concerns that interim storage will become a de facto disposal facility. This point was highlighted recently in a letter by New Mexico

Governor, Lujan Grisham. That said, I'm pleased interim storage is addressed in S. 1234, the Nuclear Waste Administration Act. I strongly believe interim storage can be successful if moved in parallel with the Yucca Mountain licensing.

And finally, the nuclear industry and electricity consumers around the country have paid their fair share to address the back end of the fuel cycle. But S. 1234 was originally drafted prior to the court mandated prohibition on the fee, and I want to strongly convey the importance of not prematurely re-imposing the nuclear waste fee, especially given the substantial balance and large investment interest which accrues annually.

The industry believes that the fee should not be reinstated until (1) the annual expense for the program's ongoing projects exceed the annual investment and come on the fund, and (2) the projected life cycle cost demonstrates that the fee must be reinstated to achieve full cost recovery over the life of the program.

The fact that we are here today considering this legislation is a positive step in the right direction, and I sincerely appreciate the Committee's motivation to find a durable solution.

We look forward to continuing to work with each and every one of you to reach bipartisan consensus on the best approach for long-term management of the nation's used fuel.

Thank you, and I look forward to your questions.

[The prepared statement of Ms. Korsnick follows:]

Testimony for the Record

Nuclear Energy Institute

Maria Korsnick, President and Chief Executive Officer
 U.S. Senate Committee on Energy and Natural Resources
 June 27, 2019

I am Maria Korsnick, President and Chief Executive Officer of the Nuclear Energy Institute (NEI).¹ I appreciate the opportunity to provide testimony on the Nuclear Waste Administration Act of 2019 (S. 1234). On behalf of NEI and its members, I sincerely appreciate the Committee's deliberate effort to develop an effective federal used fuel management program. We look forward to continuing to work with lawmakers to reach bipartisan consensus on the best approach for a durable solution.

Since this bill was first introduced in 2013, several things have changed. Because of a court order, the U.S. Department of Energy (DOE) has reduced the Nuclear Waste Fund fee to zero. That notwithstanding, the Nuclear Waste Fund now has a balance of more than \$41 billion and each year more than \$1.5 billion in interest is added to the principal. The U.S. Nuclear Regulatory Commission (NRC) technical staff has also completed safety and environmental reviews of the Yucca Mountain license application, concluding that Yucca Mountain complies with all regulations. A final Yucca Mountain decision, however, awaits an extensive formal hearing, which requires further appropriations. Finally, private initiatives are now underway to develop consolidated storage facilities in two states.

These developments all put squarely before Congress the obvious and pressing need to revitalize the federal used nuclear fuel program, including providing direction to move the Yucca Mountain application forward and support private consolidated interim storage facilities. Used nuclear fuel is stored safely and securely at sites in 35 states. But onsite storage was intended to be temporary until the federal government meets its legal obligation to develop a permanent solution. Action by the federal government is long overdue. The failure of the federal government to implement the statutorily required used fuel management program has given the industry a black eye for far too long despite the fact that nuclear generation provides more than half of the nation's carbon-free electricity. Further, there are many advanced reactor designs being developed that can usefully be deployed in the U.S. in the near future to meet our clean energy needs. Burdening these promising technologies with the weight of a floundering federal used fuel management program unnecessarily and unreasonably limits the tools we have to combat climate change at a time when we need every carbon-free generation option available.

Utilities and their electricity customers have done their part, as their contributions have resulted in the \$41 billion balance in the Nuclear Waste Fund. In addition, taxpayers have been saddled with the consequences of the federal government's inaction as more than \$7 billion in damages has already been paid from the Judgment Fund and billions more in liability continue to mount the longer delay on the program continues. And let us not forget about the communities in 35

¹ NEI is responsible for establishing policy on issues affecting the commercial nuclear energy industry. NEI has about 300 members, including companies licensed to operate U.S. commercial nuclear power plants, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, materials licensees, labor organizations, universities, and other organizations involved in the nuclear energy sector.

states that host the facilities used to store used fuel. The citizens of those communities, and particularly those where there is no longer an operating plant, are an often-overlooked constituency with a significant stake in a fully functioning used fuel management program. Both they and the site owners are currently prevented from redeveloping the land on which these storage facilities sit. Congress owes it to these communities to ensure science—not political whims—determines the fate of Yucca Mountain.

The Importance of Nuclear Power to the United States

Nuclear energy is the largest and most efficient source of carbon-free electricity in the United States. Currently, 97 commercial nuclear power plants in 29 states provide nearly 20 percent of America's electricity and more than half of the emissions-free electricity. Because electricity generation from nuclear energy does not release carbon dioxide and other harmful air pollutants, by maintaining the domestic nuclear fleet, the United States will not have to choose between the health of its electric grid and the health of its citizens. Nuclear plants run 24 hours a day, 7 days a week, producing power with unmatched reliability, and have the added benefit of 18-24 months of fuel on site. Nuclear plants are hardened facilities that are protected from physical and cyber threats, helping to ensure we have a resilient electricity system in the face of potential disruptions.

Nuclear energy facilities are essential to the country's economy and the local communities in which they operate. The typical operating plant generates \$470 million each year in the sale of goods and services in the local community, and employs 700 to 1000 workers. Construction of a new nuclear plant provides approximately 3,500 jobs at peak periods. Collectively, the nuclear industry contributes about \$60 billion every year to the U.S. economy, by supporting over 475,000 jobs and producing over \$12 billion annually in federal and state tax revenues.

The Used Nuclear Fuel Stalemate

Unlike fossil fuel-fired power plants, which emit carbon dioxide and other air pollutants to the atmosphere, nuclear generation's primary byproduct is contained in the solid fuel it uses to produce electricity. After generating electricity for about five years, used nuclear fuel assemblies are removed from the reactor and safely stored initially in a concrete and steel fuel pool. When cool enough that the used fuel no longer needs to be stored underwater—a few years after removal from the reactor—it can be transferred and stored in dry casks, which are large steel-reinforced concrete containers. Over the past three decades, industry has safely loaded and placed into storage more than 3,000 of these containers. All the used fuel produced by the U.S. nuclear energy industry in more than 50 years of operation would, if stacked end to end, cover a football field to a height of approximately 10 yards.

Used nuclear fuel is stored safely and securely at reactor and storage sites around the country, but onsite storage was never intended to be permanent. The Nuclear Waste Policy Act of 1982 (NWPA) codified DOE's obligation to dispose of used fuel generated by U.S. commercial nuclear power plants and the reciprocal obligation of plants owners and operators to offset disposal costs by paying fees into the Nuclear Waste Fund. To cement these obligations, the NWPA required plant owners/operators to enter into the legally binding Standard Contract with

DOE. Pursuant to that contractual obligation, the owners and operators of nuclear plants—and the consumers of their electricity—have paid billions into the Nuclear Waste Fund. However, despite these massive investments, the federal government has fallen far short of meeting its end of the bargain as no tangible progress is being made toward developing a durable used fuel program.

In enacting the NWPA, Congress recognized that it was important to drive the government's action to complete the project by providing statutory deadlines by which significant milestones were to be met. Most prominently, Congress directed DOE to begin accepting used fuel by January 31, 1998. To help ensure this date was met, Congress amended the NWPA in 1987 to designate Yucca Mountain as the sole candidate for a repository. Despite this statutory deadline, by the mid-1990s, DOE made clear that it could not meet the 1998 deadline. Nonetheless, as statutorily required, DOE extensively evaluated the Yucca Mountain site before formally recommending moving forward with the repository in 2002. Congress again endorsed moving forward with Yucca Mountain and established a 90-day deadline for DOE to submit a construction authorization application to the NRC. Missing another deadline, DOE did not submit its application to the NRC until 2008, which triggered a 2012 deadline for the NRC to complete its review of the application. This was yet an additional deadline that was missed because in 2010, DOE—without basis—shut down the Yucca Mountain project in the middle of the NRC's application review and hearing process.

The failure to meet these deadlines—and the resulting harm to the industry, consumers, taxpayers, and local communities—has spurred literally dozens of lawsuits.² These lawsuits were necessary to protect the rights of generating companies and electricity consumers, and required the expenditure of countless resources that would have been better used elsewhere. Two of the more recent lawsuits are particularly relevant to the current used fuel stalemate.

First, the U.S. Court of Appeals for the D.C. Circuit in 2013 ordered DOE to reduce the Nuclear Waste Fund fee to zero until either the Yucca Mountain project is revived as required by the NWPA or Congress enacts an alternative plan.³ This decision squarely places the ball before Congress to fund the Yucca Mountain project or develop a comprehensive alternative disposal plan. In short, the court made clear that DOE would not be permitted to start assessing fees from electricity customers unless tangible progress is made on a repository.

Second, also in 2013, the D.C. Circuit ordered the NRC to complete safety and environmental reviews of the Yucca Mountain license application.⁴ Although these reviews by the NRC's technical staff have since concluded that Yucca Mountain complies with all regulations, a final

² See, e.g., *Texas v. United States*, 891 F.3d 553 (5th Cir. 2018); *Nat'l Ass'n of Regulatory Util. Comm'rs v. DOE*, 680 F.3d 819 (D.C. Cir. 2012); *Dairyland Power Coop. v. United States*, 645 F.3d 1363 (Fed. Cir. 2011); *Pacific Gas & Elec. Co. v. United States*, 536 F.3d 1282 (Fed. Cir. 2008); *Yankee Atomic Elec. Co. v. United States*, 536 F.3d 1268 (Fed. Cir. 2008); *Alabama Power Co. v. DOE*, 307 F.3d 1300 (11th Cir. 2002); *Roedler v. DOE*, 255 F.3d 1347 (Fed. Cir. 2001); *Northern States Power Co. v. United States*, 224 F.3d 1361 (Fed. Cir. 2000); *Maine Yankee Atomic Power Co. v. United States*, 225 F.3d 1336 (Fed. Cir. 2000); *Northern States Power Co. v. DOE*, 128 F.3d 754 (D.C. Cir. 1997); *Indiana Michigan Power Co. v. DOE*, 88 F.3d 1272 (D.C. Cir. 1996).

³ *Nat'l Ass'n of Regulatory Util. Comm'rs v. DOE*, 736 F.3d 517 (D.C. Cir. 2013).

⁴ *In re Aiken County*, 725 F.3d 255 (D.C. Cir. 2013).

decision awaits an extensive formal hearing in which Nevada and others opposing the project can present evidence and arguments challenging DOE's license application to NRC's independent administrative judges. But these hearings cannot proceed absent further congressional appropriations.

Actions to Address Used Fuel are Well Understood and Technologically Achievable

Used fuel is and can continue to be stored safely onsite or at consolidated interim storage facilities. Although most used fuel remains at the reactors that generated it, used fuel has been and will continue to be transported safely and securely. Ultimately, however, a permanent disposal solution is needed. The consensus within the scientific and technical community engaged in used fuel management is that safe geologic disposal is achievable with currently available technology.⁵ Yet the U.S. is the only major nuclear nation without a used fuel management program. To help the U.S. maintain its role as a leader in the nuclear arena, NEI urges Congress to implement the following critical steps, which will put the U.S. on the path toward a viable used fuel management solution:

1. Reach a Decision on Yucca Mountain: The NRC has yet to decide whether it will approve DOE's license application for the Yucca Mountain project. We support completing the Yucca Mountain license application proceeding. But to move forward, Congress must grant the NRC's and DOE's requests for funding to complete their duties. S.1234 could help move the Yucca Mountain licensing proceeding forward by establishing a deadline for the NRC to issue a final decision on the Yucca Mountain construction authorization application. The NRC missed the original deadline because of funding shortfalls and the absence of a cooperative applicant. A new deadline would add certainty and reinforce Congress's mandate to make meaningful progress. With adequate funding and a committed applicant, a 2- to 3-year deadline would be achievable and would give the NRC a reasonable timeframe in which to consider and rule on the challenges to the application raised by Nevada and other stakeholders.

2. Authorize Consolidated Interim Storage: NEI appreciates the leadership demonstrated by S.1234's establishment of a consolidated interim storage program. NEI supports the development of a consolidated interim storage program in willing host communities and states in parallel with completing the Yucca Mountain licensing proceeding. Moving the consolidated interim storage program forward in parallel with the Yucca Mountain project helps to alleviate state and local concerns that interim storage will become a *de facto* disposal facility and will distract from repository development. New Mexico Governor Lujan Grisham's June 7 letter to DOE Secretary Perry and NRC Chairman Svinicki identified this very concern.⁶ To address these concerns, NEI urges Congress to include language in the bill that would require moving forward with the Yucca Mountain licensing proceeding.

⁵ Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy § 4.3 (Jan. 2012).

⁶ Letter from New Mexico Governor Michelle Lujan Grisham, to DOE Secretary Rick Perry and NRC Chairman Kristine Svinicki at 1-2 (June 7, 2019) (claiming that "the absence of a permanent high-level radioactive waste repository creates even higher levels of risk and uncertainty around any proposed interim storage site" and that "given that there is currently no permanent repository for high-level waste in the United States, any interim storage facility will be an indefinite storage facility").

A consolidated interim storage program would enable DOE (or a new management organization) to move existing dry casks, which are already designed and licensed for transportation, from nuclear plant sites to a consolidated interim storage facility where they can be more efficiently managed until a permanent repository is built. Such a program would, over time, reduce the federal government's liability for not meeting its obligation to take title to used fuel, which in turn would reduce payments from the taxpayer-funded Judgment Fund. Efforts to protect taxpayers, however, should not come at the expense of electricity consumers and the owners and operators of nuclear plants. As such, the forced and legally questionable "settlement" provision in the bill should be removed. There is no basis for mandating that contract holders settle all claims for DOE's failure to meet its obligation as a condition precedent for taking title to and moving used fuel to a storage facility. That is, this provision would deny plant owners and operators of their legal right under the Standard Contract to have their fuel taken by the federal government unless they agreed to accept a settlement of *all* of their breach of contract claims. As a practical matter, a forced settlement is likely to be crafted with whatever terms the government wanted to impose. Where the Department of Justice sees fit to settle the breach of contract lawsuits, it must be on reasonable terms with willing contract holders.

The Committee should also update the bill to recognize that private applicants have already begun the licensing process and may have already completed that process by the time the bill becomes law. The bill should not impede the opportunity to move fuel in a timely manner to these private facilities when licensed. Furthermore, given the progress being made by private applicants for consolidated interim storage facilities, S.1234 should prioritize storage at such non-federal facilities unless there is a clear demonstration that it would be faster and less expensive to site, construct, and operate a federally-owned facility.

3. Reform the Nuclear Waste Fund and Fee Process: Because of contributions of the owners and operators of nuclear plants—and the consumers of their electricity—the Nuclear Waste Fund has a balance of more than \$41 billion and each year more than \$1.5 billion in interest is added to the principal. Historically, congressional budgeting practices have prevented the use of this fund for its intended purpose. Any legislation that becomes law must provide access to the Nuclear Waste Fund corpus.

NEI supports—and electricity customers deserve—granting access to the Nuclear Waste Fund for its intended purpose without reliance on the annual appropriations process. We appreciate that the sponsors of S.1234 recognize the challenge of accessing the Nuclear Waste Fund and would establish a Working Capital Fund, separate from the Nuclear Waste Fund, making any future fees readily accessible without reliance on congressional appropriations. This approach is a good first step, but more should be done to provide access to the Nuclear Waste Fund. The program can only succeed if it has resources to do so. Congress should authorize the use of the Nuclear Waste Fund in a manner that avoids the competition with other programs and uncertainty inherent in the appropriations process.

In addition, Congress should do more to protect electricity consumers from unnecessary new fees. It would be unfair to restart assessing fees until there is a showing, at a minimum, that (1) the annual expenses for the program's ongoing projects exceed the annual investment income on the Nuclear Waste Fund and (2) the projected life-cycle cost demonstrates that additional fees

are necessary to achieve full cost recovery over the life of the program.

4. Establish a New Management Organization: A key element to the long-term success of a federal program is establishing a new entity to assume program management responsibility from the DOE. NEI supports the establishment of a new management and disposal organization outside of DOE that is empowered with the authority and resources to succeed.

NEI greatly appreciates the efforts made by the sponsors of S.1234 to tackle this challenge. The bill would create a new agency, the Nuclear Waste Administration (NWA), which would be led by an Administrator and Deputy Administrator who are appointed by the President and confirmed by the Senate. It appears, however, that both the Administrator and Deputy Administrator can be removed without cause by the President. The bill would also establish a five-member Nuclear Waste Oversight Board, with its members also appointed by the President and confirmed by the Senate. Members of the Oversight Board, however, may not have a financial interest in any NWA contract holder despite their being important stakeholders in the process. The Oversight Board is also limited to making recommendations, which need not be accepted by the Administrator.

To achieve greater separation from political election cycles than has been the case with DOE's program, NEI suggests that the new management organization be structured as a governmental or quasi-governmental corporation rather than a federal agency. This would alleviate many of the political uncertainties associated with presidential appointments so that the organization can focus on performing the task at hand with the requisite attention to nuclear safety and security. Instead of a presidentially appointed Administrator, we suggest that the new organization have a chief executive officer hired by a board of directors. The board should be required to include directors from contract holders and public utility commissions, and should serve more than an advisory function. Numerous studies of the management issue carried out over the past decades consistently advocate for a management entity with a corporate structure to provide continuity, efficiency, and an appropriate degree of insulation from political influences.⁷

Used fuel is a Political Problem, Not a Technical One

As history has shown, the government inaction impeding completion of a durable and permanent solution for used nuclear fuel is caused by political, not technical obstacles. But with strong leadership, they can be overcome.

In charting a path forward, Congress should not allow the political will of one state to stymie progress on an important project that would benefit 35 other states and the nation as a whole. This is not to say that Nevada should have no say in this process or that Yucca Mountain should be constructed without a full and fair airing of the concerns raised by those opposing the project.

Nevada and other stakeholders with technical concerns should be given the opportunity to demonstrate their perspectives on whether Yucca Mountain should be granted a license to

⁷ See, e.g., Report of the Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Management Facilities: A Report to the Secretary of Energy (Dec. 1984); Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy § 7.2 (Jan. 2012).

receive fuel and operate as our nation's repository. There are approximately 300 contentions admitted in the NRC licensing hearing on Yucca Mountain. Should funding be restored and those proceedings restarted, Nevada and others who oppose the project can make their case to NRC's independent administrative judges and then appeal those rulings—allowing a licensing decision on Yucca Mountain to be determined based on its scientific and technical merits. Congress owes it to the communities in 35 states around the country where used fuel is currently being stored to ensure that science—not the political whims—determines the fate of the Yucca Mountain repository as required by law.

Establishing a new management organization more akin to a corporation than a federal agency could also improve relations with Nevada and local communities. As the Blue Ribbon Commission noted, “by signaling a clear break with the often troubled history of the U.S. waste management program [a new organization] can begin repairing the legacy of distrust left by decades of missed deadlines and failed commitments.”⁸ Thus, should the NRC deem Yucca Mountain safe and should the project move forward, a new management organization would be in a better position to work collaboratively with Nevada and other stakeholders.

Conclusion

On behalf of NEI and its members, I thank the bill's sponsors for reintroducing the Nuclear Waste Administration Act of 2019. The industry sincerely appreciates the Committee's deliberate effort to find a durable solution. We look forward to continuing to work with lawmakers to reach bipartisan consensus on the best approach for the long-term management of the nation's used fuel. We urge lawmakers to ensure that resulting legislation protects both electricity consumers and taxpayers.



⁸ Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy § 7.1 (Jan. 2012).

The CHAIRMAN. Thank you.
Mr. Norton, welcome.

**STATEMENT OF WAYNE NORTON, CHAIR, DECOMMISSIONING
PLANT COALITION STEERING COMMITTEE, AND PRESIDENT
& CEO, YANKEE ATOMIC ELECTRIC COMPANY**

Mr. NORTON. Good morning, Chairman Murkowski, Ranking Member Manchin and members of the Committee. My name is Wayne Norton. I'm the President and CEO of Yankee Atomic Electric Company with responsibility for Maine Yankee, Connecticut Yankee and Yankee Rowe nuclear facilities.

The three nuclear plants at my sites are fully decommissioned but for the storage facilities for the spent fuel and graded and Class C waste produced during our operating life.

Each company is undergoing litigation with the Department of Energy for monetary damages resulting from its partial breach of contract. To date, the courts have awarded my companies damages of approximately \$575 million, claims that now encompass virtually all cost for the management of our companies and the fuel storage facilities.

In addition, I serve as the Chair of the Decommissioning Plant Coalition (DPC) Steering Committee. And as such, I want to express our appreciation for this invitation to appear before you today on behalf of the Coalition and would ask that our full statement, excuse me, be read into the part of the record.

We are here today, in part, because the failure of the Federal Government to make good on its commitment is creating a spent fuel management burden across the increased number of states and localities. This delay in performance by the government has created a situation whereby communities across the nation are becoming the unanticipated home for interim storage of spent nuclear fuel.

In New England alone there are five sites in four states that are providing indefinite storage of this material, even though the electric ratepayers in that region have met their obligations and paid upward of \$3 billion into the nuclear waste fund.

Members of the Decommissioning Plant Coalition have adopted a formal position statement that emphasizes our support for an integrated nuclear waste program that provides for the timely and safe solution to removing this material from our sites. Many of these positions are captured in the recommendations of the Blue Ribbon Commission and in Senate 1234, the Nuclear Waste Administration Act.

I'd like to focus on two issues relative to the Blue Ribbon Commission recommendations and Senate 1234. One, consolidate interim storage, and two, funding reform.

As suggested by the Blue Ribbon Commission, Senate 1234 calls for a consolidated interim storage program as part of an active repository siting and licensing effort. Given that Congress has not funded the current repository program for almost a decade, given the current federal and state tension relative to the repository program and given the future funding constraints and mounting taxpayer liabilities, we at the DPC also believe the most effective and timely path to remedy the government's default lies with such a program.

We appreciate the fact that Senate 1234 does not prohibit the commencement of fuel movement to CIS facility prior to final action on the repository licensing application. Based on the most credible estimates for this licensing action, it seems clear that a consolidated interim storage facility license will likely be granted first and the explicit linkage between the two could unduly delay the anticipated title transfer and fuel acceptance, a key to reducing ongoing taxpayer liability.

Title IV of Senate 1234 is a clear effort to correct our major policy concern relative to the sufficient and reliable funding of the program. The establishment of a new working capital fund is clear movement in a direction that the DPC supports. However, it does not fully resolve the continued risk of annual appropriations and, perhaps more importantly, it leaves unresolved, the matter of \$40 billion already funded into the nuclear waste fund.

In conclusion, along with many of our other national organizations which you'll hear from today, the DPC has repeatedly called for the need for urgent action by Congress to establish an integrated national nuclear waste program.

Continued inaction is now costing American taxpayers, as you've heard today, approximately \$2.2 million a day and the ratepayers of New England and this nation deserve to see the tens of billions of dollars, already collected, used for its intended purpose.

Madam Chairman, Ranking Member Manchin and members of the Committee, the DPC deeply appreciates your interest in this issue. We are encouraged by your legislative initiative and the attention you have brought through the conduct of this hearing.

Thank you for the opportunity to testify today. I'd be glad to answer any questions.

[The prepared statement of Mr. Norton follows:]

Wayne Norton
Chair, Decommissioning Plant Coalition Steering Committee
President & CEO, Yankee Atomic Electric Company

Written Testimony to the United States Senate
 Committee on Energy and Natural Resources
 June 27, 2019

Introduction

Good Morning Chairman Murkowski, Ranking Member Manchin and Members of the Committee. I am Wayne Norton, the President and CEO of Yankee Atomic Electric Company with responsibilities for Maine Yankee Atomic Power Company, Connecticut Yankee Atomic Electric Company and Yankee Atomic Power Company -- three single asset companies with permanently shutdown nuclear power plants in New England¹. I am also the Chairman of the Decommissioning Plant Coalition (DPC) Steering Committee, and as such, I appreciate the invitation to appear before you today on behalf of the Coalition² and present our views on options for the interim and long-term storage of spent nuclear fuel and legislation before your Committee -- S. 1234, the Nuclear Waste Administration Act.

As the map attached to my testimony demonstrates, the failure of the federal government to make good on the promises encompassed within the Nuclear Waste Policy Act of 1982 (NWPA), and its 1987 amendments, is creating a spent fuel management burden across an increasing number of states and localities. While the spent nuclear fuel and greater-than-class-c waste (SNF/GTCC) at our sites is safely managed in compliance with rigorous NRC regulation and oversight, there is no doubt that the delay in the commencement of federal stewardship in 1998 has created a situation whereby communities across the Nation are the unanticipated home for interim storage sites, sites that cannot now be repurposed for other beneficial uses of value to the community.

In my home region of New England, there are now five sites in four states that are planning the unanticipated and indefinite storage of SNF/GTCC notwithstanding the fact that the electric ratepayers of New England have met their obligation under the

¹ Connecticut Yankee, Yankee Atomic, and Maine Yankee are fully decommissioned nuclear power plants storing spent nuclear fuel and Greater than Class C waste generated during plant operations at their Independent Spent Fuel Storage Installations. The annual cost to operate the three sites is approximately \$30 million. Each Company also has ongoing litigation with the U.S. Department of Energy in the U.S. Court of Federal Claims for monetary damages resulting from the DOE's failure to fulfill its obligations to remove the spent nuclear fuel and Greater than Class C waste from the former plant sites for the years 1998-2016. To date, through the recently completed Phase IV of our litigation, the court has awarded a total of \$575.5 million in damages.

² The Decommissioning Plant Coalition (DPC) was established in 2001 to ensure a coordinated focus on legislative and regulatory issues unique to what was then a relatively small number of plants. Permanently shutdown plants now represented by the DPC include: Connecticut Yankee (CT), Crystal River (FL), Duane Arnold (IA), Humboldt Bay (CA), Kewaunee (WI), LaCrosse (WI), Maine Yankee (ME), Pilgrim (MA), Rancho Seco (CA), San Onofre (CA), Vermont Yankee (VT), Yankee Rowe (MA), and Zion (IL).

Nuclear Waste Policy Act and paid upwards of \$3 billion into the Nuclear Waste Fund.

The taxpayers of New England and elsewhere throughout the United States have also been met with an unanticipated burden from this situation, with current payments of more than \$7.4 billion from the Judgment Fund for the government's partial breach of contract, a liability that DOE estimates could grow to more than \$35 billion – and that figure comes with the assumption that the agency will begin to accept this material for management in the first half of the next decade.³

In the case of the three Yankee plants I represent, the claim for damages now encompasses virtually all costs of our corporate existence, it having been determined by the U.S. Court of Federal Claims that were it not for this failure we would have been able to close the books and go entirely out of business, at all three companies, on or before 2010.

DPC Position Statement

At the beginning of the last Congress, members of the DPC adopted a formal position statement to guide our response to legislative proposals then developing in the Executive Branch and Congress. I've attached that position statement to my testimony and it will contain no surprises to Members who have followed this issue over the years. Simply put, for over a decade we have been advocating for an integrated nuclear waste program that provides the soonest possible solution to removing the SNF/GTCC from our sites and are pleased that many of the forward looking recommendations were captured in the recommendations of the Blue Ribbon Commission on America's Nuclear Future (BRC) and several of the legislative proposals put forward in the past and under consideration today.

Commentary on Selected Legislative Issues

Given that Congress has not funded the current repository program for almost a decade, the current adversarial federal/state relationship with regard to that program, future funding constraints, mounting taxpayer liabilities, and the desire of many communities to gain use of these sites for other purposes, we believe the likely fastest, most effective path to a remedy for the government's default lies with the initiation of a consolidated interim storage facility (CISF) program. Indeed, as suggested by the BRC, S. 1234 calls for the initiation of such a program as part of an active repository siting and licensing effort. Legislation passed by the House in the last Congress and again the subject of discussion also proposes the development of a storage component to the federal SNF/HLW management program, although more limited than contemplated in S. 1234.

³ Office of Inspector General, U.S. Department of Energy, Audit Report DOE-OIG-19-08, November 2018

A few general observations are in order.

As we read the provisions of Section 305 of S. 1234, they–

- ✓ call for the creation of a centralized storage program;
- ✓ direct the program be established by cooperative agreement with a non-Federal entity;
- ✓ stipulate that priority for storage be given to permanently shutdown units; and
- ✓ require the consent of the host State and local governments and affected Native American Tribes.

A key development since the release of the BRC report and the initial drafting of this section is the advanced state of two private applications now before the NRC for CISFs. The current NRC staff schedule calls for completion of both the safety and environmental issues addressed in the both applications by the late summer, early fall of next year. The advancements associated with the licensing of these facilities should be considered in authorizing legislation going forward to help ensure that there is no duplicative work and/or the second guessing of NRC licensing determinations relative to active CISF applications or license holders should they, as one would assume, respond to a future request for proposals (RFP) called for in S. 1234.

Other legislation modeled after the bill that passed the House last session raise a couple of other issues in its tailoring of current law provisions dealing with the once discarded concept of “monitored retrievable storage” (MRS). Those proposals, while authorizing the Secretary of Energy to immediately initiate work that could lead to the licensing and construction of a pilot MRS facility, prohibit the movement of any spent nuclear fuel to the site until a final determination has been made on the current Yucca Mountain license application or such a decision is determined imminent.

Given the most optimistic and realistic timeline we’ve heard for such to occur, it is clear to us that an MRS or CISF license will likely be granted well before then and this provision could long delay efforts to begin removing for storage the material now stored across the country at a number of our shutdown plants. We have also questioned whether subsequent volume restrictions on the amount of material that may be stored at such a facility, depending on various circumstances related to the repository program, are overly stringent and would wind up resulting in the government picking winners and losers among the shutdown plants.

We appreciate the argument that some form of formal linkage between a repository and storage program is necessary to ensure that any interim storage site does not become a *de facto* permanent site. We would simply note that as long as an interim storage program is consent based, the issue of linkage, if an issue with the

respective State or local government, will be raised in the context of those consent discussions without the need for a statutory requirement.

We also call attention to section 406 of S. 1234, which we read as requiring the settlement of all claims for the government's existing and ongoing breach of contract as a condition precedent for any agreement by the government to take title to and store SNF and HLW at a CIS facility. A number of companies, including my own, have discussed settlement with the government about its breach, but because of the government's uncompromising settlement conditions, have had to resort to continuing litigation that we continue to win and recover virtually all our damages claims. It would be unfortunate if the Congress were to empower the Executive Branch with the authority to provide a remedy to its breach, but on a "take it or leave it" basis.

We applaud the attention given to transportation planning in section 309 of S. 1234. One of the DPC policy provisions highlights the need for DOE to request and receive funding from Congress to reinvigorate the state and tribal regional planning effort called for by Section 180 of existing law. Such planning efforts, begun sooner rather than later, will be critical to the early initiation of a consolidated storage program.

We also suggest that DOE receive direction and funding from Congress to advance and complete assessments that began a few years ago to visit shutdown sites, conduct an inventory of infrastructure needs to actually move SNF and GTCC material from those sites and develop budget requests that would allow necessary work to begin for that eventuality. This work will be a necessary adjunct to the eventual movement of this material from all sites.

Our policy position regarding funding reform might touch on the most critical element of any legislative effort meant to bring renewed focus to the Nation's SNF/HLW management program. The best intentioned efforts to create a path forward for either or both a repository and a centralized interim storage program will likely be met with halting implementation at best unless the sponsoring agency is granted timely access to necessary resources. The unfortunate current reality that receipts into the Nuclear Waste Fund (NWF) are categorized as mandatory receipts and outflows to the program are treated as discretionary spending helped lead to constant underfunding of every annual program request since at least enactment of the 1987 NWPA Amendments. It is doubtful that any entity would have been successful in meeting statutory or even internal programmatic milestones as a result. Simply put, this situation needs to be rectified moving forward under any scenario.

As we read the provision Title IV of S. 1234 there is an effort to correct this problem going forward, through the establishment of a new Working Capital Fund made available to the Administrator immediately for implementation purposes, but it vests in Congress the right through annual legislation to limit what might otherwise be planned for and perhaps more importantly leaves behind approximately \$40

billion in the current NWF. In a similar vein, legislation modeled on last session's House bill attempts to address the issue moving forward by, in essence, creating a "user fee" type accounting of annual appropriations, but also leaves annual spending decisions to the Congress and to that extent raises issues as to access to the current balance of the NWF.

We appreciate the desire of Congress to provide useful oversight of this program through the appropriation process, but we would urge you to consider the proper balance between necessary oversight and the needs of any enterprise conducting an intergenerational program to have ready and sustainable access to necessary capital.

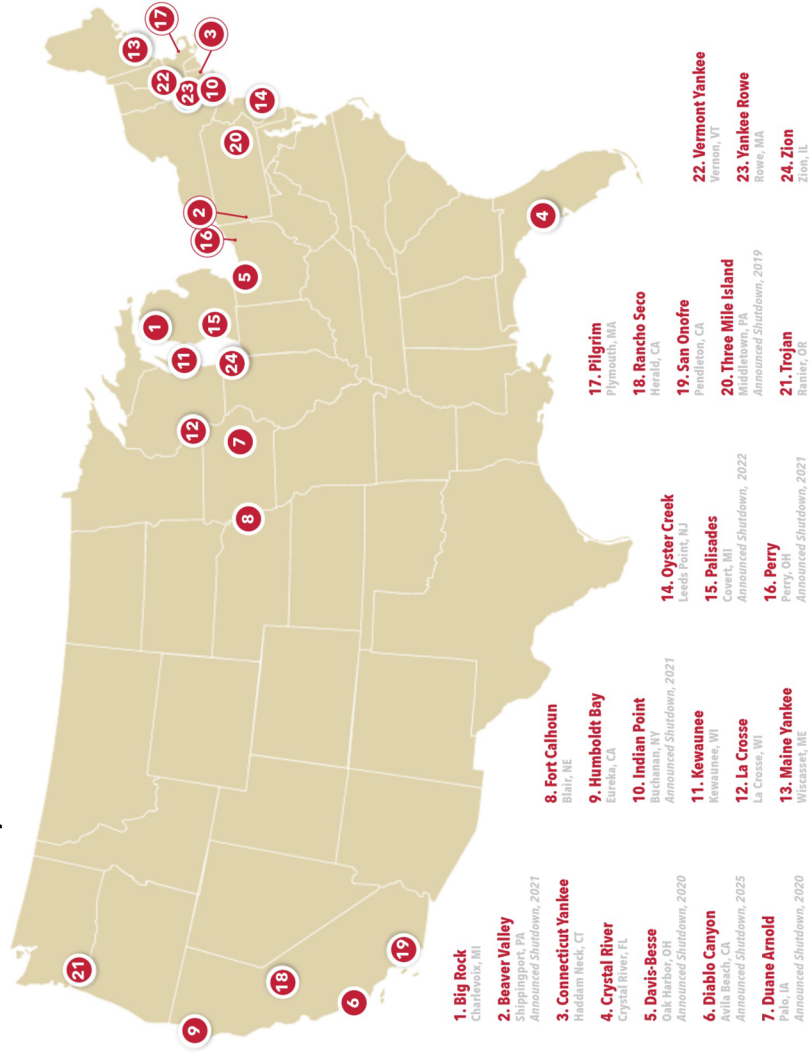
Along with many other national organizations, the DPC has repeatedly called out the need for urgent action by Congress to establish an integrated national nuclear waste program. Continued Congressional inaction is now costing American taxpayers \$2.2 million dollars a day and the ratepayers of New England and this nation deserve to see the tens of billions of dollars already collected from them used for their intended purpose.

Conclusion

Madam Chairman and ranking Member Manchin and Members of the Committee, the DPC deeply appreciates your interest in this issue, we are encouraged by your legislative initiative and the attention you have brought through the conduct of this hearing. We stand ready to work with you to enact meaningful reform to the Nation's spent fuel and high-level nuclear waste management program.

Thank you for the opportunity to testify today, and I will be glad to answer any questions.

Permanently & Announced Shutdown Nuclear Plant Sites



Position Statement
Decommissioning Plant Coalition
Spent Fuel Management Program

- The Administration and Congress should support funding sufficient to resume the Yucca Mountain licensing proceeding to allow for the adjudication of technical issues raised by the State of Nevada and other stakeholders.
- The Administration and Congress should immediately take the steps necessary to advance the development of one or more pilot projects (private or public) that would provide consolidated interim storage (CIS) for spent nuclear fuel (SNF) and Greater-Than-Class-C (GTCC) waste from sites where nuclear power generating activities have permanently ceased.
- The Department of Energy should complete its ongoing evaluation of the existing infrastructure at permanently shutdown plant sites and, in conjunction with those contract holders, develop and implement a planning process that will allow for the timely and orderly removal of the SNF and GTCC waste at each.
- The Department of Energy should fund regional transportation planning efforts envisioned by the Nuclear Waste Policy Act and begin the procurement of rolling stock, transportation casks and other support equipment necessary for the acceptance and transportation of SNF and GTCC waste from permanently shutdown plant sites.
- The Administration and the Congress should reform the federal budgetary treatment of the Nuclear Waste Fund (NWF) so that monies already collected, as well as interest and other receivables credited to the NWF, are available as needed for the Yucca Mountain adjudication and the timely implementation of the pilot CIS program.

The CHAIRMAN. Thank you, Mr. Norton.
Mr. Nesbit, welcome.

**STATEMENT OF STEVEN P. NESBIT, CHAIR, NUCLEAR WASTE
POLICY TASK FORCE, ON BEHALF OF THE AMERICAN NU-
CLEAR SOCIETY**

Mr. NESBIT. Thank you, Chairwoman Murkowski, Ranking Member Manchin and members of the Committee. I appreciate the opportunity to testify on behalf of the American Nuclear Society (ANS). ANS represents 10,000 men and women who work every day to provide clean energy, detect and cure cancer through nuclear medicine, develop systems to power deep space exploration and enable the many other beneficial applications of the atom.

We applaud the introduction of the Nuclear Waste Administration Act of 2019 as a serious effort to break the political log jam that prevents the effective management of nuclear waste in the U.S. To the detriment of the American people, the Federal Government is approaching a decade of inexcusable inaction in this critical area, an impending anniversary that should spur Congress and the Administration to action.

To be clear, used nuclear fuel is being stored safely today and poses no immediate danger to the public; however, the lack of progress on a geologic repository has clearly endangered nuclear power's potential to address our long-term energy and environmental objectives.

In particular, advanced reactor developers, men and women, who are earnestly striving to meet global demand for emissions-free, reliable energy are most impacted by the question, what about the waste?

I will turn now to discuss several key provisions of S. 1234 along with other governmental actions that we believe can begin addressing that very fundamental question.

We endorse the initiation of a search for a geologic repository site other than Yucca Mountain as required by Section 306 of the proposed legislation. Make no mistake about it, ANS strongly supports the timely completion of Yucca Mountain licensing; nevertheless, if Yucca Mountain doesn't become operational, our waste will have to go somewhere. Consolidated interim storage by itself is not the solution, and the country deserves a better understanding of what options are realistically available.

To enable repository siting, the government needs to update several regulations to reflect scientific advances and lessons learned over the past decades. In particular, the nation's generic environmental standard for geologic repositories, 40 CFR Part 191, lacks transparency, is out of date and is inconsistent with international guidelines.

We endorse a consolidated interim storage program with priority for fuel at shut down plants as authorized by Section 305. However, Congress should understand that success in this area is unlikely without a credible repository program.

ANS supports a new independent entity to manage high level waste but has some concerns with a new government agency proposed entitled to the NWAA. We suggest continued consideration be given to the public corporation model.

High level waste funding reform is essential. Title IV of the bill takes a step in the right direction by improving access to future contributions to the Nuclear Waste Fund. The Committee should also consider incorporating practical provisions to allow an empowered management entity to use the existing balance of the fund.

The approach to consent-based siting of nuclear waste management facilities described in Sections 305 and 306 appear reasonable; however, it is an open question if a process with all parties having an absolute veto can succeed in our system of government. Additional information on these points and others is provided in my written testimony.

In closing, ANS suggests three principles for future action. First, make real progress by focusing on achievable tasks. Create a viable management organization with the necessary resources that can work without undue political interference. Empower that organization to complete Yucca Mountain licensing, investigate a second repository site and move forward on consolidated interim storage. Initiate the development of up-to-date repository regulations for sites other than Yucca Mountain. Engage with Nevada and other potential host states and communities.

Second, seek to combine the concepts of "consent" and "benefit." In addition to money from the Nuclear Waste Fund, the Federal Government has many means of providing infrastructure improvements, federal land, educational opportunities and other means of support to states and communities interested in exploring a partnership on the management of nuclear material. Make those potential benefits abundantly clear from the beginning.

Third, empower our scientists and engineers. Congress must address the legal and administrative issues associated with nuclear waste. But we will not succeed if we allow politics to overwhelm good science. Act based on real risk, not perceived risk. We must give our best and brightest nuclear professionals the opportunity to take on this challenge with some degree of independence, funding and flexibility.

I thank you again for the opportunity to testify and stand ready to answer your questions. I yield back the remainder of my time.

[The prepared statement of Mr. Nesbit follows:]

Steven P. Nesbit
Chair, Nuclear Waste Policy Task Force
American Nuclear Society

Written Testimony to the U.S. Senate Committee
on Energy and Natural Resources
June 27, 2019

Chairman Murkowski, Ranking Member Manchin, and members of the Senate Energy and Natural Resources Committee, I appreciate the opportunity speak to you today on behalf of the American Nuclear Society or ANS. We represent 10,000 men and women who have brought incredible benefits to society through clean, reliable electricity generation, detecting and curing cancer through nuclear medicine, developing power systems to enable deep space exploration and other applications of nuclear technology. America's nuclear professionals have the skills and expertise to manage our country's portfolio of nuclear waste through the safe and secure storage, transportation and, ultimately, disposal of nuclear material.

I have spent a substantial portion of my professional career working on used fuel and nuclear waste, both on the behalf of the government and for a major nuclear utility. In addition to my current leadership of the ANS Spent Fuel Policy Task Force, I chair the Nuclear Industry Council's Backend Working Group and I am a member of the Nuclear Waste Strategy Coalition. These and other stakeholder groups are committed to putting the waste program back on track, and they are in general agreement about the important steps required to do so.

All energy-producing technologies produce wastes that must be managed responsibly. The good news is that used nuclear fuel, the by-product of operating reactors for electricity production, is a robust and stable waste form that the nuclear industry has a sterling record of storing and transporting safely. High-level radioactive waste, the by-product of chemical reprocessing which, in the United States, was conducted primarily for weapons production purposes, is also robust and stable once converted to solid form. However, these materials are highly radioactive for many years and must be isolated from the environment for millennia. The long-standing international consensus is that such materials should ultimately be disposed in stable geologic formations, and several countries are making good progress toward siting and constructing repositories. Unfortunately, the U.S. program has foundered. While it has generated huge federal government revenues through fees charged to generators of nuclear electricity (and generally collected from their customers), due to political considerations those revenues have not translated to steady and adequate funding for the critical job of nuclear waste management.

There are many social, financial, and environmental imperatives for addressing used nuclear fuel and high-level radioactive waste management (collectively, high-level waste or HLW). Today, America's nuclear power reactor fleet provides a majority of the nation's zero-emissions electricity, and advanced reactors offer the promise of additional clean, "always on" energy production for the future. ANS professionals are working diligently to develop and

deploy advanced nuclear energy systems such as small modular light water reactors and Generation IV reactors. However, we are very concerned that the lack of a credible, demonstrated HLW management plan threatens these efforts, which are essential for our clean energy future.

When evaluating potential changes to the U.S. HLW program, it is important to appreciate the specific problems that have plagued the program for the past 35 years. Appropriations to support program activities have been less than requested by past administrations, highly variable, and, for the last seven years, non-existent, despite the accumulation of tens of billions of dollars in the Nuclear Waste Fund. The key appointed position of Director of the Office of Civilian Radioactive Waste Management (OCRWM) has been vacant for extended periods, to the extent that one career Department of Energy (DOE) employee filled the office on an acting basis longer than any actual director on a permanent basis. A previous administration eliminated OCRWM nine years ago despite the fact that the office was—and still is—required by federal law. I highlight these realities not to cast blame, but to remind the committee that as you seek to fix problems associated with the waste program, any effective solution to the problem must be insulated, to the extent possible, from detrimental political action (and inaction). HLW management is a long-term endeavor that needs steady and consistent management over many decades, but it has suffered greatly due to the vagaries of the annual appropriations process and the two-year election cycle.

The official ANS positions on HLW management policy issues are documented in four ANS Position Statements. PS-80 “Licensing of Yucca Mountain as a Geologic Repository for Radioactive Wastes” states the Society’s support for completing the Nuclear Regulatory Commission (NRC) licensing action on the DOE’s construction authorization request for the proposed repository, as is required by current law. The country has invested more than \$10 billion in determining the acceptability of Yucca Mountain as a site for geologic disposal of HLW. The process is nearly completed, and finishing the job will provide valuable information and insights even if a repository is never built on the Yucca Mountain site. PS-76 “Interim Storage of Used or Spent Nuclear Fuel” summarizes our technical and operations experience with both wet and dry storage of used fuel and endorses moving forward with the development of centralized storage facilities as part of an integrated used fuel management system. This position statement makes it clear that centralized storage is only a “partial and temporary solution” and does not obviate the need for a geologic repository. PS-18 “The Safety of Transporting Radioactive Materials” documents the impeccable worldwide public safety record associated with the transportation of such material, including used fuel. PS-22 “Creation of an Independent Entity to Manage U.S. Used Nuclear Fuel” addresses the need for a management organization that has the authority and access to funding to successfully carry out the used fuel storage and disposition mission. These four position statements are attached to this testimony.

Having established the official ANS positions, I will now discuss several key provisions of the Nuclear Waste Administration Act of 2019, or NWAA. These remarks reflect the views of the ANS Nuclear Waste Policy Task Force on the proposed legislation and are informed by consultation with a number of knowledgeable and experienced ANS members. Clearly, there are a number of areas for improvement in the HLW management program, but in our view, governance reform and funding reform are the pre-eminent issues that Congress and the Administration must address in order to achieve tangible, convincing progress.

NWAA Section 306 would initiate a search for additional geologic repository sites other than Yucca Mountain, a prudent and appropriate course of action. A geologic repository is a “must have,” not an optional element of a successful waste management program. At the present time, the country’s waste program is stuck in the political logjam of Yucca Mountain. State of Nevada and other intervenor concerns have not yet been addressed by the adjudicatory process and there is no certainty that the site will be politically feasible even if it passes technical muster. ANS strongly supports the timely completion of Yucca Mountain licensing, and we are pleased that the NWAA does not preclude that action. At the same time, we believe the nation should resume the process of identifying a second repository site. If, for whatever reason, all HLW does not ultimately go to Yucca Mountain for disposition, it will have to go somewhere. The country deserves a better understanding of what options are realistically available.

Aspects of our regulatory structure need updating if the U.S. is to pursue a second repository. Specifically, the regulations which should be revisited are the Environmental Protection Agency’s (EPA’s) 40 CFR Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes; DOE’s 10 CFR Part 960, General Guidelines for the Preliminary Screening of Potential Sites for a Nuclear Waste Repository; and the NRC’s 10 CFR Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories. All of these generic regulations are out-of-date and revisions will be well-informed by the experience gained characterizing multiple potential repository sites in the 1980s as well as Yucca Mountain site suitability and licensing work. Accordingly, we recommend the NWAA be modified to include a requirement for the timely revision of these regulations to reflect advances in science and other lessons-learned over the past three and a half decades.

Of the three regulations discussed above, the long pole in the tent is probably 40 CFR Part 191. While we recognize that this issue is largely outside the Committee’s jurisdiction, the update of this regulation is particularly important when determining the suitability of a repository site. The regulation establishes the acceptance criteria for the ability of a repository to isolate radioactive waste from the environment. The U.S. generic standard for repositories, 40 CFR Part 191, lacks transparency, is out-of-date, and focuses on population dose rather than individual protection, making it inconsistent with current international guidelines for such regulations. A transparent, up-to-date, workable generic standard is essential. A more recent standard, 40 CFR Part 197, is risk-based and has a clear nexus with public health and safety, but it was developed for, and legally applies to, the Yucca Mountain site only. It took the EPA more than a decade to put the previous generic standard in place and more than a decade and a half to promulgate a Yucca Mountain-specific standard, so the revision should begin as soon as possible. As a side note, completing Yucca Mountain licensing will support the revision of 40 CFR Part 191 by providing practical insights into the workability of a repository standard.

NWAA Section 305 authorizes a consolidated interim storage program with priority for used fuel residing at permanently shut down nuclear power plants. This is a very positive feature of the legislation—a successful consolidated storage program would (i) begin to discharge the government’s responsibility to manage used fuel, (ii) develop and exercise the used fuel transportation system, and (iii) act to minimize the government’s long-term financial liabilities.¹ However, without a credible geologic repository plan, our ability to implement a

consolidated interim storage program is very questionable. With no prospect of a permanent repository, key stakeholders are unlikely to support the temporary storage of used nuclear fuel in their states. This consideration highlights the need to complete Yucca Mountain licensing as well as the value of initiating a search for another repository site.

Title II of the NWAA of 2019 would move management of the waste program away from DOE to a new government agency—the Nuclear Waste Administration—which would have primary authority for carrying out the government’s responsibilities. As documented in its Position Statement 22, ANS supports establishing an “independent entity” to manage HLW. It is not clear, however, that the Nuclear Waste Administration as proposed in the NWAA would be significantly better positioned than DOE’s OCRWM to achieve success. Notably, several well-compensated leadership positions are established atop the Nuclear Waste Administration, but there are no hard and fast requirements to ensure that the political nomination and confirmation process will keep them continually filled by well-qualified individuals. We continue to believe that elements of the public corporation model, as suggested by the Blue Ribbon Commission on America’s Nuclear Future and others, and embodied in legislation proposed by the late Senator Voinovich in 2010,² deserve serious consideration as the legislative process moves forward.³

Funding reform is an essential element of successfully revamping the HLW management program. Title IV of the NWAA takes a step in the right direction by establishing a Working Capital Fund that would preserve new contributions to the Nuclear Waste Fund for application to the nuclear waste program without being subject to year-to-year appropriations. The NWAA does not, however, provide a reliable mechanism for accessing the large and growing balance in the Nuclear Waste Fund (more than \$40 billion currently, and increasing at a rate of approximately \$1.5 billion per year). As such, we recommend the Committee consider incorporating provisions for accessing the current balance of the Nuclear Waste Fund along the lines of those included in H.R. 3053,⁴ passed by the House of Representatives in the 115th Congress. Another beneficial reform worthy of consideration would be to direct all future interest earned by the Nuclear Waste Fund into the Working Capital Fund. Such a measure would at least prevent the problem of lack of access to the corpus of the Nuclear Waste Fund from getting materially worse.

We strongly encourage the Committee to revisit Section 406 of the bill, which requires contract holders to settle standard contract lawsuits as a “condition precedent” for storage of used fuel under the NWAA. It is not at all evident why the government should be allowed to coerce standard contract holders into settling on the government’s terms in return for the government discharging its existing statutory and contractual responsibilities. Based on my past experience as a utility used fuel manager who was part of a team that successfully negotiated a durable used fuel settlement in 2006, I believe the only thing preventing all standard contract lawsuits from settling—to the joint benefit of the government, the American people who foot the bill for the Judgment Fund, and the companies overseeing the safe storage of used fuel on operating and shut down reactor sites—is the unwillingness of the federal government to settle the lawsuits on equitable terms.

With respect to consent-based siting of nuclear waste management facilities described in Sections 305 and 306 of the NWAA, the legislation appears to outline an equitable process for obtaining consent of local and state governments and affected Indian Tribes. The overriding

question is – can a consent-based process, with all parties having an absolute veto, succeed in our system of government? There is ample cause for skepticism. To date, there is no example, here or abroad, of a disposal facility for HLW being sited successfully using a consent-based process when a state government (or equivalent) is required to provide consent. Simply put, consent is unlikely, absent meaningful monetary and non-monetary incentives to states and communities in return for hosting waste management facilities.

To summarize the ANS perspective, we urge you to adopt three broad principles for action. First, commit to make real progress, focusing on achievable tasks. Create a viable management organization with the necessary funding and resources that can work without undue political interference. Empower that organization to complete Yucca Mountain licensing, investigate a second repository site and other suitable disposal techniques, and move forward on consolidated interim storage. Initiate the development of up-to-date regulations including a generic environmental standard for additional repositories. Engage with Nevada and other potential host states and communities.

Second, seek to combine the concepts of “consent” and “benefit.” In addition to a portion of the substantial monies collected from electricity customers over the years for the express purpose of HLW management, the federal government has at its disposal many means of providing infrastructure improvements, federal land, educational opportunities and other means of support to any state and/or community interested in taking on the responsibility of managing nuclear materials. Make those potential benefits abundantly clear from the beginning.

Third, empower our scientists and engineers, who remain world leaders in radioactive waste management. Congress must address the political, legal, and public acceptance issues associated with nuclear waste, but we will not succeed if good science takes a back seat to other considerations. We must allow our best and brightest nuclear professionals the opportunity to take on the challenge with some degree of independence, funding and flexibility.

In closing, ANS is grateful for the Committee’s willingness to address this very important issue. I thank you again for the opportunity to testify and stand ready to answer your questions.

¹ Steven Nesbit, “Centralized Interim Storage – Does It Make Sense Today?” International High-Level Radioactive Waste Management Conference, Albuquerque, NM, April 2011.

² United States Nuclear Fuel Management Corporation Establishment Act of 2010, S.3322, 111th Congress 2D Session (introduced May 6, 2010).

³ Steven Nesbit, Lake Barrett, Rod McCullum, and Dan Stout, “A Blueprint for the New Used Fuel Management Organization,” International High-Level Radioactive Waste Management Conference, Albuquerque, NM, April 2013.

⁴ Nuclear Waste Policy Amendments Act of 2018, H.R.3053, 115th Congress (passed House of Representatives May 10, 2018).



Position Statement #18

The Safety of Transporting Radioactive Materials



Millions of shipments of radioactive materials have taken place in the United States over the last five decades—by road, rail, sea, and air—at the rate of about 3 million per year. Shipments of radioactive materials on public rights-of-way are regulated by the U.S. Department of Transportation and the U.S. Nuclear Regulatory Commission; these regulations are effective and consistent with International Atomic Energy Agency safety standards.^{1,2,3} Taken together, the experience base and the mature regulatory oversight structure provide confidence that radioactive materials have been and will continue to be transported safely.

Transporting radioactive material is necessary to provide for the use, storage, processing, and disposal of the material. Federal regulations address packaging, radiation shielding, labeling, loading and unloading, storage, transportation routes, and vehicle requirements. They impose strict limits on external radiation from the transported package, on the amount of fissile material that can be transported, on the radiation exposure of workers and crews of transport vehicles, and on the amounts of radioactive materials that can be released to the environment. There are also requirements to protect against the diversion of radioactive materials. All shippers and carriers are licensed, and all storage and shipping containers are certified. A graded approach is taken to regulations, so that the greater the potential radiological hazard of the material being shipped, the more stringent the packaging safety requirements. Packages containing material with the highest levels of radioactivity, such as used nuclear fuel (UNF) and high-level radioactive waste (HLW), must demonstrate their ability to withstand hypothetical accident conditions, including a high-speed impact simulated by a 30-foot drop onto an unyielding surface, 30 minutes in a completely engulfing fire at 1475°F (800°C), and immersion under 50 feet of water.

Studies of the risk posed by the transportation of radioactive materials have repeatedly confirmed that current regulations protect public health and safety. The 1977 environmental impact statement on radioactive materials transportation, NUREG-0170,⁴ concluded that existing regulation protects public health and the environment. This result was confirmed most recently by NUREG-2125,⁵ published in 2014. In addition, NUREG-2125 estimated that (1) over 99.999 percent of accidents that could involve a UNF shipment would have no impact at all on the cargo, and (2) the amount of ionizing radiation exposure to the public along the transportation route from a routine, incident-free UNF shipment would be a negligible fraction of annual background ionizing radiation.

More than 4,000 shipments of UNF have been made over U.S. highways and railroads since 1964.⁶ Moreover, the U.S. Department of Energy has transported to the Waste Isolation Pilot Project in New Mexico nearly 12,000 shipments of transuranic waste over 14 million miles since 1999 without incident.⁷ The environmental impact statement for the proposed Yucca Mountain repository (DOE/FEIS-0250),⁸ published in 2002, estimated that if UNF were to be transported to the repository primarily by truck, about 2,200 shipments per year over a 24-year period would be needed to support Yucca Mountain. This would constitute an increase of less than 0.1 percent over the current number of radioactive shipments and less than 0.0007 percent of the 400 million shipments of hazardous materials taking place per year in the United States. If UNF were to be transported primarily by rail, even fewer shipments would be required. Analyses demonstrate that the projected shipments of UNF to a consolidated storage facility or a repository can be accomplished without adding any significant radiological risk to the population along the shipping routes. International experience supports this conclusion. Outside of the United States, in the past

50 years, at least 20,000 shipments of UNF and HLW totaling at least 80,000 tons of material have been made safely.⁶

There have been a few instances in which shipments of UNF or HLW have been involved in transportation accidents.⁶ While extremely rare, severe accidents have taken place, including a trailer hauling UNF overturning, and a grade-crossing accident involving a train carrying UNF. In each case, the packages performed as they were designed. The UNF cargo was not damaged, the material was contained within the package, and the health and safety of the public was not put at risk from the radioactive material.

The transportation of radioactive materials in the United States and worldwide has been conducted with an excellent safety record. The historical record of shipments of radioactive material has demonstrated that the regulations currently in place are sufficient to protect the health and safety of the public and the environment. Furthermore, an increase in the number of radioactive materials shipments, specifically of UNF shipments to a consolidated storage facility and/or repository, would not present any additional radiological risk, when compared to the natural background radiation, or any adverse impact to the public or the environment. ANS is confident that the current regulations are adequate and sufficient to protect the health and safety of the public and the environment in the future. ANS supports the continued safe transportation of radioactive materials under the current regulatory structure.

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The Safety of Transporting Radioactive Materials | Position Statement #18



Position Statement #22

Creation of an Independent Entity to Manage U.S. Used Nuclear Fuel

The United States has a large and growing inventory of commercial used nuclear fuel as well as government-owned used fuel and high-level radioactive waste. While it is possible to store the material safely for an indefinite period of time, long-term storage is not the ultimate solution. Responsible nuclear waste management requires an integrated approach involving some combination of on-site/centralized dry cask interim storage, nuclear fuel recycling, and emplacement of high-level wastes in a deep geologic disposal facility. A viable and durable waste management program will contribute to public confidence in nuclear energy as an important component of an energy future with reliable base load electricity generation and low greenhouse gas emissions.

Technologically proven solutions exist today that can safely and economically manage the flow of used nuclear fuel from the nation's current and planned nuclear power plants. As such, the so-called "nuclear waste problem" the United States faces is not the result of inadequate technical capabilities. Rather, it is largely a political problem, whereby parochial and ideological factions have successfully exploited U.S. legislative and administrative processes to prevent the U.S. Department of Energy from taking possession of used nuclear fuel.

In order to promote the primacy of scientifically sound and technically informed decision making in U.S. nuclear fuel cycle policy, the American Nuclear Society urges Congress and the Administration to consider the creation of an independent entity to oversee management of the current and expected stockpile of U.S. used nuclear fuel. Such an entity should possess the following characteristics:

- access to nuclear waste fees, not subject to annual congressional appropriations;
- governance that promotes long-range planning and continuity of leadership;
- authority to provide consolidated interim storage, nuclear fuel recycling, and geologic disposal consistent with laws, policies, and regulations;
- authority to support U.S. national security and nonproliferation objectives on a full-cost reimbursement basis;
- fully subject to U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency regulations.

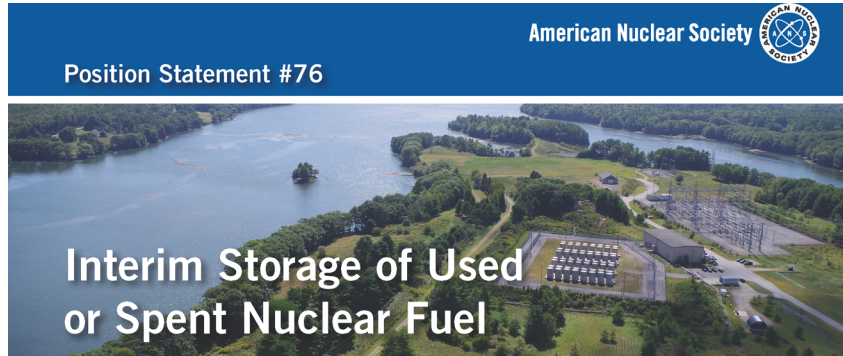

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Creation of an Independent Entity to Manage U.S. Used Nuclear Fuel | Position Statement #22



American Nuclear Society



Position Statement #76

Interim Storage of Used or Spent Nuclear Fuel

The American Nuclear Society (ANS) endorses interim storage of irradiated fuel from a nuclear power reactor (commonly referred to as spent or used nuclear fuel, and referred to herein by the acronym UNF) until final disposal is completed. In the United States, the Nuclear Regulatory Commission (NRC) is the licensing and regulatory authority for used fuel management.

Newly discharged UNF is stored underwater in pools at reactor sites. As these pools approach capacity limits, the UNF is transferred into robust metal or concrete and steel dry storage systems typically located on or near the reactor site in a facility commonly referred to as an Independent Spent Fuel Storage Installation (ISFSI). These relatively simple and passive dry storage systems protect against events that could result in radiological releases into the environment. The ISFSIs are monitored and secured to ensure continued protection.

As of 2016 the U.S. nuclear industry had loaded and placed into service over 2300 dry storage systems at 68 locations in 33 states since 1986¹. Plant workers, the public, and the environment have been effectively protected in every case.

Current operational and decommissioned nuclear power plants in the U.S. were licensed with the expectation that the UNF would be stored at the nuclear power plant site for a short period of time until shipment to a recycling plant or geologic disposal facility for high-level radioactive waste. However, no facility capable of receiving UNF is operating in the U.S. and it is uncertain when one might become available. Therefore, utilities have been forced to store UNF at nuclear power plant sites in greater quantity and for longer time periods than originally envisioned.

ANS believes that the successful operating experience to date demonstrates that UNF storage at nuclear power plant sites has been, and can continue to be, achieved in a safe and environmentally sound manner.

As longer periods of storage become inevitable, the nuclear industry and NRC have placed an increased emphasis on assuring the long-term integrity of storage systems. This is being accomplished through aging management programs similar in scope to those that have been successfully deployed at more than 80% of the U.S. commercial nuclear reactor fleet (extending operations from 40 to 60 years, with periods of up to 80 years under consideration).

ANS believes that aging management programs for UNF storage will be as effective as those already applied to reactors. NRC's recent determination that the environmental impacts of continued storage of UNF are small supports this conclusion – as, in reaching this conclusion, the NRC examined storage periods of as long as 100 years without any repackaging of the UNF².

Nevertheless, interim storage of UNF is a partial and temporary answer to managing the UNF produced by nuclear power reactors. ANS supports the ultimate development of recycling (see *Position Statement 45, Nuclear Fuel Recycling*) and geologic disposal (see *Position Statement 80, Licensing of Yucca Mountain as a Geologic Repository for Used Nuclear Fuel and High-Level Radioactive Waste*).

Until recycling and/or geologic disposal can be accomplished, ANS also supports the development of consolidated away from reactor

interim storage for UNF – in most cases using the same proven technology now deployed at reactor sites¹. Consolidation could result in a more efficient storage system (as aging management and security capabilities could be combined for a larger number of systems). It would also allow land which is currently being used to store UNF at decommissioned reactors to be returned to surrounding communities for other purposes. Away from reactor consolidated storage facilities have been safely operated for decades in Europe, using both wet (pool) storage and dry storage technology.

Until recycling and/or disposal facilities are in operation, the interim storage of UNF can continue under current controlled conditions – in pools and casks at either reactor or consolidated sites.

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Interim Storage of Used or Spent Nuclear Fuel I Position Statement #76



Position Statement #80

Licensing of Yucca Mountain as a Geological Repository for Used Nuclear Fuel and High-Level Radioactive Waste

The American Nuclear Society (ANS) supports the expeditious processing of the Yucca Mountain geologic repository license application in an open, technically sound manner. ANS believes the completion of the Yucca Mountain licensing process would convey a number of valuable benefits, including:

- Demonstrating progress in the management and disposal of Used Nuclear Fuel (UNF) and High-Level Radioactive waste (HLW)^a
- Providing insight into the feasibility of the regulatory process for geologic disposal facilities
- Helping to address criticism that there is no solution to the problem of the waste produced by the generation of electricity using nuclear energy
- Providing some return to the nation's electricity customers and taxpayers, who have invested billions of dollars in characterizing and licensing Yucca Mountain
- Fully informing and providing transparency into the ultimate decision whether or not to proceed with development of the nation's first geologic repository for UNF and HLW at Yucca Mountain

UNF is a byproduct of nuclear reactor operation and its radioactivity poses a potential health hazard if not appropriately managed. Similarly, if UNF is reprocessed the resulting HLW contains long-lived radionuclides that could be harmful if released. The issue has been studied for more than 60 years, going back to a 1957 National Academy of Sciences recommendation that HLW can be safely isolated from the environment underground in stable geologic formations while most of the radioactivity decays away¹. An international consensus has developed behind disposal of UNF and HLW in geologic repositories (underground facilities designed to isolate the material from the biosphere) and several nations are making substantial progress developing them. Reflecting this consensus, the Nuclear Energy Agency of the Organisation for Economic Cooperation and Development² supports geologic disposal of UNF and HLW as the preferred method for ultimate disposal³.

To date, the United States has licensed only one geologic repository: the Waste Isolation Pilot Plant (WIPP) in New Mexico. WIPP houses long-lived transuranic wastes⁴ from government defense work and research, development, and demonstration activities. The proposed Yucca Mountain repository would primarily store UNF from commercial nuclear power plants, with about ten percent of

a. Most of the United States inventory of UNF comes from commercial nuclear power plants; the remainder is from defense, research and educational applications in the United States and abroad. High-level radioactive waste consists of radioactive fission products produced by reprocessing UNF. The liquid waste stream is vitrified (solidified in glass form) prior to disposal. In the United States, most high-level radioactive waste was produced as a result of national defense activities – nuclear weapons production and naval propulsion.

b. Member countries operate most of the nuclear power plants in the world today.

c. Transuranic waste is not UNF or HLW but it contains radioactive elements heavier than uranium (e.g., plutonium and americium).

the total repository capacity reserved for government-owned UNF and HLW. Yucca Mountain is located on federal land in Nye County in southern Nevada, an arid region of the southwestern United States approximately 90 miles northwest of Las Vegas. The U.S. Nuclear Regulatory Commission (NRC) is required by federal law to evaluate the safety of the proposed Yucca Mountain geologic repository.

The U.S. Department of Energy (DOE) conducted scientific investigations to investigate the suitability of the Yucca Mountain site, developed a design for the proposed geologic repository and submitted an application to the NRC in 2008 for authorization to construct a disposal facility at the site. The NRC completed its staff review and issued the final volume of its Safety Evaluation Report (SER) for Yucca Mountain in 2015¹. The NRC safety review was based on a thorough evaluation of the DOE construction authorization application as well as decades of independent analysis and review of the characteristics of Yucca Mountain.

Volume 3 of the SER concluded that a geologic repository at Yucca Mountain would meet the stringent EPA safety standards² and isolate radioactive wastes for at least one million years. However, upon completion of the entire SER the NRC staff recommended that the Commission not authorize construction of the repository because (i) DOE had not met certain land and water rights requirements identified in Volume 4 of the SER and (ii) a supplement to DOE's Environmental Impact Statement (EIS) had not been completed. The NRC completed and issued the EIS supplement in 2016³.

The next step of the Yucca Mountain licensing process is to resolve the contentions that were submitted by parties with standing and admitted by Atomic Safety and Licensing Board judges. ANS supports Congress providing the NRC and DOE with the funds necessary to hold adjudicatory hearings and complete the Yucca Mountain licensing process, consistent with the requirements of the Nuclear Waste Policy Act, as amended^{6,7}.

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Licensing of Yucca Mountain as a Geological Repository for Used Nuclear Fuel and High-Level Radioactive Waste | Position Statement #80

The CHAIRMAN. Thank you, Mr. Nesbit. We appreciate that. Mr. Fettus, welcome.

**STATEMENT OF GEOFFREY H. FETTUS, SENIOR ATTORNEY,
NATURAL RESOURCES DEFENSE COUNCIL, INC.**

Mr. FETTUS. Thank you, Chairman Murkowski and Ranking Member Manchin and members of the Committee. Thank you for the opportunity to present NRDC's views.

Chairman Murkowski started the hearing perfectly when she said we're in the same place. We trust this can be a new beginning with more than 80,000 metric tons of spent fuel in more than half of our states and reactors moving to decommissioning, we need to reset the process. S. 1234 however, will not solve the current stalemate and won't lead toward workable solutions; therefore, we oppose it in its current form.

For more than 50 years Congress has offered and even passed bills that would restart the Yucca licensing process or kick open a door in New Mexico or Utah for an interim storage site. In doing those things, S. 1234 severs any meaningful link between storage and disposal and excludes Nevada from the consent process it sets up. This won't work. And such efforts have failed in Tennessee, in Kansas, Nevada, Utah and everywhere else. Another such attempt restarts litigation and controversy and the likely result is the continued stalemate we've been in.

Seven years ago, a bipartisan Blue Ribbon Commission keenly described why past attempts failed. That Commission wisely asserted we can't keep doing the same thing. Congress must create a process that allows any potential host state to demonstrate consent or, for that matter, non-consent.

So rather than spend more of your valuable time on the specifics of why this won't work, they're all in the written testimony, I put before you a durable, meaningful, reset of how we can manage and dispose of nuclear waste and how we can really achieve consent. The solution could be summed up simply. Give EPA and the states power under well-established environmental statutes so that they can set the terms for how much and on what conditions they could host a disposal site.

Radioactive waste is stranded at sites across the country and will remain so because the Atomic Energy Act treats radioactive waste as a privilege pollutant. The Act preempts the regulatory authority of EPA and the states, exempting radioactivity from hazardous waste law and sizable portions of the Clean Water Act. It ignores the vital role states play in addressing other environmental pollutants.

Senator Manchin talked of a mechanism that can drive buy-in. Our government is at its strongest when each player's role is respected. As an example, the years of wrangling over what standards should be set for cleanup at our massively contaminated nuclear weapon sites, such as those in Washington or South Carolina, is made exponentially worse by DOE's self-regulatory status which the Atomic Energy Act ordains with these exemptions.

The same is true with commercial spent fuel where any state that is targeted to receive nuclear waste looks to be on the hook for the entire burden of the nation's spent fuel. State consent and

public acceptance of potential repository sites will never be willingly granted unless and until power on how, when and where waste is disposed of is shared rather than decided simply by federal fiat.

There's only one way consent can happen consistent with our cooperative federalism. Specifically, Congress can finally remove the Atomic Energy Act's anachronistic exemptions from our bedrock environmental laws. Our hazardous waste and clean water laws must include full authority over radioactivity and nuclear waste facilities so that EPA and, most importantly, the states can assert direct regulatory authority.

Removing these exemptions will not magically solve this puzzle and create a final repository, but I think it can work faster than what we have now because it will open a path forward that respects each state rather than offering up the latest one for sacrifice. The Texas and New Mexico events of the last several weeks demonstrate this.

Why will NRDC's plan work and why does this provide a better chance than S. 1234? Because a state can say no. It can also say, yes. And it can set the terms for how it will receive the waste and, importantly, not be on the hook for the entire burden because a state can protect its citizens and environment, limit what comes into the state. Such a new regime would allow for the thorough technical review on the ability of any site to meet strict, protective standards unlike the years of fighting that have been the hallmark of this process. And just as important, that fundamental sharing of power can result in public acceptance of solutions.

We've seen these bills before. Each has been a mirror of the last. It's time to try something that has a proven track record of addressing other controversial topics.

If you want to garner the consent the Blue Ribbon Commission deemed necessary, you have to give EPA and the states regulatory authority under environmental law. It's time to regulate nuclear waste the same way as every other pollutant with EPA and delegated states taking the lead under our foundational environmental statutes.

Thank you again for having me here today, and I look forward to answering your questions.

[The prepared statement of Mr. Fettus follows:]

Statement of
Geoffrey H. Fettus
Senior Attorney
Natural Resources Defense Council, Inc.

on

S. 1234, Nuclear Waste Administration Act of 2019

Before the
Committee on Energy & Natural Resources
United States Senate
Washington, D.C.

June 27, 2019



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I. Introduction

Chairman Murkowski and Ranking Member Manchin, and members of the Committee, thank you for providing the Natural Resources Defense Council, Inc. (NRDC) this opportunity to present our views on S. 1234, a bill *[T]o establish a new organization to manage nuclear waste, provide a consensual process for siting nuclear waste facilities, ensure adequate funding for managing nuclear waste, and for other purposes*. We appreciate that the Committee sees the need to commence work again on solving our national nuclear waste dilemma and we hope to work with all of you on a constructive process.

NRDC is a national, non-profit organization of scientists, lawyers, and environmental specialists, dedicated to protecting public health and the environment. Founded in 1970, NRDC serves more than one million members, supporters and environmental activists with offices in New York, Washington, Los Angeles, San Francisco, Chicago and Beijing. NRDC has worked on nuclear waste issues for more than four decades, and we continue to be engaged in shaping United States (U.S.) law and policy on the nuclear fuel cycle.

II. Summary of Testimony's Major Points

Nuclear waste is an unresolved political and technical challenge. Despite residual good intentions and skeletal remains of the original legislative efforts from 2012's Blue Ribbon Commission on America's Nuclear Future¹ that survive in S. 1234 today, this bill will not provide the changes in law necessary to solve U.S. nuclear waste challenges. Fundamental components of what is necessary to establish a scientifically defensible and publicly accepted set of solutions to nuclear waste are simply not present in S. 1234. We oppose this bill in its current form and offer today the reasons for our objections. Importantly, NRDC offers a precise alternative legislative prescription for a durable and successful path forward on nuclear waste.

S. 1234 is premised on a good intention – finding a way forward on storing or disposing of commercial spent nuclear fuel. With a few cosmetic changes, this draft is the same text as 2013's S. 1240, introduced in the 113th Congress.² We object because the bill: 1) severs the crucial link between storage and disposal; 2) places highest priority on establishing a federal interim storage facility at the expense of getting the geologic repository program back on track; 3) fails to ensure that adequate geologic repository standards will be in place before the search for candidate geologic repository sites commences; 4) fails to provide the Environmental Protection Agency (EPA) and – most importantly, states – with regulatory authority under existing environmental law over radiation-related health and safety issues associated with nuclear waste facilities; and 5) fails to prohibit the Administrator (or Board) from using available funds to engage in or support spent fuel reprocessing (chemical or metallurgical).

We lodged those objections seven years ago. The passage of time and the continued travails of the nuclear industry have only confirmed our original reaction. Since the last time this bill was proposed, the commercial nuclear industry has added approximately 12,000 metric tons of spent

¹ President Obama's "Blue Ribbon Commission on America's Nuclear Future - Report to the Secretary of Energy, January 31, 2012" (hereafter "BRC"); see full report online at https://www.energy.gov/sites/prod/files/2013/04/f00/brc_finalreport_jan2012.pdf.

² See <https://www.congress.gov/bills/113/congress/113th-congress/senate-bill/1240>. Also, I summarize the trajectory of legislation in the background section, *infra*, at 3-5, n. 9, 10.

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fuel to its at-reactor storage, shut down, or decommissioning sites where this nuclear waste becomes stranded spent fuel; and the idea and false promise of a nuclear renaissance (which would only add to the already sizable waste burden of ~82,000 metric tons) died under the load of gigantic capital costs and the inability to compete with renewable energies and natural gas.³ None of this is likely to change in the near future, even if we continue to artificially subsidize the existing reactor fleet so that many plants operate beyond what the competitive capital markets might have allowed.

Contemporaneously, despite significant shows of legislative, regulatory and financial support for the nuclear industry in Congress, nuclear waste bills of various stripes came and went, with some even passing out of a chamber. But the waste issues remained locked in a stalemate for all the reasons we articulated seven years ago. To wit, Utah's Private Fuel Storage Facility, licensed in 2006, remains forever blocked by a wilderness area originally sponsored by former Utah Senator Orrin Hatch; initial licensing efforts at interim sites in New Mexico and Texas remain controversial, fiercely opposed, and unlikely to ever result in waste storage;⁴ and unwise attempts to restart the abandoned Yucca Mountain licensing process in Nevada have repeatedly foundered.

Despite all of this, S. 1234 is offered as it was years ago, and again wrongly prioritizes the narrow aim of getting a government-run interim spent fuel storage facility up and running as soon as possible. We had evidence in 2013 that it would be unlikely to succeed, and we are now quite sure that enacting what is on offer today would immediately precipitate a welter of controversy and litigation from the potential recipient states, resulting in no progress toward a solution and years more unproductive rancor. President Obama's BRC rightly found that consent-based siting, with meaningful partnerships and open communication among federal,

³ It should be noted that the failure of the nuclear waste program and the impending closure of uneconomic nuclear reactors are not related. The domestic nuclear waste program has had a consensus position since at least 1957, when the National Academies first stated that geologic repositories were necessary and the best solution. NRDC concurs with that finding. During the decades from 1957 to the present day – a time period that includes the construction of more than 100 domestic commercial reactors built in this country – there has been no nuclear waste solution. Yet the glaring and unwise lack of a solution for nuclear waste has not halted or substantially perturbed the construction or operation of nuclear reactors. By contrast, what has perturbed and halted reactor construction in the United States (and globally) are the gigantic up-front costs of building nuclear reactors and a distinct lack of economic competitiveness in modern energy markets. As of now, thanks to decades of direct subsidies and legal protections such as the federal assumption of both the liability in the case of an accident and the waste burden that is the subject of this hearing, nuclear power represents approximately 19 percent of all U.S. electricity production (and 11% of production worldwide), and the U.S. nuclear plant fleet comprises 98 reactors at 61 facilities across 30 states. But most of the plants were designed and constructed in the 1960s and 1970s and almost all reach the end of their 60-year operating licenses in the 2030s and 2040s. New reactors are rare because, as we've seen with the failure of the VC Summer plant in South Carolina, the up-front costs required are astronomical. And a portion of the existing reactors are at risk of closing before their license end dates because they are no longer economical, have potential looming safety issues, and cannot compete in the marketplace, often because of the low price of natural gas and renewable energy and in some cases due to the need to replace expensive major components. The delays of the waste program have no bearing on the market failures of the nuclear industry.

⁴ Discussed *infra* at 6, n. 14.

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state, local, and tribal leaders, is the most important step toward establishing geologic nuclear waste repositories. S. 1234 bypasses that wise observation and tries a slight variation of the same tired approach of forcing the waste on Nevada, New Mexico, and Texas (or elsewhere).

There is another way forward; one that defuses the rancor before it begins. A legislative change that would provide potential host states the right to say “No,” but also “Yes, and on these strict, protective terms, and with these distinct limits.” A legislative change that might not address all the nuclear waste at once, but could get the federal government started, at least incrementally, and likely in a much faster time frame than attempting to fight Nevada (or New Mexico) once again. This path forward can happen if Congress fixes the fundamental flaw in the Nuclear Waste Policy Act, 42 U.S.C. §10101 *et seq.* (NWPA) – the exemption of radioactivity from environmental laws that has been part and parcel of the Atomic Energy Act for decades. Ending this set of exemptions through legislative change will then allow for meaningful, full regulatory authority from the EPA and the potential host states. S. 1234 won’t start moving nuclear waste off reactor sites, but the change in law we suggest can.

III. Legislative History & Background for S. 1234

A. The BRC

In 2009, then President Obama’s Administration concluded the proposed Yucca Mountain project was “unworkable” and took steps to withdraw its license application for the facility. This action finished years of disputes over the viability of the proposed site. President Obama recognized the failure of the repository program and immediately commenced a bipartisan effort – the BRC. Hearings were held, interim reports published for comment, and, after approximately three years, the BRC offered findings and recommendations to the Administration and Congress.⁵

B. Multiple Attempts at Legislation

Following on the heels of the BRC Final Report, the Senate Environment and Public Works Committee held a hearing in June 2012.⁶ This first hearing was closely followed by the first legislative attempt to bring the BRC recommendations to life in legislation, S. 3469, sponsored by then Chairman Bingaman of this committee.⁷ S. 3469 (which despite being tabled subsequent to the hearing, included several aspects that merited NRDC’s support) was followed by further years of legislative efforts.⁸

⁵ See NRDC statements before the BRC, e.g., Statements of Christopher Paine & Dr. Thomas Cochran, https://www.nrdc.org/sites/default/files/nuc_10101201a.pdf; and https://www.nrdc.org/sites/default/files/nuc_10062201a.pdf.

⁶ Hearing Before the Committee for Environment & Public Works, Subcommittee on Clean Air and Nuclear Safety “Recommendations from the Blue Ribbon Commission on America’s Nuclear Future for a Consent-Based Approach to Siting Nuclear Waste Storage and Management Facilities.” June 7, 2012, <https://www.epw.senate.gov/public/index.cfm/hearings?ID=A5351696-802A-23AD-472E-965E66850ABE>.

⁷ Hearing Before the Committee on Energy and Natural Resources, United States Senate, 112th Congress, Second Session, Testimony On S. 3469, *The Nuclear Waste Administration Act Of 2012*, September 12, 2012 <https://www.govinfo.gov/content/pkg/CHRG-112shrg76685/pdf/CHRG-112shrg76685.pdf>. NRDC’s statement for the record can be found at *Id.*, 33 – 42.

⁸ On September 12, 2012, NRDC testified before this committee on S. 3469. We commended the bill’s adherence to three principles that, in our view, must be complied with if America is ever to develop an adequate, safe solution for

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In 2013, the second legislative attempt subsequent to the BRC came – the “Discussion Draft” sponsored by then Chairman Wyden and Ranking Member Murkowski. Unfortunately, the Discussion Draft was a dispiriting retreat from many of the stronger aspects of S. 3469 and, in contrast to the previous year, precipitated NRDC’s strong objection on several items. Attachment A (hereinafter, “Att. ___”).

Then later in 2013 came S. 1240, sponsored again by then Chairman Wyden, Ranking Member Murkowski, and Senators Alexander and Feinstein.⁹ As with the previous year, an extensive hearing record was created, and it is this record we chiefly rely on today to avoid overstepping the Committee’s time or effort by repeating ourselves.¹⁰

Next, in 2015, then Chairman Murkowski and Senators Alexander, Feinstein, Cantwell, and Wyden again offered an updated version of S. 1240 (now S. 854) with only the cosmetic changes on offer today, but there was no hearing on the draft legislation.¹¹ Since that time, nuclear waste legislation was offered in the House of Representatives (2015’s H.R. 3643, 2016’s H.R. 4745, 2017’s H.R. 474, 2017’s H.R. 4442, 2018’s H.R. 3053, 2019’s H.R. 2699, 2019’s H.R. 3136, 2019’s H.R. 1544).

Regrettably, S. 1234, introduced this past spring and the subject of today’s hearing, is essentially the same bill as S. 1240. It suffers the same maladies that halted the bills’ progress in 2013-15 and, we suspect, will again block progress on dealing with nuclear waste unless serious changes are made along the lines suggested *infra* at 8-16.

IV. Specific Comments on S. 1234

We commented extensively on S. 1240, the nearly identical precursor to S. 1234, and there is little reason to burden the Committee with a set of redundant observations. Therefore, we

nuclear waste – (1) radioactive waste from the nation’s commercial nuclear power plants and nuclear weapons program must be buried in technically sound deep geologic repositories, the waste permanently isolated from the human and natural environments; (2) governing legislation must contain a strong link between developing waste storage facilities and establishing final deep geologic repositories that ensures no “temporary” storage facility becomes a permanent one; and (3) nuclear waste legislation must embody the fundamental concept that the polluter pays the bill for the contamination that the polluter creates. In short, we found that “Chairman Bingaman has made a laudable effort and turned some of the stronger ideas in the recent BRC report into legislative language. We support fundamental components in the proposed bill, dispute other parts, and have several key suggestions for expansion and refinement of S.3469. But the Chairman’s emphasis on the necessity of repositories and the need to link any potential storage site with the development of a disposal site is of lasting value. Any legislation that fails to adhere to these concepts will prolong the failures of the past 30 years in developing solutions for nuclear waste.” NRDC’s full testimony can be found online at https://www.energy.senate.gov/public/index.cfm/files/serve?File_id=54965BF6-E91B-41F8-A3E7-342B695C58AA.

⁹ Hearing Before the Committee on Energy and Natural Resources, United States Senate, 113th Congress, 1st Session, S. 1240, *The Nuclear Waste Administration Act of 2013*, July 30, 2013, <https://www.govinfo.gov/content/pkg/CHRG-113shrg85875/pdf/CHRG-113shrg85875.pdf>.

¹⁰ We incorporate our testimony on S. 1240 into this record by reference. *Id.*, link at n. 9 above, at 64-75. In brief, NRDC could not support S. 1240 for the reasons listed on page 1 of today’s testimony.

¹¹ See, S.854, *Nuclear Waste Administration Act of 2015*, 114th Congress, <https://www.congress.gov/bill/114th-congress/senate-bill/854/cosponsors>.

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provide a short summary and update some key observations, made more trenchant by the events of the past several years.

A. Title I

Title I of S. 1234 closely tracks the original template laid out by 2012's S. 3469, which in turn, recognized our generation's ethical obligation to future generations regarding nuclear waste disposal.

B. Title II

Title II of S. 1234 creates a Nuclear Waste Administration, an idea with which we have no quarrel in light of the failures of the past 40 years. However, we caution that any new federal entity must be subject to all of the nation's environmental laws, including the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, *et seq.* Explicit language is necessary to clarify specific application of NEPA at certain junctures of the siting process (for example, in support of the initial guidelines), but the Committee should make precisely clear that NEPA has full application to S. 1234. We hope the Committee will speak to this matter in the record of this proceeding and clarify the matter in future and improved versions of the bill.

Another matter in Title II merits updated comments. In our 2013 comments on the Discussion Draft (Att. A at 14-16), we stated that representation on this board of directors should be balanced by political party representation, by governmental affiliation (*i.e.*, federal, state, or tribal), and include representation by non-governmental organizations in addition to industry. We emphatically stand by those comments today and are compelled to reiterate them. In establishing the board of directors of the nuclear waste entity, the legislation should have a provision explicitly prohibiting the majority on the board from comprising members with existing or historical ties to the nuclear industry. Such a requirement would recognize the existing revolving door between government service at NRC, DOE and the nuclear industry. Ensuring the board is not disproportionately composed of members with existing or historical ties to the nuclear industry would improve public trust and acceptance of the government's newly legislated nuclear waste disposal program.

As a last note on Title II, it has long been NRDC's view that independent oversight is critical to safe and environmentally sound operation of DOE nuclear weapons production facilities and commercial nuclear facilities regulated by the NRC. Indeed, while creating a review board may be a useful initial step, more important is ensuring that the full suite of existing environmental laws have full application to nuclear waste matters. And should the new Nuclear Waste Administration be created, it must be bound by, and benefit from, clearly defined external regulation. We address this issue in more detail, *infra* at 8-16.

C. Title III

Disposal of nuclear waste in geologic repositories should remain the core focus of this legislation. Regrettably, since 2013, the nuclear waste legislative process has been moving in the wrong direction on this issue. Indeed, S. 1234 still includes much of "alternative" Section 305

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from the Nuclear Waste Discussion Draft¹² including presenting a structure that advantages immediate introduction of interim storage options over development of a sound geologic repository program. The BRC initially set out a phased, careful approach to developing both repositories and storage sites with strong checks to ensure storage sites could not become *de facto* repositories. This has been transmogrified in S. 1234 to a measure that prioritizes consolidated storage at the expense of a meaningful repository program. In short, if S. 1234 becomes law, a future Congress will be forced to deal with this issue again, with no meaningful disposal solution on the horizon, but with an even larger burden of dangerous radioactive waste that lasts for a million years. Our comments on Title III of S. 1240 should be directed to Title III of S. 1234 as the language is essentially the same,¹³ but three items merit a specific expansion of our 2013 comments.

First, S. 1234 lacks the specific check on the development of interim storage sites pending meaningful progress on the repository program found in Section 306 of S. 3469. This was troubling in 2013 and is even more so today in light of the recent objections by the States of New Mexico and Texas to the current nuclear waste interim storage proposals (Att. C, D, and E). Both states, and New Mexico most explicitly thus far, demonstrate the precise need for “consent” called for by the BRC, and the continued inability to obtain that consent.¹⁴

In contrast to the emerging legislative confusion this year over interim storage, the requirement in S. 3469’s Section 306(a) stated: “The Administrator may not possess, take title to, or store spent nuclear fuel at a storage facility licensed under this Act before ratification of a consent agreement for a repository under Section 304(f)(4).” Such a provision wisely put the horse before the cart and ensured the crucial linkage between storage and disposal that the BRC acknowledged is necessary.¹⁵ Such language is not in S. 1234 and therefore elicits our prompt

¹² The Nuclear Waste Discussion Draft released by the Committee in March 2013 included a proposal for an alternative Section 305 as a suggested replacement of Section 304(b)-(g) of the draft bill. S. 1240 includes the replacement language, and while some elements of alternative Section 305 have been altered from the Discussion Draft, the majority of the text remains the same.

¹³ See *supra*, n. 9, at 68-70, which we incorporate here by reference.

¹⁴ We include the following three supporting documents: Att. B, June 7, 2019 *Ltr. From NM Governor Michele Lujan-Grisham to Energy Secretary Perry regarding opposition to the proposed interim storage of high-level nuclear waste in New Mexico*; Att. C, *Proclamation of Texas Governor Greg Abbott, Disapproval and Veto of Senate Bill No. 1804*, which states in pertinent part: “Senate Bill 1804 was a laudable effort to address domestic violence, until someone slipped in an ill-considered giveaway to a radioactive waste disposal facility. Unfortunately, the bill author’s good idea about domestic violence has been dragged down by a bad idea about radioactive waste.”; and Att. D, June 19, 2019 *Ltr. From New Mexico Commissioner of Public Lands to Krishna P. Singh, President & CEO of Holtec International*, which concludes in pertinent part: “Given these safety concerns, and lack of concern for the State Land Office’s fiduciary responsibilities, I do not believe that Holtec’s proposed nuclear storage project is in the best interest of the State Land Office, its lessees, and its beneficiaries.”

¹⁵ See BRC Final Report at xii, “[A]t the same time, efforts to develop consolidated storage must not hamper efforts to move forward with the development of disposal capacity. To allay the concerns of states and communities that a consolidated storage facility might become a *de facto* disposal site, a program to establish consolidated storage must be accompanied by a parallel disposal program that is effective, focused, and making discernible progress in the eyes of key stakeholders and the public.” See also, “[t]his means that a program to establish consolidated storage will succeed only in the context of a parallel disposal program that is effective, focused, and making discernible progress in the eyes of key stakeholders and the public. A robust repository program, in other words, will be as

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objection. And in light of the legal questions flurrying around the private efforts at sites in New Mexico and Texas (putting the lack of consent and controversy to the side), the need to provide that kind of assurance is key to any meaningful progress in developing confidence in potential host states.

Second, section 306(e), Consent Agreements, was the subject of extensive comments on our part in 2013. For today's purposes, we additionally remind the Committee that the subsection functionally ignores the reality that the proposed Yucca license application was submitted long ago and there is no way to walk back the failure to gain Nevada's consent, either at that time or in the future. Excluding that failure from coverage under the law undercuts entirely the BRC's clearest admonition that consent must be obtained before proceeding.

Third, the preference in site selection for co-location presents a host of problems that could lead to the consolidated storage site morphing into the *de facto* repository, regardless of the progress in the repository program (if, *e.g.*, the co-located repository program derails late in the process for technical or institutional reasons). Indeed, there is nothing in Title III barring the construction and operation of facilities for repackaging nuclear spent fuel and nuclear waste, which could include construction and operation of facilities for spent fuel reprocessing (chemical or metallurgical). We are aware of efforts and interest over the years in co-locating storage and reprocessing facilities. Such activities merit our immediate and strong objection and any waste legislation should explicitly bar such efforts.

As a last matter, the consent process for storage and repository facilities should be strongly consistent, if not identical. For storage facilities, there is the possibility, but not the requirement, of a "cooperative agreement" in Section 305(b)(3)(C). The consent process should require this minimal, initial agreement. The consent process of Section 305(b)(4)(B) includes no provisions related to the contents or terms and conditions of a consent agreement as were included in S. 3469. In addition to the lack of adequate technical requirements, this lack of an adequate consent process is contrary to the purpose of "establish[ing] a new consensual process" (Section 102(3)) and makes it unlikely that there will be successful siting of storage facilities. And the recent reactions of Texas and New Mexico to non-consensual nuclear waste siting underlines this point.

Further, the consent process for repositories still exists in Section 306(e) of S. 1234 (but clearly does not include or "grandfathers out" the Yucca Mountain project, yet again unwisely ignoring the long-expressed intention of that state). But the ratification requirement that was present in S. 3469 Section 304(f)(4) is missing.¹⁶ So apparently, Congress could, at any time, choose not to ratify the consent agreement, or ratify it with changed conditions, or not provide funding or allow other provisions to be implemented. It is not clear to NRDC why any state would consider

important to the success of a consolidated storage program as the consolidated storage program will be to the success of a disposal program. Progress on both fronts is needed and must be sought without further delay." BRC Final Report at 40.

¹⁶ See also Section 506(a), which states that "[t]his Act shall not affect any proceeding or any application for any license or permit pending before the Commission on the date of the enactment of this Act; thereby allowing "consent" to be ignored the cases of Nevada, New Mexico, Texas and Utah. We stress that this is the precise recipe to further entrench the national stalemate on nuclear waste.

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this to be an adequate “consent” process, when its requirements could be arbitrarily overturned by Congress. Take the lesson that New Mexico and Texas are offering right now – a lesson that is consistent with 50 years of failure in siting nuclear waste sites – create a process that is both scientifically defensible and publicly accepted. In our next section, we describe how to create this legal framework.

V. How the Evolution of the BRC Process Can Be Saved: NRDC’s Prescription

A. Understanding the History & Need for a Fundamental Change in Law

After more than 50 years of effort, the federal nuclear waste program in this country has failed to deliver a final resting place for highly toxic, radioactive waste that will be dangerous for millennia. Over the years, there have been numerous efforts to attribute the failure of the repository program to certain Senators, to Nevada Governors of both parties, to NRC Commissioners, and even to the public for failure to accept its part in disposing of nuclear waste. All of this is wrong.

Failure cannot be laid at the feet of any one person or entity or the public; rather, this defeat has many causes. Several agencies (including the EPA, the DOE, the NRC, and the U.S. Department of Justice (DOJ)) and Congress repeatedly distorted the process established in the NWPA, including for developing licensing criteria for a proposed repository. In each instance, such action weakened environmental standards rather than strengthened them, and always aimed to ensure the site would be licensed, no matter the end result. These actions both precipitated and gave traction to ferocious resistance from Nevada, Tennessee, New Mexico, Washington, Texas, Louisiana, Mississippi, Utah, Georgia, Maine, Minnesota, New Hampshire, North Carolina, Virginia, Wisconsin, and Indian tribes. But even those actions are not the reason we remain stuck in a virtual *cul de sac*, witness to repeated attempts to try and force the same result by the same fashion – *i.e.*, transferring the entirety of the nation’s nuclear waste to an above ground parking lot in a resistant New Mexico, or to the technically inadequate attempt at a repository in Nevada.

B. Science & Politics Are Both Necessary

Nuclear waste remains a third rail of American politics, and we suggest today there is a leading reason – **a deep misunderstanding of federalism and the necessary role of states in the process of solving this challenge**. If you take one message from our appearance before you today, it is that there is another way to try and cut this Gordian Knot, but it must be done in a fashion that respects the extraordinary history of cooperative federalism in environmental laws.

We urge the Committee to appreciate the metamorphosis of Congressman Mo Udall’s (D-AZ) NWPA, the organic subject of today’s hearing. Indeed, NRDC views the original incarnation of the NWPA as a remarkable, nearly visionary piece of legislation that contained one tragic flaw: a deep misunderstanding of federalism and the necessary role of states. And that that flaw is fatal is the single clear conclusion that we have drawn from the history of failures associated with nuclear waste.

As the Committee is aware, the enacted 1982 NWPA set forth obligations and duties for EPA, DOE and NRC, with Congressional oversight and checkpoints along the way. The law attempted

to place science in the forefront and balance political power in a way that might allow for this fraught, difficult process of finding and developing disposal sites for nuclear waste. But, importantly, the NWPA never challenged or altered in any way the AEA's provision for exclusive federal jurisdiction over radioactive waste. Despite this baked-in oversight, the NWPA's attempt at the legal balancing act was unprecedented at the time and that observation remains true today. And as we know, the balancing act was upset as the NWPA was repeatedly altered, and the process was finally abandoned by the previous administration in 2009.

But why the repeated derailments? Some of my fellow witnesses here today suggest that "not in my backyard" (NIMBY) sensibilities and associated politics are responsible for the failure to license and open Yucca Mountain. But as noted at the outset – this is wrong. The deep misunderstanding of federalism and the necessary role of states at the heart of the NWPA just kept getting lost over the years. The federal exclusivity over nuclear waste regulation was simply presumed *a priori*, without consideration as to whether that might be at the root of the problem.

So how is the misunderstanding of federalism at the root of the problem? The relationship of the federal government to the governments of the 50 states that comprise our republic is the fundamental fact of American politics. Our political system has never easily digested or durably solved profound national problems like voting rights, health care, gun control, carbon restrictions, or the disposal of nuclear waste by either federal fiat or, conversely, by turning matters over to the states entirely.¹⁷ And in every instance of national decision making on these and other complex issues, laws or regulations reached through compromise have taken into account the needs and perspectives of states.

Bedrock environmental laws reflect this fact. With the notable exceptions of the AEA (the organic act for nuclear power) and its progeny, the NWPA, there is federalist intention at the heart of environmental statutes and a role expressly reserved for the states. As examples, the Clean Water Act, Clean Air Act, and Resource Conservation & Recovery Act (RCRA) allow states authority to implement those air, water, and waste programs, respectively, in lieu of a federal program. States that obtain "delegated" authority from the federal government must meet minimum federal standards (and the federal government retains independent oversight and enforcement authority). And generally, depending on state law, those delegated states can impose stricter requirements or different, but no less protective, regulatory mandates that meet the needs of the state in question. Nuclear waste should be no different, but under the AEA and the NWPA, it is different.

So, where do these observations leave us? It is NRDC's firm conclusion that Congress is right to take up these matters, that new nuclear waste legislation must be written, and that a new process must be created. Consistent with the expressed statements of so many in the Congress today, whatever results must be "consent based," concordant with President Obama's bipartisan BRC, and take into account the needs of the industry and their federal champions. But this time, any

¹⁷ For perspective on the ever-present interplay of the constitutional principles of federalism and equal sovereignty of the states and the extraordinary controversies that still attend such matters, see the 2013 landmark (5 votes to 4 votes) Voting Rights decision and its vigorous dissent, *Shelby County, Ala. v. Holder*, 133 S. Ct. 2612 (2013).

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new legislation must also take into account the fundamental need for public and state acceptance and there is only one way to do that, as we explain next.

C. It Is Past Time to Normalize the Treatment of Nuclear Waste Under Environmental Law

State consent and public acceptance of a nuclear waste solution will never be granted unless and until power to make such a decision as to how, when and where such waste is disposed of is shared rather than decided by federal fiat. There is only one way that can happen consistent with the protective, cooperative federalism at the heart of environmental law. Specifically, Congress must finally end the AEA's exemptions from environmental law. Our hazardous waste and clean water laws must have full authority over radioactivity and nuclear waste facilities so that EPA and – most importantly – the states can assert direct regulatory authority. This will necessarily alter the federalism oversight that has been central to the failure of the NWPAs.

The NWPAs's (and AEA's) misunderstanding of the importance of federalism is at the heart of the repository program's failure. If we don't find a way to give EPA and the states regulatory power over nuclear waste – and that is accomplished only by doing away with the environmental exemptions in the AEA – we will not solve this dilemma. Lack of consent from an unwilling host state selected in an expedient demonstration of legislative and administrative power over the (statutorily defined) powerless is a recipe for inaction and, ultimately, disaster in this country, whether the issue is nuclear waste or any other great public concern.

D. NRDC's Five Recommendations to Get the Nuclear Waste Program Back on Track

We can dispose of nuclear waste and do so in a fashion that is both scientifically defensible and publicly accepted, but we cannot do so if we keep using the approach that has failed for more than 50 years. To that end, NRDC urges Congress to – (1) recognize that geologic repositories must remain the focus of any legislative effort; (2) create a coherent legal framework before commencing any geologic repository or interim storage site development process; (3) arrive at a consent-based approach for nuclear waste storage and disposal via the fundamental change in law we described above; (4) address storage in a phased approach consistent with the careful architecture of former Senator Bingaman's S. 3469 (introduced in 2012); and (5) exclude delaying, proliferation-driving and polarizing closed fuel cycle and reprocessing options from this effort to implement the interim storage and ultimate disposal missions.

Rather than repeat mistakes of the last four decades, Congress must create a transparent, equitable process incorporating strong public health standards that are insulated from efforts to weaken those same standards when expedient to license a facility. Such a process can conclude with the licensing and operation of a suitable repository site (or sites) that can be effectively regulated under long effective environmental laws. We will briefly describe the criteria necessary for this path.

1. Recommendation 1 - Deep Geologic Repositories Are The Solution For Nuclear Waste And Must Remain The Focus.

NRDC concurs with the long held, consensus recognition that our generation has an ethical obligation to future generations regarding nuclear waste disposal. Adherence to the principle of deep geologic disposal as the fundamental result of this obligation is consistent with more than

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60 years of scientific consensus. The decision to isolate nuclear waste from the biosphere implicates critical issues, including: financial security, environmental protection, and public health, and no other solutions are technically, economically, or morally viable over the long term. This is why NRDC strongly supports development of a science-based repository program that acknowledges the significant institutional challenges facing nuclear waste storage and disposal. Thus, in whatever legislation moves forward, we urge explicit adherence to the first purpose of the NWPA, 42 U.S.C. § 10131(b)(1), “to establish a schedule for the siting, construction, and operation of repositories that will provide a reasonable assurance that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste and such spent nuclear fuel as may be disposed of in a repository.”

2. Recommendation 2 – Create A Coherent Legal Framework That Ensures The “Polluter Pays” Before Commencing Any Repository Or Interim Storage Site Development.

To avoid repeating failures of past decades and consistent with the bipartisan BRC recommendations, both the standards for site screening and development criteria must be in final form before any sites are considered. Generic radiation and environmental protection standards must also be established prior to consideration of sites. To give this recommendation explicit and simple context, as well as a precise set of language to follow, former Senator Bingaman’s 2012 legislative effort (S.3469, specifically in Sections 304, 305 and 306) set in place some of the necessary structures that could avoid repeating the failure of the Yucca Mountain process. Specifically, the bill would have directed EPA to adopt, by rule, broadly applicable standards for the protection of the general environment from offsite releases of radioactive material from geologic repositories. The bill also directed NRC to then amend its regulations governing the licensing of geological repositories to be consistent with any relevant standard adopted by EPA. Further, embedded in Senator Bingaman’s bill was the requirement that the polluters pay the bill for the contamination created. This bipartisan concept has long history as bedrock American law and must remain in full force in any legislation.

These requirements and this phasing of agency actions in Senator Bingaman’s bill were appropriate (*i.e.*, first EPA sets the standards and then NRC ensures its licensing process meets those standards) – and in the next recommendation we’ll expand on how this coherent legal framework must be improved. But it is key that a coherent legal framework be in place before siting decisions get made. Unfortunately, recent iterations of nuclear waste legislation, including the items on offer today, ignore this wise sequencing, thus ignoring BRC’s recommendation that new, applicable rules be in *final* form before site selection.

And regarding site selection, the Committee would be wise to direct the United States Geological Survey (USGS) to commence an update of its 40 years old analysis of the appropriate geologic media for nuclear waste disposal.¹⁸ In this report, the USGS commences with a useful characterization:

¹⁸ Geological Survey Circular 847, U.S. Geological Survey, *Research in Radioactive Waste Disposal-Fiscal Year 1979*; found online at <https://pubs.usgs.gov/circ/1982/0847/report.pdf>.

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Since the advent of the atomic age, scientists have known that the release of radioactivity could have harmful effects on the environment and on man. It was also recognized that the potential transport of this radioactivity from buried sources to the human environment would involve water. For these reasons and because the U.S. Geological Survey (USGS) is the principal earth-science agency in the Federal Government, the various agencies concerned with nuclear facilities and the testing of nuclear weapons have requested the advice of the USGS for many years on the relation of geology and hydrology to the isolation of radioactivity from the biosphere.

Id. at 1. Then, USGS goes to provide a first cut analysis of many regions across the country, but without any conclusions. The USGS described its first objective was “to identify or contribute to the identification of geohydrologic environments with hydrodynamic, geochemical, and geologic characteristics which provide independent, multiple natural barriers to the migration of radionuclides and which may warrant intensive study.” *Id.* at 3. This is precisely the kind of analysis and science that needs to begin again to start us on the road to a publicly transparent, consent-based siting process.¹⁹

Last, Congress should also direct that standards for site screening and development criteria be based on careful characterization of the radiation sources and resulting doses. The chief sources of radiation in high-level nuclear waste are the beta-decay of fission products like Cs-137 and Sr-90 and the alpha-decay of actinide elements like Uranium, Neptunium and Americium. Beta-decay is the primary source of radiation during the first 500 years of storage, as it originates from the shorter-lived fission products. Then alpha-decay becomes the dominant source after approximately 1,000 years. These radiation sources and doses must be considered to ensure a scientifically defensible legal framework for site selection.

3. Recommendation 3 – Develop A Consent-Based Approach For Nuclear Waste Disposal Through A Fundamental Change In Law.

a. The BRC Failed To Define Consent & Thereby Did Not Point The Way Forward.

For all its laudable qualities, the 2012 BRC report did not accurately portray the fundamental problem facing how to finally solve our nuclear waste disposal challenges. The BRC should have explicitly stated – and we do so here today – that Congress, with its firm understanding of federalism, should legislate a role for EPA and the states in nuclear waste disposal by amending the AEA to remove its express exemptions of radioactive material from environmental laws. State, local and tribal governments *must* be central in any prescription for a successful repository and waste storage program. Regrettably, current law has treated these relationships as

¹⁹ Contemporaneous with and informed by a renewed look across the country, we also urge attention to the BRC’s adoption of the National Academies of Science 2006 transportation recommendations, including “full-scale cask testing, more systematic examination of social or societal risk and risk perception, making planned shipment routes publicly available, shipping stranded spent fuel from shutdown reactor sites first, and executing technical assistance and funding under NWPA, Section 180(c).” BRC Final Report, 81, 150.

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dispensable afterthoughts, preempted from any meaningful power and authority over radioactive waste disposal sites. And S. 1234 suffers the same malady.

Rather than address this problem head on, seven years ago the BRC chose to carefully skirt the matter in its report, while still noting that federal and state tensions are often central in nuclear waste disputes. We think this failure to squarely address the matter provides the continued impetus to ignore this elephant in the room. The BRC's Final Report states in pertinent part:

We recognize that defining a meaningful and appropriate role for states, tribes, and local governments under current law is far from straightforward, given that the Atomic Energy Act of 1954 provides for exclusive federal jurisdiction over many radioactive waste management issues. Nevertheless, we believe it will be essential to affirm a role for states, tribes, and local governments that is at once positive, proactive, and substantively meaningful and thereby reduces rather than increases the potential for conflict, confusion, and delay.

BRC Final Report at 56 (citation omitted).

The first sentence above both makes an observation and states a fact. The observation is that defining a meaningful and appropriate role for states, tribes, and local governments under current law is far from straightforward. The fact is that the AEA provides for exclusive federal jurisdiction over many radioactive waste management issues. According to the BRC, the difficulty of defining a meaningful and appropriate role for states is a "given" because of the fact of exclusive federal jurisdiction.

So what did the BRC suggest Congress do about this? Do away with the explicit federal jurisdiction? Increase the exclusivity of the federal jurisdiction? Somehow argue that the problems can be addressed without altering the exclusive federal jurisdiction in some fashion? There is nothing so clear or direct in the text. Rather, the BRC's very next sentence is simply an aspiration, without any explicit recommendation addressing the "given" (*i.e.*, exclusive federal jurisdiction) that makes the process so difficult. The BRC simply noted that it is "essential to affirm a role for states, tribes, and local governments that is at once positive, proactive, and substantively meaningful." NRDC agrees with the aspiration, but plainly the BRC missed an important opportunity to address the fundamental roadblock to solving our nuclear waste problem.

Without fundamental changes in our current, non-consent based law that explicitly address what the BRC termed, "federal, state and tribal tensions," we will never approach closure and consent on transparent, phased, and adaptive decisions for nuclear waste siting. We now explore in more detail this decades-overdue change in the law.

b. NRDC's Prescription For Ensuring States' Authority – Remove The AEA's Exemptions From Environmental Law.

As we stated at the outset (*supra* at 3), a meaningful and appropriate role for states in nuclear waste storage and disposal siting can be accomplished in a straightforward manner by amending

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the AEA to remove its express exemptions of radioactive material from environmental laws. The exemptions of radioactivity make it, in effect, a *privileged pollutant*. Exemptions from the Clean Water Act and RCRA are at the foundation of state and, we submit, even fellow federal agency distrust of both commercial and government-run nuclear complexes. Removing the exemptions would make the treatment of radioactive waste consistent with every other bedrock environmental law.

As the Committee is aware, most federal environmental laws expressly exclude “source, special nuclear and byproduct material” from the scope of health, safety and environmental regulation by EPA or the states, leaving the field to DOE and NRC. In the absence of clear language in those statutes authorizing EPA (or states where appropriate) to regulate the environmental and public health impacts of radioactive waste, DOE retains broad authority over its vast amounts of radioactive waste, with EPA and state regulators then only able to push for stringent cleanups on the margins of the process. The NRC also retains far reaching safety and environmental regulatory authority over commercial nuclear facilities, with agreement states able to assume NRC authority, but only on the federal agency’s terms.

States are welcome to consult with NRC and DOE, but the federal agencies can, and do, assert preemptive authority as they see fit. This has happened time and again at both commercial and DOE nuclear facilities. This outdated regulatory scheme is the focal point of the distrust that has poisoned federal and state relationships involved in managing and disposing of high-level radioactive waste and spent nuclear fuel, with resulting significant impacts on public health and the environment.

If EPA and the states had full legal authority and could treat radionuclides as they do other pollutants under environmental law, clear cleanup standards could be promulgated, and the Nation could be much farther along in remediating the toxic legacy of the Cold War nuclear weapons production complex. Further, we could likely avoid some of the ongoing legal and regulatory disputes over operations at commercial nuclear facilities. Indeed, the BRC Report discusses New Mexico’s efforts to regulate aspects of the Waste Isolation Pilot Plant under RCRA as a critical positive element in the development of the currently active site.²⁰

Any regulatory change of this magnitude would have to be harmonized with appropriate NRC licensing jurisdiction over facilities and waste, and harmonized with EPA’s existing jurisdiction with respect to radiation standards: but such a process is certainly within the capacity of the current federal agencies and engaged stakeholders. Some states would assume regulatory jurisdiction over radioactive material as delegated programs under the Clean Water Act or RCRA, and others might not. In any event, substantially improved clarity in the regulatory structure and a meaningful state oversight role would allow, for the first time in this country, consent-based and transparent decisions to take place on the matter of developing nuclear waste storage sites and geologic repositories.

²⁰ BRC Final Report at 21.

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Ending the anachronistic AEA exemptions does not guarantee a repository will be sited in the next few years. Indeed, expecting immediate progress on nuclear waste seems a fool's errand in light of the history. But ending these exemptions and providing RCRA authority for nuclear waste solves the most crucial matter for consent – the opportunity for meaningful, ongoing state oversight over nuclear waste. Any such statutory change bars the substantial likelihood of Congressional terms and modifications being exacted from states (that might be willing to host a repository) years into a good faith negotiation on a site. Indeed, while it would be theoretically possible for a future Congress to revisit the AEA and re-insert exemptions from environmental law, it would have to do so in a manner that would remove jurisdictional authority from all states (or Congress would have to single out one state for special treatment). The difficulty of prevailing over the interest of all 50 states rather than simply amending legislation that affects the interests of just one state should be apparent. It is past time to normalize nuclear waste with the rest of environmental law and NRDC sees this as the key to developing a durable consent-based approach.

4. Recommendation 4 – Address Storage In A Phased Approach Consistent With The Careful Architecture Of 2012's S. 3469.

Efforts to initiate a temporary away-from-reactor storage facility – that are now, unfortunately, in process in H.R. 2699 and 3136 – must be inextricably linked with development of a permanent solution. This linkage, which is a crucial guard against a “temporary” storage facility becoming a permanent one, or essentially dictating the choice of a nearby site, should guide the legislative process. Consistent with the BRC's findings, a case can only be made for interim storage if it is an integral part of the repository program and not as an alternative to, or *de facto* substitute for, permanent disposal.

Specifically, the only way in which NRDC could see merit in a pilot project is in a hardened building,²¹ located at one of the currently operating commercial reactor sites. These potential volunteer sites – operating commercial reactors – already have demonstrated “consent” by hosting spent nuclear fuel for years or decades. Far less of the massive funding that would be necessary in the way of new infrastructure would be required, and the capacity for fuel management and transportation is already in place, along with the consent necessary for hosting nuclear facilities in the first instance. Further, Congress would avoid entirely the ferocious fight that is already well underway with New Mexico and Texas citizens, governments, and delegations (as previously happened in Utah and Tennessee) if they continue down the road with the DOE and the existing license applications in those states.

Rather than prematurely bypassing a careful, consent-based process that can arrive at protective, publicly accepted and scientifically defensible solutions, we have urged NRC and industry to focus spent fuel storage efforts on ensuring that all near-term forms of storage meet high standards of safety and security for the decades-long time periods that interim storage sites will be in use. Congress could legislatively direct such efforts and would be wise to do so.

²¹ An example of such a hardened building is the Ahaus facility in Germany.

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5. *Recommendation 5 – Exclude Unsafe, Uneconomic Closed Fuel Cycle And Reprocessing Options From This Effort.*

Both the BRC Recommendations and all the subsequent legislative iterations (including those under discussion today) have, for the most part, wisely resisted inclusion of support for reprocessing, fast reactors, or other closed fuel cycle options as a corollary to new nuclear waste policy. We agree with relevant BRC findings, that there are “no currently available or reasonably foreseeable” alternatives to deep geologic disposal.²² As Senator Bingaman noted in 2012 at the outset of legislative efforts subsequent to the BRC process, “even if we were to reprocess spent fuel, with all of the costs and environmental issues it involves, we would still need to dispose of the radioactive waste streams that reprocessing itself produces and we would need to do so in a deep geologic repository.”²³ At no point should this evolving nuclear waste process include support for so-called closed fuel cycle options.

VI. Conclusion

The history of the federal nuclear waste program has been dismal. But decades from now others will face the precise predicament we find ourselves in today if Congress again tries to push through unworkable solutions contentiously opposed by states, lacking a sound legal and scientific foundation, and devoid of wide public acceptance and consent. Efforts to quickly restart the abandoned Yucca Mountain licensing process or fast track an interim storage facility will not work, will lead to years of litigation, and will thereby derail needed efforts to find scientifically defensible disposal sites. Unless and until Congress fundamentally revamps how nuclear waste is regulated and allows for meaningful state oversight by amending the AEA to remove its express exemptions of radioactive material from environmental laws, the United States is doomed to repeat this dismal cycle until a future Congress gets it right.

NRDC looks forward to continuing to work with the Committee on this difficult topic, and I am happy to answer any questions.

²² BRC Final Report at 100.

²³ See, *Previewing the Nuclear Waste Bill*, Remarks by Chairman Bingaman to the Bipartisan Policy Center, June 6, 2012, online at <https://www.energy.senate.gov/public/index.cfm/democratic-news?ID=490349a4-4b5e-4ac2-83e7-6e9a54c7aa00>.

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NRDC's Response to S. ____, *To establish a new organization to manage nuclear waste, provide a consensual process for siting nuclear waste facilities, ensure adequate funding for managing nuclear waste, and for other purposes.*

Introduction

Chairman Wyden, Ranking Member Murkowski, and Senators Feinstein and Alexander, thank you for providing the Natural Resources Defense Council, Inc. (NRDC) this opportunity to present our views on your discussion draft of S. ____, a bill *[T]o establish a new organization to manage nuclear waste, provide a consensual process for siting nuclear waste facilities, ensure adequate funding for managing nuclear waste, and for other purposes* (hereinafter, "Nuclear Waste Discussion Draft"). Last fall, NRDC testified on S. 3469 – the template for the Nuclear Waste Discussion Draft – before the Energy & Natural Resources Committee. We reference our testimony on S. 3469 throughout our response this day and include it as a resource for the Senators and staff.¹

Mission Statement

NRDC is a national, non-profit organization of scientists, lawyers, and environmental specialists, dedicated to protecting public health and the environment. Founded in 1970, NRDC serves more than one million members, supporters and environmental activists with offices in New York, Washington, Los Angeles, San Francisco, Chicago and Beijing. We have worked on nuclear waste issues since our founding, and we will continue to do so.

Overview of NRDC's Response to Questions

We commence our comments on the Nuclear Waste Discussion Draft with disappointment over severing S. 3469's clear and careful linkage between storage and disposal. Specifically, no "temporary" storage facility should become a permanent one, and this discussion draft, if it becomes law, invites just such an outcome.

A strong linkage that never allows an interim or temporary storage site to become a *de facto* repository should guide the legislative process. NRDC concurs with former Chairman Bingaman's caution that whatever case made for interim storage can be done "only as an integral part of the repository program and not as an alternative to, or de facto substitute for, permanent disposal." Such caution is consistent with decades of national policy and the purpose of the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10131(b)(1). Indeed, while we expressed concerns that the pilot program offered in S. 3469 upset the likelihood of a strong repository

¹ See Attachment 1, Statement of Geoffrey H. Fettus, Senior Attorney, Natural Resources Defense Council, Inc. on S. 3469, *Nuclear Waste Administration Act of 2012*, Before the Committee on Energy & Natural Resources, United States Senate, Washington, D.C., September 12, 2012.

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program, the evisceration of the linkage between storage and disposal found in this Nuclear Waste Discussion Draft dooms the process, and virtually guarantees a repeat of the mistakes made in the failed Yucca Mountain effort.

Specifically, severing strong links between contemporaneous progress on storage and disposal options removes meaningful impetus for adherence to the principle that waste from the nation's nuclear weapons program and its commercial nuclear power plants must be buried in deep geologic repositories, permanently isolated from the human and natural environments. The primacy of geologic disposal as the solution for nuclear waste is consistent with more than 50 years of scientific consensus and, and, most recently, with the findings of President Obama's bipartisan Blue Ribbon Commission on America's Nuclear Future (BRC). No other solutions are technically, economically or ethically viable over the long term for the environment and human society, and NRDC strongly supports the development of a science-based repository program that acknowledges the significant institutional challenges facing spent fuel storage and disposal. Advancing this Nuclear Waste Discussion Draft without reinstating a strong link between storage and disposal does grave harm to the effort to find a final solution for nuclear waste.

We remind you the United States attempted to sever the link between interim storage and final disposal previously, only to conclude doing so was a mistake. Beginning in 1957, the Atomic Energy Commission (AEC) pursued a geologic repository program for high-level radioactive waste (HLW) in a salt deposit near Lyons, Kansas. Opposition initially came from the Kansas Geological Survey but soon spread. Concerns over conditions in the mine, the presence of numerous oil and gas wells in the vicinity, and the fact that there was solution mining at an operating adjacent salt mine operated by American Salt Company forced the AEC to abandon the site in 1972. Following the demise of the Lyons repository effort, later in 1972 the AEC announced it intended to develop a 100-year Retrievable Surface Storage Facility (RSSF). The U.S. Environmental Protection Agency (EPA) and others opposed this interim storage proposal because it diverted attention and resources from efforts to find a permanent geologic disposal solution. As a consequence of this opposition, the Energy Research and Development Agency (ERDA) abandoned its plans for a RSSF in 1975. The similarities of this history with failed attempts to force acceptance of the proposed Yucca site should be apparent.

As we have noted repeatedly over the last few years, the success of any legislative outcome depends on a consensus process that— (1) recognizes that repositories must remain the focus of any legislative effort; (2) creates a coherent legal framework before commencing any geologic repository or interim storage site development process; (3) arrives at a consent-based approach for nuclear waste storage and disposal via a fundamental change in law; (4) addresses storage in a phased approach consistent with the careful architecture of S. 3469 and NRDC's suggestions; and (5) excludes polarizing closed fuel cycle and reprocessing options from this effort to implement the interim storage and ultimate disposal missions. The Nuclear Waste Discussion Draft is a retreat from some of the better aspects of last year's S. 3469 and we urge the Senators to go back to that earlier template and to incorporate the suggestions that follow.

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Questions from the Senators

1. Should the Administrator take into account, when considering candidate storage facility sites, the extent to which a storage facility would: (a) unduly burden a State in which significant volumes of defense wastes are stored or transuranic wastes are disposed of; or (b) conflict with a compliance agreement requiring the removal of nuclear waste from a site or a statutory prohibition on the storage or disposal of nuclear waste at a site? Alternatively, should the State and other non-federal parties seeking to site a candidate storage facility be allowed to determine whether they are unduly burdened? Should the final consent agreement, which would be sent to Congress for ratification, contain an authorizing provision to amend any conflicting compliance agreement or statutory prohibition?

NRDC Response:

This first question has several parts and presumes the viability of consolidated interim storage sites as defined by the Nuclear Waste Discussion Draft. In order to present an orderly response to the important ideas contained in the question, we begin with (a) our prescription for how to address a pilot project for consolidated interim storage and avoid supporting closed nuclear fuel cycles; we then turn to the questions' related matters of (b) undue burdens on states and (c) meaningful state authority. We conclude the response with (d) our prescription for meaningful state authority.

To understand our specific responses, we begin with four general observations:

- 1.) Consolidated storage of spent fuel from currently operating reactor sites at an alternate, previously greenfield site is unnecessary and ill-advised. Any pilot project for consolidated storage should be limited to hardened, dry-cask storage of stranded spent fuel from shut down reactor sites.
- 2.) If emergency conditions arise at an existing operating reactor site, *e.g.*, due to an earthquake, discovery of a fault under the reactor(s), or a disaster related condition, that threatens the environment and public health, the reactors should be shut down and the spent fuel at the site would qualify as stranded spent fuel.
- 3.) Existing and currently operating reactor sites have government and implicit public consent for interim storage of spent fuel.
- 4.) Consolidated spent fuel storage should not be viewed as a step toward, or means of furthering, spent fuel reprocessing.

(a) NRDC's Support for Interim Storage Pilot Project at a Commercial Reactor Site

As preliminary matter, NRDC is not opposed in principle to commencing work on consolidated interim storage, and development of an interim storage facility for stranded fuel. Indeed, we proposed a set of steps to develop a pilot interim storage option in our testimony on S. 3469.

Specifically, NRDC sees merit in a pilot project to address the total stranded spent fuel at closed reactor sites (currently eleven sites), and where spent fuel is stored in dry casks within one or more hardened buildings similar to the Ahaus facility in Germany. Potential volunteer sites

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already demonstrating “consent” are found in operating commercial reactors. The utility of using existing commercial operating reactor sites rather than burdening new areas with spent nuclear fuel should be apparent. Far less in the way of new infrastructure is required and the capacity for fuel management and transportation is already in place, along with consent necessary for hosting nuclear facilities in the first instance. And by keeping consolidated, interim-stored spent nuclear fuel under the guardianship of the nuclear industry that produced the waste in the first instance, Congress ensures that careful progress will continue with the necessary repository program.

Further, the Nuclear Waste Discussion Draft is silent on an important matter – the current configuration of spent fuel storage at a number of operating reactor sites. The BRC cited no evidence for why continued reliance on densely-packed wet storage should be accepted as adequate in light of the health, safety and security risks that interim wet storage poses. This is true regardless of the seismic, population density, or other natural factors that might create concern with the current storage configuration. NRDC and others noted the BRC was negligent in not recommending that Congress statutorily direct movement of spent fuel from wet pools to dry casks as soon as practical, *i.e.*, as soon as spent fuel has cooled sufficiently to permit safe dry cask storage, generally about five to seven years following discharge from the reactor. We again urge Congress to act on this issue in this legislation or even a stand-alone bill.

To reiterate, a pilot interim storage project housed at an existing commercial reactor site addressing issues of stranded fuel would go far in addressing a number of public safety and environmental harms, do no damage to a carefully constructed bill that focuses on repository development, and presents an option of greater efficiency and expediency.

By contrast, the unlimited interim storage allowed for in the Nuclear Waste Discussion Draft, regardless of the state of repository program, is an expedient course for the narrow financial interests of industry, does little to advance final repository solutions, and sets up a clear set of incentives for reprocessing and fast reactors. This is an enormous step back from S. 3469. Last year former Chairman Bingaman noted:

The Commission wisely resisted the allure of reprocessing, concluding that there is “no currently available or reasonably foreseeable” alternative to deep geologic disposal. In short, we need a deep geologic repository. Even if we were to reprocess spent fuel, with all of the costs and environmental issues it involves, we would still need to dispose of the radioactive waste streams that reprocessing itself produces and we would need to do so in a deep geologic repository.

NRDC concurs. No limit consolidated interim storage increases the probability of continued efforts at reprocessing the spent fuel, resulting in plutonium separations with no way to ensure that the plutonium would not be used to make nuclear weapons. Inclusion of incentives for reprocessing and fast reactors would necessitate NRDC’s objection to such nuclear waste legislation. In addition, reprocessing is expensive, environmentally disastrous, and a serious non-proliferation threat. As the BRC found, reprocessing is also not a viable waste management strategy because it does not significantly reduce the radioactivity of the waste that must be stored

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in a repository. Indeed, just as for spent fuel, we must also work to resolve the path to a repository for the millions of gallons of dangerous, highly radioactive waste generated by spent nuclear fuel reprocessing in the United States over the past half century.

In contrast to this setup for reprocessing and fast reactors, NRDC's recommendation of an interim storage pilot project that is strictly limited to existing commercial operating sites avoids many of the burdensome problems posed and assumed in the question. First, our consolidated pilot proposal gets the ball rolling on spent fuel almost all parties agree is "stranded." Second, with its strict limit to shut down reactors and careful attention to establishing appropriate safety criteria, any such interim site could solve immediate public safety risks but not take the air out of meaningful progress geologic repository program.

(b) Undue Burdens

Turning to the specific subparts of the question about consolidated storage sites, NRDC asserts that any Administrator of a federal nuclear waste program should take into account a host of factors in considering equities of nuclear waste disposal, including existing burdens of defense-generated HLW or transuranic (TRU) waste, cleanup/compliance agreements, and statutory prohibitions against import of nuclear waste. Other considerations must include: an assessment of existing infrastructure and the potential for consent for spent fuel management; environmental justice; and reducing the need to unnecessarily transport spent fuel prior to final disposal in a repository.

Addressing the alternative question posed, of whether a (1) State should be allowed to determine the extent of any "undue burden," or (2) should any final consent agreement contain an authorizing provision to amend conflicting compliance agreements or statutory prohibitions, NRDC notes that the Senators' question suggests States – if operating consistent with the text found in Section 304 of Nuclear Waste Discussion Draft – could somehow have meaningful oversight roles, which we address at length below.

(c) State Authority

As a first matter, NRDC does not believe the Nuclear Waste Discussion Draft provides full and clear authority to States to determine the extent of any undue burden or necessarily to negotiate conflicting compliance agreements or statutory prohibitions. As we noted last fall, while several components of subsection 304(f) have merit – as it provides language responsive to the BRC's recommendation that any successful approach must be "consent based" and allow affected States and communities to retain control – the proposed legislation falls short of the mark in developing solutions and in way that sheds light on the Senators' query.

Section 304 provides allowances for any recipient state to have regulatory oversight authority and authority over operational limitations at either a storage or disposal site. Such things are crucial recognitions of the need for meaningful state oversight that have been missing from previous efforts at nuclear waste disposal. Equally important is the statutory requirement that Congress must ratify (and, assuredly, the President must therefore sign) any consent agreement.

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And finally, the statutory direction that neither party (the federal or state government) may unilaterally amend or revoke the contract is a concept that NRDC fully supports.

But for all those laudable qualities in Section 304, we believe the suggested consent agreements will not solve the fundamental problem facing nuclear waste disposal nor allow States the oversight role suggested by the Senators' question. Rather, Congress, with its firm understanding of federalism, should legislate a role for states in the matter of nuclear waste disposal by amending the Atomic Energy Act (AEA) to remove its express exemptions of radioactive material from environmental laws.

State, local and tribal governments must be central in any prescription for a successful repository and waste storage program. The BRC recognized as much and noted federal and state tensions are often central in nuclear waste disputes. The BRC's Final Report states in pertinent part:

We recognize that defining a meaningful and appropriate role for states, tribes, and local governments under current law is far from straightforward, given that the Atomic Energy Act of 1954 provides for exclusive federal jurisdiction over many radioactive waste management issues. Nevertheless, we believe it will be essential to affirm a role for states, tribes, and local governments that is at once positive, proactive, and substantively meaningful and thereby reduces rather than increases the potential for conflict, confusion, and delay.

Final Report at 56 (citation omitted).

Without fundamental changes in the law to address such federal, state and tribal tensions, we will never approach closure and consent on transparent, phased, and adaptive decisions for nuclear waste siting. Indeed, even if such a provision as Section 304(f) is enacted into law, we think it likely disputes will continue unchecked unless Congress avails itself of the opportunity to finally suggest a decades-overdue change in the law which we will now explore in more detail.

(d) NRDC's Prescription for State Authority – Remove the AEA's Exemptions from Environmental Law

A meaningful and appropriate role for states in nuclear waste storage and disposal siting can be accomplished in a straightforward manner by amending the AEA to remove its express exemptions of radioactive material from environmental laws. The exemptions of radioactivity make it, in effect, a privileged pollutant. Exemptions from the Clean Water Act and the Resource Conservation and Recovery Act (RCRA) are at the foundation of state and, we submit, even fellow federal agency distrust of both commercial and government-run nuclear complexes.

As the Senators are aware, most federal environmental laws expressly exclude "source, special nuclear and byproduct material" from the scope of health, safety and environmental regulation by EPA or the states, leaving the field to Department of Energy (DOE) and Nuclear Regulatory Commission (NRC). In the absence of clear language in those statutes authorizing EPA (or states where appropriate) to regulate the environmental and public health impacts of radioactive waste,

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DOE retains broad authority over its vast amounts of radioactive waste, with EPA and state regulators then only able to push for stringent cleanups on the margins of the process. Indeed, the BRC Report discusses the State of New Mexico's efforts to regulate aspects of the Waste Isolation Pilot Plant under RCRA as critical positive element in the development of the currently active site (Final Report at 21). The NRC also retains far reaching safety and environmental regulatory authority over commercial nuclear facilities, with agreement states able to assume NRC authority, but only on the federal agency's terms.

States are welcome to consult with the NRC and the DOE, but the agencies can, and will, assert preemptive authority where they see fit. This has happened time and again at both commercial and DOE nuclear facilities. This outdated regulatory scheme is the focal point of the distrust that has poisoned federal and state relationships involved in managing and disposing of HLW and spent nuclear fuel, with resulting significant impacts on public health and the environment.

If EPA and the states had full legal authority and could treat radionuclides as they do other pollutants under environmental law, clear cleanup standards could be promulgated, and the Nation could be much farther along in remediating the toxic legacy of the Cold War. Further, we could likely avoid some of the ongoing legal and regulatory disputes over operations at commercial nuclear facilities. Any regulatory change of this magnitude would have to be harmonized with appropriate NRC licensing jurisdiction over facilities and waste and harmonized with EPA's existing jurisdiction with respect to radiation standards: but such a process is certainly within the capacity of the current federal agencies and engaged stakeholders. Some states would assume regulatory jurisdiction over radioactive material, others might not. But in any event, substantially improved clarity in the regulatory structure and a meaningful state oversight role would allow, for the first time in this country, consent-based and transparent decisions to take place on the matter of developing storage sites and geologic repositories.

Section 304(f) is a detailed attempt to remedy regulatory deficiencies that could be more simply and effectively handled by ending exemptions under the AEA. Removing the ability of the United States to unilaterally break the terms of the contract could potentially give a state some measure of comfort that the agreement it had painstakingly negotiated over "undue burdens" or conflicting compliance agreements will hold fast. But there would be nothing stopping Congress from revisiting this law, ratifying the consent agreements with conditions, and thereby removing whatever meaningful restraint a state might assert. Thus, ultimately what is offered as a thoughtful contract provision could be rendered inoperable, and could eviscerate a state's protection against altered, less favorable terms.

By contrast, ending the anachronistic AEA exemptions solves the matter of meaningful state oversight and does not carry with it substantial likelihood of congressional terms and modifications exacted from states years into a good faith negotiation on a site. Indeed, while it would be possible for a future Congress to revisit the AEA and re-insert exemptions from environmental law, it would have to do so in a manner that would remove overdue jurisdictional authority from all states (or Congress would have to single out one state for special treatment).

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The difficulty of prevailing over the interest of all 50 states rather than simply amending legislation that affects the interests of just one state should be apparent.

NRDC's Concluding Thoughts on Question 1 from the Senators

Interim storage configurations that provide clear incentives for reprocessing and fast reactors guarantees strong objection from NRDC. And leaving assessments of “undue burdens” or reconciling conflicting cleanup and compliance obligations to the Administrator illustrates our contention that the ultimate decision making power still resides with the federal entity, thus running afoul of the dangers BRC warned about by failing to allow States meaningful oversight roles.

And further, relying on Section 304 of Nuclear Waste Discussion Draft to provide the meaningful oversight role States seek is another recipe for gridlock as there is nothing in the law stopping Congress from revisiting any negotiated agreement, ratifying the consent agreements with conditions, and thereby removing whatever meaningful restraint a state might assert. The Energy Department’s current effort to reclassify HLW and ship that waste to the WIPP Project in New Mexico illustrates just how an agency can and will take such liberties. *See Attachment 2, NRDC, SRIC and HC Marc 27, 2013 letter to Energy Secretary Chu, Re: Proposal to Ship Hanford High-Level Radioactive Waste to New Mexico.*

In contrast to the difficulties in structuring state and federal roles noted above, ending the anachronistic AEA exemptions solves the matter of meaningful state oversight once and for all. It is past time for Congress to end anachronistic AEA exemptions from environmental law and this is the legislation where it should finally be done.

2. Should the bill establish a linkage between progress on development of a repository and progress on development of a storage facility? If so, is the linkage proposed in section 306 of the bill appropriate, too strong, or too loose? If a linkage is needed, should it be determined as part of the negotiations between the state and federal governments and included in the consent agreement rather than in the bill?

NRDC Response:

NRDC asserts that the bill should establish a linkage between progress on development of a repository and progress on development of a storage facility, and that the linkage proposed in section 306 of the bill is too loose. The needed linkage should not be determined as part of the negotiations between the state and federal governments and included in the consent agreement. Linkage between storage and disposal should be required and in the legislation.

Appropriating the term from the question, the linkage between storage and disposal provided in Section 306 is indeed far too loose. NRDC believes the linkage originally suggested in our fall 2012 testimony on S.3469 and here today in response to Question 1 provides a workable plan, allowing for both a meaningful pilot project on interim storage that does not undercut what the BRC made perfectly clear is the solution for nuclear waste.

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Unfortunately, this iteration of Section 306 severs the strong linkage:

Notwithstanding subsection (a), the Administrator may site, construct, and operate storage facilities in the absence of parallel progress on the siting, construction, or operation of a repository if the Administrator is making substantial progress towards siting, constructing, and operating a repository, as measured by the mission plan.

Section 306(b). Unfortunately, measurement by the “mission plan” does not provide a meaningful linkage between storage and disposal. In brief, the “Mission plan” is the report required under section 504, presented to Congress, the Oversight Board, the NRC, the Nuclear Waste Technical Review Board and then released for public comment. All this is to be done in short order. The proposed mission plan is due not later than 1 year after the date of enactment of the Nuclear Waste Discussion Draft. There is no specific date for final issuance, and there is provision for revision to reflect major changes in the planned activities, schedules, milestones, and cost estimates reported in the mission plan.

The pertinent dates of the mission plan are found in subsection (b), where the Administrator is to set out schedules for operation of a pilot facility not later than December 31, 2021; a storage facility for “nonpriority” waste not later than December 31, 2025; and a repository not later than December 31, 2048, likely more than three decades distant from the passage of any iteration of the Nuclear Waste Discussion Draft. Any analysis of “meaningful” progress on the repository during the first few years subsequent to the Act is meaningless when weighed against a scale of more than 3 decades. The likelihood of halting movement of nuclear waste – expedient for the industry – is unlikely in the extreme. Further, the allowance for revision of the mission plan can be used to simply shunt aside observations about problems in repository development or rapid development of the interim storage sites.

The certification process and suspension proceedings in subsections (c) and (d) could prove to be politically fraught, but ultimately meaningless in light of the time frames. The oversight board, comprised of the Deputy Director of the Office of Management and Budget, the Chief of Engineers of the Army Corps of Engineers and the Deputy Secretary of Energy, with the President designating one chair, is unlikely to brook any suggestion that any lack of progress on something decades away should halt an expedient activity for some of the largest corporations in the United States.

Rather than the hard cap on volume present in S. 3469 or, as NRDC suggests, an interim storage pilot project at an operating commercial site limited to the stranded fuel, the Nuclear Waste Discussion Draft sets out a functionally meaningless process that requires the Administrator to move quickly with consolidated interim storage and posit (likely rosy) scenarios about repository development decades away.

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3. *Should the bill establish separate storage and disposal programs with clearly defined requirements for each, with any linkage negotiated in the consent agreement between the federal and non-federal parties, to allow the two program to run on separate, but parallel tracks, as proposed in the alternative section 305 (which would replace section 304(b)-(g) of the draft bill)?*

NRDC Response:

No.

The proposed alternative section 305 does away the residual linkage left by Section 306 of the Nuclear Waste Discussion Draft. First, alternative section 305 hypercharges the consolidated interim storage process by requiring the Administrator to issue a request for proposals for cooperative agreements for a pilot program for storing priority waste within 180 days. Second, the alternative section does away with the Nuclear Waste Discussion Draft's fig leaf *Suspension For Lack Of Substantial Progress*, severing even the barest link that remained, leaving the repository program and storage program on two entirely separate tracks. The priority and preference in site selection for sites suitable for co-location of a storage facility and a repository are cold comfort. Preference and priority for co-location are not presented as binding factors, and even if they were, such preference presents a host of problems that could lead to the consolidated storage site morphing into the de facto repository, regardless of the progress in the repository program.

Alternative section 305 fails to heed Chairman Bingaman's caution that whatever case made for interim storage can be done "only as an integral part of the repository program and not as an alternative to, or de facto substitute for, permanent disposal." Such a provision, if enacted into law, is inconsistent with decades of national policy and the purpose of the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10131(b)(1).

4. *To what extent should the siting and consensus approval process for spent fuel storage facilities differ from that for the repository? Should the Administrator be required to conduct sufficient site-specific research (referred to as "characterization" in the bill) on candidate storage sites to determine if they are suitable for storing nuclear waste or only on candidate repository sites to determine if they are suitable for geologic disposal of nuclear waste? Should the Administrator be required to hold public hearings both before and after site characterization (as required by current law in the case of the Yucca Mountain site) or only before site characterization?*

NRDC Response:

The siting and consensus approval for storage and repository facilities should be strongly consistent, if not precisely the same. NRDC has five recommendations for ensuring the success of any legislative outcomes— (1) recognize that repositories must remain the focus of any legislative effort; (2) create a coherent legal framework before commencing any geologic repository or interim storage site development process; (3) arrive at a consent-based approach for

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nuclear waste storage and disposal via a fundamental change in law; (4) address storage in a phased approach consistent with the careful architecture of S. 3469, not what is currently under review in the Nuclear Waste Discussion Draft; and (5) exclude polarizing closed fuel cycle and reprocessing options from this effort to implement the interim storage and ultimate disposal missions. We discussed these five recommendations in our testimony last fall on S. 3469 and will not repeat them here.

It should suffice to say that ensuring a coherent legal framework is crucial to avoid repeating the failure of the proposed Yucca Mountain process. We urged the BRC and we urge the Senators collectively now to be explicit and state clearly in legislation that both the standards for site screening and development criteria be in final form before any sites are considered. We also urge that generic radiation and environmental protection standards be established prior to consideration of any sites. S. 3469 went much of the way toward structuring such a result, but we have some specific concerns with that iteration and have even more concerns with the Nuclear Waste Discussion Draft and Alexander-Feinstein alternative.

4.b. Should the Administrator be required to conduct sufficient site-specific research (referred to as “characterization” in the bill) on candidate storage sites to determine if they are suitable for storing nuclear waste or only on candidate repository sites to determine if they are suitable for geologic disposal of nuclear waste?

Not necessarily – as we noted, a pilot project to address the current total stranded spent fuel at the eleven closed reactor sites, accommodated in a hardened building at one or more sites that follows the example of the Ahaus facility in Germany. Potential volunteer sites already demonstrating “consent” are operating commercial reactors. The utility of using existing commercial operating reactor sites rather than burdening new areas with spent nuclear fuel should be apparent. Far less in the way of new infrastructure is required and the capacity for fuel management and transportation is already in place, along with consent necessary for hosting nuclear facilities in the first instance. And by keeping consolidated, interim-stored spent nuclear fuel under the guardianship of the nuclear industry that produced the waste in the first instance, Congress ensures that careful progress will continue with the necessary repository program.

4.c. Should the Administrator be required to hold public hearings both before and after site characterization (as required by current law in the case of the Yucca Mountain site) or only before site characterization?

Yes, the Administrator should be required to hold public hearings both before and after site characterization. The engagement of the public should be seen as a long running and iterative partnership process for the development of a repository program based on sound science and consensus acceptance. Ending the public hearing process after site characterization is a recipe similar to the mistakes of the past.

After more than 55 years of failure, policy makers must look with clear eyes at the history of U.S. nuclear waste policy, an exercise that President Obama’s Blue Ribbon Commission only

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partially accomplished. The BRC recommended geologic repositories and the Nuclear Waste Discussion Draft suggests a new path to arrive at them. But we emphasize today that the record created by this process should fully reflect the story of how the EPA, the DOE, the NRC, the Justice Department, and the U.S. House and Senate together corrupted the process for developing and implementing licensing criteria for the Yucca Mountain repository. Public engagement was not the source of Yucca Mountain's demise. Failure to understand that history will doom any new effort.

While the BRC recognized that the 1987 amendments to the NWSA were "highly prescriptive" and "widely viewed as being driven too heavily by political considerations," those observations are insufficiently critical assessments of what actually occurred. We recommend Congress be clear about what happened to avoid repeating the mistakes of the past. Put bluntly, first DOE and then Congress corrupted the site selection process leading to Yucca Mountain as the only option. The original NWSA strategy contemplated DOE first choosing the best out of four or five geologic media, then selecting a best candidate site in each media alternative. Next, DOE was to narrow the choices to the best three alternatives, finally picking a preferred site for the first of two repositories. A similar process was to be used for a second repository. Such a process, if it had been allowed to fairly play out, would have been consistent with elements of the adaptive, phased, and science-based process to which the BRC referred.

But instead, what happened was that DOE first selected sites that it had pre-determined. Then in May of 1986 DOE announced that it was abandoning a search for a second repository, and narrowed the candidate sites from nine to three, leaving in the mix the Hanford Reservation in Washington (in basalt medium), Deaf Smith County, Texas (in bedded salt medium) and Yucca Mountain in Nevada (in unsaturated volcanic tuff medium). Next, all equity in the site selection process was abandoned in 1987, when Congress, confronted with cost of characterizing three sites and strong opposition to the DOE program, amended the NWSA of 1982 to direct DOE to abandon the two-repository strategy and to develop only the Yucca Mountain site. Not by coincidence, at the time, Yucca Mountain was DOE's preferred site, as well as being the politically expedient choice for Congress. The abandonment of the NWSA site selection process jettisoned any pretense of a science-based approach, led directly to the loss of support from the State of Nevada, diminished Congressional support (except to ensure that the proposed Yucca site remained the sole site), and eviscerated public support for the Yucca Mountain project.

Briefly, with respect to Title II and the creation of a Nuclear Waste Administration, as NRDC has expressed numerous times over past years, the failures of the AEC and its successor agencies (ERDA, DOE and the NRC) make the case that an alternative institutional vehicle for nuclear waste disposal is necessary. However, we note that any such new federal entity must be subject to all of the nation's environmental laws, including the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, *et seq.* We presume such is the case for this proposed agency. Alternative language may be necessary to clarify specific application of NEPA at certain junctures of the siting process (for example, in support of the initial guidelines), but it is clear to us that NEPA has full application to the newly proposed Nuclear Waste Administration.

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Additionally, it has long been NRDC's view that independent oversight is critical to safe and environmentally sound operation of DOE nuclear weapons production facilities and commercial nuclear facilities regulated by the NRC. Indeed, the full suite of environmental laws should have full application. We addressed this issue in more detail when discussing Section 304, *infra* at ____.

5. Should the siting process in section 304 of the draft bill be streamlined? If so, how?

NRDC Response:

No.

Efforts to "streamline" or "reduce regulatory obligations" are in significant measure how the Yucca project was derailed. Rather than trying to anticipate an imaginary parade of onerous regulatory obligations that lengthen this decades long dispute over nuclear waste disposal, NRDC urges careful attention to creating a coherent legal framework before commencing any geologic repository or interim storage site development process. Then (and only then) arriving at a consent-based approach for nuclear waste storage and disposal consistent with our history of federalism. *See* pages 4-7 *infra*.

As we noted last fall, while several components of section 304 have merit – as it provides language responsive to the BRC's recommendation that any successful approach must be "consent based" and allow affected States and communities to retain control – the proposed legislation falls short of the mark in developing solutions and needs no streamlining.

Section 304(a)

Turning to specific subsections and how they might be reformed, section 304(a) sets out the general terms of a process that reflects the transparent, adaptive, consent based qualities called for by the BRC. Allowing affected communities to decide, and on what terms, they will host a nuclear waste facility is an important step forward that has not heretofore existed in nuclear legislation.

Section 304 (b)

Next, section 304(b) wisely provides for consistency with section 112(a) of the NWSA but requires issuance of guidelines not later than one year after the date of enactment of this Act. We think one year an inadequate time frame. We support such consistency with the enumerated provisions in section 112(a) and agree that additional attention is important to detailed considerations such as minimizing impacts of transportation and handling and to not unduly burden states storing significant volumes of defense or transuranic wastes is important. But it is our strong recommendation that more time should be provided for the agency to get up and running before final guidelines become statutory time restrictions. Indeed, such guidelines must comply with NEPA, and ensuring those guidelines are in place prior to consideration of any storage or disposal site could go a long way in avoiding the mistakes of the past.

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Section 304(c)

Section 304(c) sets up a process for determining candidate sites that, in general terms, could chart a process arriving at protective disposal solution, if it is: (1) undertaken subsequent to imposition of sound final site screening and development criteria and sound final generic radiation and environmental protection standards; and (2) not hamstrung or corrupted by Congress, other federal agencies or the Executive Branch. However, the Environmental Assessment required in section 304(c)(4) should explicitly be termed an Environmental Impact Statement to ensure there is no confusion regarding NEPA obligations.

As a final comment on section 304(c)(4)(A), we think any legislative record associated with the Nuclear Waste Discussion draft, should such a thing come to pass, must make it clear that there is no transference of the NRC's "waste confidence" obligation to the Administrator. By its terms, the "confidence" sought in section 304(c)(4)(A) is whether the environmental assessment provides the Administrator with a reasonable basis to be confident that "the proposed nuclear waste facility at the proposed site" will be safe. The "confidence" at stake in the NRC's waste confidence decision is "whether there is reasonable assurance that an off-site storage solution will be available by ... the expiration of the plant's operating licenses, and if not, whether there is reasonable assurance that the fuel can be stored safely at the sites beyond those dates." *Minnesota v. NRC*, 602 F.2d 412, 418 (D.C. Cir. 1979); *see also, New York, et al. v. NRC*, 681 F.3d 471 (D.C. Cir. 2012). The confidence required of the NRC is nuclear waste generated at a reactor can be safely stored somewhere and stems from the NRC's NEPA and Atomic Energy Act obligations. The confidence required of the Administrator under section 304(c)(4)(A) relates to a specific candidate site and stems from the Administrator's obligation under this legislation to select sites that have a reasonable prospect of proving suitable.

6. *Should the new entity be governed by a single administrator or by a board of directors?*
 (a) *If by a single administrator, should the administrator serve for a fixed term? If so, how long should the term of service be? Should the legislation prescribe qualifications for the administrator? If so, what should be the selection criteria?*

NRDC Response:

NRDC advises that the new entity be governed by a board of directors. We think that the lengthier processes associated with arriving at consensus decisions – as compared to the decision making capacity of a single administrator – can be painful but are worthwhile. It is NRDC's view that the success of any legislative outcomes will depend on a consensus process that includes– (1) recognize that repositories must remain the focus of any legislative effort; (2) create a coherent legal framework before commencing any geologic repository or interim storage site development process; (3) arrive at a consent-based approach for nuclear waste storage and disposal via a fundamental change in law; (4) address storage in a phased approach consistent with, as one example, the careful architecture of S. 3469 and our associated clarifications and suggestions; and (5) exclude polarizing closed fuel cycle and reprocessing options from this effort to implement the interim storage and ultimate disposal missions. A single administrator could upset the entire disposal architecture in one term, but a diverse board of directors is less

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likely to do so in short order. The BRC is a good example where diverse viewpoints (and not nearly as diverse as we suggested or think was necessary) can and could produce some useful results.

(b) If by a board of directors, how many people should comprise the board and how should they be selected?

NRDC Response:

As an initial suggestion we suggest somewhere between 5 to 9 members directing the operations of a CEO. Representation should be balanced by party representation, government (federal, state, tribal), non-governmental organizations, and industry. The legislation establishing the board of directors should have an explicit requirement that the majority on the board not be composed of members with existing or historical ties to the nuclear industry. Such a requirement should also be attentive to the revolving door that has existed between government service at NRC, DOE and the nuclear industry.

7. The Blue Ribbon Commission recommended establishment of both a board of directors for management oversight (whose "primary role ... is not to represent all stakeholder views, but rather to carry out fiduciary responsibilities for management oversight") and "a larger and more widely representative stakeholder advisory committee." The draft bill responds to these recommendations, first, by establishing a Nuclear Waste Oversight Board of senior federal officials and, second, by authorizing the Administrator to establish advisory committees. Should the Oversight Board and advisory committee be combined into a single body to perform both management oversight and stakeholder representation functions? Should the focus and membership of any advisory committees be established in the legislation or left to the Administrator?

NRDC Response:

As we described briefly above, we believe direct control and oversight of the program could and should exist in a board of directors and a directly accountable Chief Executive Officer that carries out the duties, attendant to the specific direction of the Board. Ensuring that the board is not heavily composed of members with existing or historical ties to the nuclear industry would go far in ensuring improved public trust and acceptance of a nuclear waste storage and disposal program.

8. Dr. Meserve testified in 2012 that representatives of stakeholders and public utility commissioners should be added to the Nuclear Waste Oversight Board. Would these additions make the Board better able to carry out its fiduciary oversight mission effectively?

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NRDC Response:

Yes. Outside “oversight” could only improve what has for too long been a closed and insular process.

For additional information or questions regarding these responses, please do not hesitate to contact us.

Sincerely,

A handwritten signature in cursive script, reading "Geoffrey H. Fettus".

Geoffrey H. Fettus
Senior Attorney
Natural Resources Defense Council
1152 15th St., NW #300
Washington, D.C. 20005
(202) 289-6868
gfettus@nrdc.org

NRDC Attachment B

State of New Mexico

Michelle Lujan Grisham
Governor

June 7, 2019

The Honorable Rick Perry
Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

The Honorable Kristine Svinicki
Chairman
U.S. Nuclear Regulatory Commission
Mail Stop O-16B33
Washington, DC 20555-0001

Dear Secretary Perry and Chairman Svinicki:

I write to express my opposition to the proposed interim storage of high-level radioactive waste in the state of New Mexico. The interim storage of high-level radioactive waste poses significant and unacceptable risks to New Mexicans, our environment and our economy. Furthermore, the absence of a permanent high-level radioactive waste repository creates even higher levels of risk and uncertainty around any proposed interim storage site.

As you know, the Nuclear Regulatory Commission (NRC) is evaluating the issuance of a 40-year license to Holtec International for a consolidated interim storage facility in southeastern New Mexico. As proposed, this facility would store spent nuclear fuel (SNF) and reactor-related materials greater than low-level radioactive waste.

A facility of this nature poses an unacceptable risk to New Mexicans, who look to southeastern New Mexico as a driver of economic growth in our state. New Mexico's agricultural industry contributes approximately \$3 billion per year to the state's economy, \$300 million of which is generated in Lea and Eddy Counties, where the proposed facility is to be sited.

Further, the Permian Basin, situated in west Texas and southeastern New Mexico, is the largest inland oil and gas reservoir and the most prolific oil and gas producing region in the world. New Mexico's oil and natural gas industry contributed approximately \$2 billion to the state last year. According to the U.S. Energy Information Administration (EIA), Lea County and Eddy County were ranked the second and sixth oil-producing counties in the country, respectively, earlier this year, with production continuing to increase.

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June 7, 2019

The Honorable Rick Perry
The Honorable Kristine Svinicki

Establishing an interim storage facility in this region would be economic malpractice. Any disruption of agricultural or oil and gas activities as a result of a perceived or actual incident would be catastrophic to New Mexico, and any steps toward siting such a project could cause a decrease in investment in two of our state's biggest industries. For those reasons, the New Mexico Cattle Growers' Association, the New Mexico Farm and Livestock Bureau and the Permian Basin Petroleum Association have all sent me letters opposing high-level waste storage in southeastern New Mexico. I have attached their letters for your review.


In addition to significant economic concerns about this project's potential impact on agriculture and the oil and gas industry, I am concerned about the financial burden it could place on the state and local communities. Transporting material of this nature safely requires both well-maintained infrastructure and highly specialized emergency response equipment and personnel that can respond to an incident at the facility or on transit routes. The state of New Mexico cannot be expected to support these activities.

Finally, given that there is currently no permanent repository for high-level waste in the United States, any interim storage facility will be an indefinite storage facility. Over this time, it is likely that the casks storing SNF and high-level wastes will lose integrity and will require repackaging. Any repackaging of SNF and high-level wastes increases the risk of accidents and radiological health risks. Again, New Mexicans should not have to tolerate this risk.

Given the potential for adverse impacts to public health, the environment and our economy, I cannot support the interim storage of SNF or high-level waste in New Mexico.

I thank you for your consideration of these concerns and look forward to your reply.

Sincerely,


Michelle Lujan Grisham
Governor

NRDC Attachment C

PROCLAMATION
BY THE
Governor of the State of Texas

TO ALL TO WHOM THESE PRESENTS SHALL COME:


Pursuant to Article IV, Section 14, of the Texas Constitution, I, Greg Abbott, Governor of Texas, do hereby disapprove of and veto Senate Bill No. 1804 as passed by the Eighty-Sixth Texas Legislature, Regular Session, because of the following objections:

Senate Bill 1804 was a laudable effort to address domestic violence, until someone slipped in an ill-considered giveaway to a radioactive waste disposal facility. Unfortunately, the bill author's good idea about domestic violence has been dragged down by a bad idea about radioactive waste.

Since the Eighty-Sixth Texas Legislature, Regular Session, by its adjournment has prevented the return of this bill, I am filing these objections in the office of the Secretary of State and giving notice thereof by this public proclamation according to the aforementioned constitutional provision.



IN TESTIMONY WHEREOF, I have signed my name officially and caused the Seal of the State to be affixed hereto at Austin, this 5th day of June, 2019.


GREG ABBOTT
Governor of Texas

ATTESTED BY:


JOE ESPARZA
Deputy Secretary of State

FILED IN THE OFFICE OF THE
SECRETARY OF STATE
4:30 PM

JUN 05 2019

NRDC Attachment D

Stephanie Garcia Richard
COMMISSIONER

State of New Mexico
Commissioner of Public Lands

310 OLD SANTA FE TRAIL
P.O. BOX 1148
SANTA FE, NEW MEXICO 87504-1148

COMMISSIONER'S
OFFICE
Phone (505) 827-5760
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June 19, 2019

Krishna P. Singh
President and CEO
Holtec International
Krishna P. Singh Technology Campus
1 Holtec Blvd.
Camden, NJ 08104

Dear Dr. Singh:

I write regarding Holtec International's stated plans to build and operate a nuclear waste storage facility in western Lea County, New Mexico, near the Eddy County line. In the course of applying for a 40-year permit from the United States Nuclear Regulatory Commission (NRC) to deposit in New Mexico up to 120,000 metric tons of highly radioactive waste from nuclear facilities across the United States, Holtec has stated that its proposal enjoys "overwhelming support" in the state. In fact, a number of New Mexico industry associations, from the New Mexico Cattle Growers' Association to the Permian Basin Petroleum Association, recently have expressed serious concerns about – and in some instances outright opposition to – Holtec's proposal. Along with elected officials and non-profit organizations, they have raised significant questions about the effect of the proposed nuclear waste storage site on New Mexico's oil and gas industry, farm and ranch economy, and environment. This letter will not restate those concerns, which are a matter of public record.

Instead, as New Mexico's Commissioner of Public Lands, with direct oversight of mineral leasing at the location of Holtec's planned facility, I write to express my safety concerns and to address several misrepresentations that Holtec has made to the NRC and New Mexicans about its control of the proposed disposal site as well as agreements that it claims to have secured from New Mexico State Land Office mineral lessees. The State Land Office has reviewed a number of Holtec's submissions to the NRC, including the company's Facility Environmental Report (FER) and Safety Analysis Report (SAR). Those

NRDC Attachment D

Krishna P. Singh
 June 19, 2019
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submissions contain statements that have the potential, intended or not, to mislead federal regulators and the public alike, and require immediate correction.

The site for Holtec's proposed nuclear waste facility (the Site) is located in Section 13, Township 20 South, Range 32 East, and portions of Section 17 and 18, Township 20 South, Range 33 East, between the cities of Hobbs and Carlsbad. Holtec has repeatedly and publicly characterized the Site as under its control. *See, e.g.*, FER 2.2.1. In fact, the subject land is a split estate; while Eddy-Lea Energy Alliance, LLC privately owns the surface estate, the State of New Mexico, through the New Mexico State Land Office, owns the mineral estate. The State Land Office's control of the Site's mineral estate is not disclosed in the FER or other NRC submissions. To the contrary, in its filings with the NRC, Holtec appears to have entirely disregarded the State Land Office's authority over the Site's mineral estate. Holtec sent notice of its initial license application in March 2017 to over 60 elected and appointed government officials, but failed to include the State Land Office. The company's subsequent filings continue to ignore the State Land Office's legal interest in the Site. For example, Table 1.4.1 of the FER lists all applicable regulatory requirements, permits and required consultations – but conspicuously omits any reference to the State Land Office.

As you know, the Site is located within the Permian Basin, one of the world's most productive oil and gas-producing regions, and there is significant oil and gas development (as well as potash mining) in the Site's immediate vicinity. Holtec claims throughout its NRC submissions that it has secured the agreements of mineral lessees on or near the Site to forebear from certain development activities. For instance, Section 2.4.2 of the FER states that “[b]y agreement with the applicable third parties, the oil drilling and phosphate extraction activities have been proscribed at and around the site and would not affect the activities at the site.” Along similar lines, Section 2.6.4 of the SAR notes: “With regard to potential future drilling on the Site, Holtec has an agreement [2.6.9] with Intrepid Mining LLC (Intrepid) such that Holtec controls the mineral rights on the Site and Intrepid will not conduct any potash mining on the Site. Additionally, any future oil drilling or fracking beneath the Site would occur at greater than 5,000 feet depth, which ensures there would be no subsidence concerns [2.1.8].”

Holtec's claim that it has secured third-party agreements for control of the Site is incomplete at best. Site control generally refers to ownership of, or a leasehold interest in, a right to develop a particular tract of land. Holtec does not “control” the “mineral rights on the Site.” Instead, Holtec only has an agreement with a single company, Intrepid, relating to that company's potash mining – an agreement that has yet to be approved by the State Land Office, under whose authorization Intrepid conducts its mining activities on the Site. The State Land Office's oil and gas lessees, meanwhile, confirm they have not entered into agreements with Holtec to suspend or limit their oil and gas development to accommodate Holtec's planned nuclear waste disposal facility. In addition, there are other mineral resources potentially present on the Site that may fall within the State Land Office's mineral estate that are not addressed in Holtec's filings at all.

In addition to misstating its control over the Site, Holtec also treats as a foregone conclusion the State Land Office's ability and desire to restrict oil and gas drilling on the Site. Holtec, through the Eddy-

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Lea Energy Alliance, has proposed that the State Land Office impose a negative easement called a “land use restriction or condition” on all mineral development on the Site, including a ban on oil and gas development between the surface and a depth of 3,000 feet, and a prohibition on any directional or horizontal wells bottomed beneath the site that Holtec believes might “disturb or conflict” with its use of the site. The State Land Office has not approved any such restriction, which would likely trigger legal challenges from businesses that already are conducting operations on the Site pursuant to their existing mineral leases.

The State Land Office’s oil and gas leases on and adjacent to the Site do not impose any depth restrictions on drilling activities. Contrary to Holtec’s assurances that “any future oil drilling or fracking ... would occur at greater than 5,000 feet depth,” the State Land Office’s analysis demonstrates the existence of numerous active oil and gas wells within a three-mile radius of the Site at depths of 5,000 feet or less.

In addition, two of the State Land Office lessees on or immediately adjacent to the Site, COG Operating, LLC and EOG Resources, Inc., raise significant concerns about the proposed project and the land use restriction that Holtec requires, particularly its implications for salt water disposal wells, pipelines, and horizontal wells underneath the Site that Holtec might determine – using unknown criteria – will “disturb or conflict” with its nuclear waste storage operations. Both companies advise that they will explore all legal options if the State Land Office were to impose a restriction on oil and gas activities that are permitted under their current leases, along the lines of what Holtec seeks. For those reasons, it is difficult to take at face value Holtec’s representation in its May 23, 2019 letter to the State Land Office that “Oil and Gas is not affected by the facility.”

The International Atomic Energy Agency appears to share the State Land Office’s and its lessees’ concerns about the unknown interaction between nuclear waste storage and preexisting oil and gas development on the very same tract of land. In a 2007 publication, it explains that “[a]ny potential site will require an adequately controlled single-use land area to accommodate storage facilities,” and that potential waste disposal sites should “avoid land with exploitable mineral and energy resources.” International Atomic Energy Agency, Selection of Away-From-Reactor Facilities for Spent Fuel Storage: A Guidebook, IAEA-TECDOC-1558 (Sept. 2007) at 3.2.2 (pp. 23-24) (emphases added). Despite Holtec’s assurances to the NRC and to New Mexicans, it does not appear that your company has undertaken a thorough and critical analysis of the possible conflicts between your nuclear waste storage proposal and the vital economic activities that are already taking place on the Site.

Finally, while I appreciate Holtec’s attendance at a February 19, 2019 meeting at the State Land Office to overview the company’s plans, a number of serious questions that I and my staff raised at that meeting remain unanswered. Holtec to date has not responded to our inquiry about the effects that its proposed operations will have on oil and gas lessees’ present or future fracking activities. In addition, we asked Holtec to identify the worst case scenario for an accident or other adverse event at the Site, and explain how the company would respond to such a contingency. To date, we have not received any

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meaningful response to this inquiry, an omission that requires the State Land Office to assume that Holtec has not sufficiently analyzed the risks posed by its planned operations or is unwilling to do so.

If Holtec's proposal moves forward, nuclear waste likely would remain in southeastern New Mexico until 2048 at the earliest, and possibly much longer since there is no designated permanent repository anywhere in the nation for high-level radioactive waste. As the Commissioner of Public Lands, I am deeply concerned about the misrepresentations Holtec made to the NRC about purported agreements and restrictions regarding mineral leasing at the Site that do not exist and may very well never ever exist. Understanding the extent of oil and gas operations and other mining activities that may be conducted at the Site is essential to accurately assessing the risks of Holtec's planned nuclear storage operations. Holtec's NRC filings are materially inaccurate in this regard. Given these safety concerns, and lack of consideration for the State Land Office's fiduciary responsibilities, I do not believe that Holtec's proposed nuclear storage project is in the best interests of the State Land Office, its lessees, and its beneficiaries.

Sincerely,



Stephanie Garcia Richard
Commissioner of Public Lands

cc: Hon. Rick Perry
Secretary, United States Department of Energy

Hon. Kristine Svinicki
Chair, United States Nuclear Regulatory Commission

Hon. Michelle Lujan Grisham
Governor of the State of New Mexico

The CHAIRMAN. Thank you, Mr. Fettus.
Let's go to views from the Idaho National Lab. Dr. Wagner.

**STATEMENT OF DR. JOHN WAGNER, ASSOCIATE LABORATORY
DIRECTOR, NUCLEAR SCIENCE AND TECHNOLOGY DIREC-
TORATE, IDAHO NATIONAL LABORATORY**

Dr. WAGNER. Chairman Murkowski, Ranking Member Manchin and members of the Committee, it's an honor to be here with you today.

I want to particularly thank Senators Murkowski, Feinstein and Alexander for sponsoring the significant legislation and their persistent efforts to make progress on this critically important issue for the nation, in general, and for nuclear energy, in particular.

Currently, I oversee INL's Nuclear Energy Research, Development and Demonstration efforts, including R&D related to spent nuclear fuel storage, transportation and disposal. Throughout my career, I've been intimately involved in the technical issues around spent nuclear fuel storage, transportation and disposal working in the private sector as well as for the Nuclear Regulatory Commission, supporting the Nuclear Regulatory Commission and the Department of Energy on these issues, including leading a DOE program to implement the Blue Ribbon Commission on America's nuclear future recommended near-term actions which involved laying the groundwork for implementing interim storage as well as the associated transportation to support that.

As the nation's nuclear energy research development and demonstration laboratory, INL is the leader in the effort to maintain and expand the lives of America's nuclear reactor fleet. These safe, efficient and high performing systems produce nearly 20 percent of the nation's electricity and more than half of our carbon-free electricity. That's more than solar, wind, hydro and geothermal combined.

At INL we also work with industry on innovative advanced reactor designs. This includes megawatt scale microreactors, small modular reactors and a variety of advanced designs that offer the potential for improved performance, greater inherent safety features and approved applicability for certain market applications as well as reduced construction, licensing and operating costs.

As this Committee heard on April 30th, during a discussion on the Nuclear Energy Leadership Act, or NELEA, a strong and vibrant commercial nuclear industry is vital to the United States environment, power grid reliability and security, economy and national security. Accordingly, we must address some major impediments to developing and deploying advanced nuclear reactors.

Congress, to its credit, has begun this process by passing two important pieces of legislation, the Nuclear Energy Innovation Capabilities Act, or NEICA, and the Nuclear Energy Innovation and Modernization Act, NEIMA, and reintroduced a third which I referred to earlier, NELEA. Now it's time to address the waste issue, an impediment to development of the new advanced reactors as well as continued operation of the existing plant in some cases.

First and foremost, I want to be clear from a technical standpoint. Spent nuclear fuel storage and transportation is safe as evidenced by more than 50 years of safe and secure operations by the

public and private sectors. We do not have a spent nuclear fuel safety crisis in this country.

We do, however, have issues caused by the lack of a sustained, coherent approach for nuclear waste and not having a final disposition solution. This has resulted in longer than anticipated storage, as you all know. The national laboratories and industry, in coordination with the Nuclear Regulatory Commission, are proactively identifying and addressing the associated potential technical issues with this situation.

More worrisome though than the relatively minor technical risk of extended storage are the socio-economic and community impacts resulting from onsite storage at permanently shut down reactor sites. The cost, which has been referred to multiple times this morning already, of approximately \$2.2 million per day for taxpayers which will only increase until the government begins to take possession of the spent fuel and will also increase as additional existing plants are shut down.

And then finally, the negative impact on public acceptance of new nuclear energy which was also referred to earlier, given the lack of progress to address the waste. In our mission at the Idaho National Laboratory related to research, development and demonstration and ultimate deployment of advanced reactor systems, we frequently encounter this issue of how in the world can we talk about new nuclear reactors when we have not addressed the waste issue? Because of all this, an interim storage facility can be viewed as an economic investment for the nation that addresses these issues and provides a range of other benefits that have been identified in numerous studies, including the BRC report that I referred to earlier.

Finally, I'd like to note that I'm encouraged that Senate bill 1234 identifies defense-related spent fuel under a compliance agreement, as a priority at the discretion of the new administrator. The Department of Energy at the INL site is responsible for managing and storing a range of spent fuel, including defense-related spent fuel. This bill would enable a meaningful storage alternative for those materials.

I appreciate the opportunity to testify. I want to thank you again for your attention to this important issue for our nation, and I look forward to answering any of your questions.

[The prepared statement of Dr. Wagner follows:]

TESTIMONY OF
DR. JOHN WAGNER, ASSOCIATE LABORATORY DIRECTOR NUCLEAR SCIENCE AND
TECHNOLOGY DIRECTORATE
IDAHO NATIONAL LABORATORY
BEFORE THE
U.S. SENATE COMMITTEE ON ENERGY & NATURAL RESOURCES
"Full Committee Hearing to Examine Options for the Interim and Long-Term Storage
of Nuclear Waste and to Consider S. 1234, the Nuclear Waste Administration Act of
2019."

JUNE 27, 2019

Chairwoman Murkowski, Ranking Member Manchin, and members of the committee, it is an honor and privilege to be with you today. My name is John Wagner, and I am the associate laboratory director for the Nuclear Science and Technology Directorate at Idaho National Laboratory (INL). I'm grateful for the opportunity to testify on S. 1234, the Nuclear Waste Administration Act of 2019, as well as to participate in a discussion on consolidated interim storage and disposal of spent nuclear fuel and high-level radioactive waste. I want to thank Senators Murkowski, Feinstein and Alexander for sponsoring S. 1234, and their persistent efforts to make progress on this important issue for the nation in general, and nuclear energy in particular.

For more than 50 years, Americans have debated the appropriate approach to manage spent nuclear fuel and high-level nuclear waste. That debate has spanned both technical and political arenas and, for that reason, I'm encouraged that this bill has been reintroduced this year. Our conversation today is a positive step toward an agreeable path forward for establishing consolidated interim storage facilities and repositories, and any progress toward developing these facilities is greatly needed and appreciated.

Currently, I oversee INL's nuclear energy research, development and deployment efforts, including R&D efforts related to the management and disposition of spent nuclear fuel. Throughout my career, I have been intimately involved in technical issues related to spent nuclear fuel storage, transportation, and disposal. My first position following graduate school was with a private company designing and licensing spent nuclear fuel storage and transportation systems. Later, during my employment at Oak Ridge National Laboratory, I supported the U.S. Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) on a variety of technical issues related to long-term storage, transportation, and disposal of spent nuclear fuel, including serving as the national technical director of the U.S. Department of

Energy's Nuclear Fuels Storage and Transportation Planning Project – a project established to implement the recommended near-term actions in the Blue Ribbon Commission on America's Nuclear Future (BRC) report, and to lay the groundwork for implementing interim storage, including associated transportation, per the administration's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*.

In that role, and my roles since that time, I have seen firsthand how the lack of a sustained, coherent nuclear waste management plan adversely impacts the deployment of carbon-free nuclear energy.

Earlier, I framed this issue as important to the future of our nation. Here's why I say that: As the nation's nuclear energy research, development and deployment laboratory, INL is a leader in the effort to maintain and extend the lives of America's reactor fleet. These safe, efficient, and high-performing systems produce nearly 20% of the nation's electricity and more than half of our carbon-free electricity. That's more than solar, wind, hydro, and geothermal combined.

At INL, we work with industry on innovative advanced nuclear reactor designs. This includes megawatt-scale microreactors, small modular reactors, and a variety of advanced designs that offer the potential for improved performance, greater inherent safety features, and improved applicability for certain market applications, as well as reduced construction, licensing, and operating costs.

As this committee heard on April 30, during a discussion on the Nuclear Energy Leadership Act (NELA), a strong and vibrant commercial nuclear energy industry is vital to the United States for a number of reasons:

- First, the environment. The federal government's fourth National Climate Assessment detailed how changes in the earth's climate are having negative impacts on our economy, environment, communities, public health, infrastructure, tourism, recreation, and agriculture. We know that efforts to reduce carbon emissions while meeting present and future energy demands require a significant expansion of nuclear power. A recent Massachusetts Institute of Technology (MIT) study found that excluding nuclear energy from deep decarbonization scenarios could double or even triple the average cost of electricity because of the enormous amounts of wind and solar energy and battery storage that would be needed to meet our basic needs. As the only carbon-free, scalable energy source that produces electricity 24 hours/day, 7 days/week, 365 days/year, nuclear energy is the single most effective tool we have to combat carbon emissions, in the U.S. and across the world.
- Second, power grid reliability and security. Cold snaps in the Midwest and Northeast, as well as hurricanes in Texas and Florida, have demonstrated that nuclear power is best equipped to generate electricity under even the most challenging circumstances. As the changing climate affects weather patterns, and demand for electricity increases, reliable and secure nuclear energy will become even more important to the continuance of American prosperity.

- Third, our economy. The U.S. nuclear energy industry contributes \$60 billion annually to the nation's gross domestic product. According to the Nuclear Energy Institute (NEI), it supports more than 100,000 direct jobs and is responsible for 475,000 indirect jobs across our economy.
- Fourth, U.S. national security. Because American ingenuity inspired and created the nuclear energy industry, the vast majority of reactors are based on American technology. Our safety and nonproliferation approaches are the world's standards. We remain among the world leaders, but our leadership and associated influence are declining. In the worldwide energy race, our competitors, specifically China and Russia, are rapidly making up ground.

Given how important nuclear energy is to our nation, today and into the future, we must address the major impediments to developing and deploying advanced reactors. Congress, to its credit, has begun that process by passing two important pieces of legislation – the Nuclear Energy Innovation Capabilities Act (NEICA) and Nuclear Energy Innovation and Modernization Act (NEIMA) – and introducing a third, NELA.

A variety of factors – high capital costs, the long time frame between licensing and construction, subsidies for other forms of electricity generation, and the low cost of natural gas – have led to premature nuclear plant closures and abandonment of new nuclear projects.

Another concern for deployment of new, advanced reactors, as well as continued operation of existing plants in some cases, is the reason we are here today – an effective solution for the management and ultimate disposition of nuclear waste. Every day that passes without a resolution to the back end of the fuel cycle is damaging to the U.S. nuclear energy industry, our nuclear-facility communities, taxpayers, the environment, economy, and national security.

Let's talk size and scope.

Currently, there is commercial-origin spent nuclear fuel at locations in 35 states. However, the total volume of spent fuel is surprisingly small when compared to the vast amount of clean energy produced over the past six decades. If all of the nation's commercial spent nuclear fuel generated to date were stacked up, it would fit within one football field at a depth of less than 10 meters. Though the volume of this material is relatively small, it is radioactive and must be safely and securely managed.

First and foremost, spent nuclear fuel storage and transportation is technically safe, as evidenced by more than 50 years of safe and secure operations by the public and private sectors. We do not have a spent nuclear fuel safety crisis in our country.

We do, however, have issues caused by the lack of a consistent national management approach for nuclear waste. These have been exacerbated by the delay in a final disposition solution.

This unanticipated delay has necessitated longer-than-anticipated storage approaches, and the national labs and industry – with input from the NRC – are proactively identifying and

addressing potential technical issues that may arise. A number of activities are being performed to ensure that safe storage and transportation of spent nuclear fuel is achieved, including:

- Development of improved understanding of spent fuel and spent fuel canister materials' performance during extended storage periods;
- Development and deployment of inspection technologies for spent fuel packages and canisters;
- Development of aging management plans for storage configurations;
- Development and evaluation of future alternative spent fuel storage configurations;
- Development of the transportation assets to move spent nuclear fuel when interim or final alternatives become available;
- Other system engineering evaluations to explore the trade-offs between different spent nuclear fuel management approaches.

More worrisome than the relatively minor technical risks associated with spent fuel storage are the socio, economic, and community impacts of on-site storage at permanently shutdown nuclear reactors. Spent fuel at these sites requires ongoing and expensive security, with no commercial value. The reactor is no longer producing megawatts of clean electricity, the reactor site is no longer supporting thousands of highly skilled and compensated nuclear workers or contributing to the local tax base, and the land cannot be reutilized until the fuel is removed.

Not only does on-site spent fuel storage have local economic impacts, the federal government's inability to accept these materials increases its liability. That bill is paid by all taxpayers, not just those who enjoyed the benefits of the clean, reliable electricity produced by the reactor. This cost of inaction increases the taxpayer burden by an estimated \$2.2 million per day and will only increase until the government begins to fulfill its contractual obligation to take possession of the spent fuel.

A 2016 Oak Ridge National Laboratory-led report predicted that consolidated interim storage, due to the ability to accept fuel from reactor sites more quickly, has the potential to avoid billions of dollars in operation and maintenance costs at individual sites. This is consistent with the Nuclear Energy Institute's recent evaluation that more than \$6 billion in taxpayer dollars have been distributed to date with an estimated \$800 million for each upcoming year of inaction.

Because of this, an interim storage facility can be viewed as an economic investment in the waste management system, providing a range of benefits that have been identified in numerous studies, including the BRC report.

Finally, I would like to note that I am encouraged to see that S. 1234 identifies defense-related spent fuel under a compliance agreement as a priority, at the discretion of the new administrator. The U.S. Department of Energy at the INL Site is responsible for managing and storing a range of spent fuel, including defense-related spent fuel as well as commercial and research fuel from domestic and foreign reactors. This spent fuel is managed safely and

effectively in state-of-the-art facilities and protected by world-class security forces. However, the presence of this spent fuel without a clear disposition path causes concern among some in our community and is an impediment to our mission to discover, demonstrate, and secure innovative nuclear energy solutions. This bill would enable a meaningful storage alternative for a number of these spent fuels.

I appreciate the opportunity to testify and I want to thank you again for your attention to this very important issue for our nation. I look forward to your questions.

The CHAIRMAN. Thank you, Dr. Wagner, and thank each of you for being here this morning and for what you are providing the Committee.

It is clear that the reviews, the studies, everybody agrees we have to deal with the permanent in order to get to interim. The discussion about interim sites becoming de facto permanent, that is kind of where we are, unfortunately, around the country which I don't think any of us believe is truly acceptable for the long-term.

We are not the only nation that has nuclear waste to deal with. It is not like this is a case of first impression here. There has been reference, plenty of reference, to other nations and how they handle their nuclear waste. Finland and Sweden are held out as good examples of areas where they have deep geologic repository siting. They have a consent-based approach.

Mr. Nesbit, you mentioned in your recommendations to us that there has to be consent and benefit tied together. What have they been able to do successfully that we should be looking to? Are their geologic formations different than ours and that is what gives them the leg up? Is it more that they do with the consent-based? I am trying to figure out by looking to others who have been more successful than we have, what we might learn. And I throw that out to anybody here on the panel.

Mr. Nesbit, and then we will go to Mr. Fettus.

Mr. NESBIT. Well, first of all, it's not the geology. The United States is blessed with a vast number of different geologic media which are all suitable for repository development. They have advantages, they have disadvantages, but in a way it may be a problem that we have so many options available to us. In other countries they're smaller and they really just have to concentrate on one option.

The other thing I'd like to point out is that in those countries that have been successful so far in what you would call a consent-based siting process, they do not have anything that corresponds to the state government in the United States and that's just the nature of their governmental structure, Sweden and Finland. It has been a challenge in the United States siting waste facilities and typically the hang-up is at the state level.

The CHAIRMAN. Your thoughts, Mr. Fettus?

Mr. FETTUS. I would actually agree with a lot of what Mr. Nesbit just said, so I hope the Committee notes that. That one, we call for in my written testimony, a return to the USGS had started some superb work at looking at the vast, over 36 states and dozens and dozens of places around the country that have potential.

But I would urge the Committee to reflect on the fact that, number one, there is no country that has fully sited a deep geologic repository for spent nuclear fuel and high-level waste, yet. Sweden and Finland are farther down the road, but for, in great measure, precisely the reason that Mr. Nesbit just pointed out which is they don't have the tripartite system we do of both a community, a state and the Federal Government. They don't have that interlocutory layer.

And if you want to solve it consistent with our environmental laws, we've always taken accord of the states. And so, that's the basis of my testimony.

The CHAIRMAN. I appreciate that.

Let me ask you, Mr. Norton, what does it cost to maintain a decommissioned plant that still has used fuel on its site on average, just give me a range?

Mr. NORTON. Thank you for the question, Senator.

At my sites, as you'll see in my written testimony, it's approximately \$30 million a year combined between the three sites to maintain those facilities and the corporate structure associated with it.

The CHAIRMAN. What is happening on the site right now? I mean, in terms of you have workers there that are just ensuring that there is a level of safety. What is costing you \$30 million?

Mr. NORTON. Well, the interesting part about our companies, Senator, is that, Madam Chairman, is that we're also managing our corporations and not just the storage of the spent fuel at our sites. I think if you just looked at spent fuel storage, the cost would be closer to \$6.5 million per site. But as the courts have found in our cases, our corporation single asset utilities would have gone out of business had the government performed.

The CHAIRMAN. Right.

Mr. NORTON. So not only is our damages including the cost of safely and securely storing the fuel, but also to manage our corporations and remain in existence until such time as the government performs.

The CHAIRMAN. But about \$6.5 million per site, on average.

Mr. NORTON. Yeah, on average.

The CHAIRMAN. In order to transport spent fuel canisters, do you anticipate that upgrades will be required to these sites as you look forward?

Mr. NORTON. Well, I would expect across the nation, Madam Chairman, that there would be upgrades required. And depending on the facility, would depend on the significance of that.

For instance, the Department of Energy has been doing studies, pre-planning studies, for de-inventorying these sites and looked at the transportation challenges, independent to many of these sites, including the shutdown ones and including my three. And in each of these sites is unique in those challenges. And so, for instance, at Maine Yankee, there would be minimal upgrades required at the site itself. The inventory reports have looked more broadly at the entire transportation route. And I realize that the Department of Energy and others have focused on that issue and should continue to focus on that issue. But, you know, the entire transportation pathway needs to be analyzed.

So, I think it's site specific, but I am certain that almost every site in the nation would have to have some level of upgrade to start removing this material from their sites.

The CHAIRMAN. I think it is important for us to understand that. Let me turn to Senator Manchin.

Senator MANCHIN. Thank you, Madam Chairman.

I think finding a solution to our nation's nuclear waste impasse is critically important, and I think you all have brought so much expertise to the table. I appreciate it very much.

Instead of asking a question right now at the beginning of my time, I am going to ask Senator Cortez Masto, since she has been

leading this effort and has more skin in the game than any of us sitting here, I would like for her to explain a little bit what she is trying to achieve right now and how we can be of help.

Senator CORTEZ MASTO. Thank you. Thank you, Ranking Member Manchin for this opportunity. I know it is rare.

Chairman Murkowski, let me just say the recommendations provided by the Blue Ribbon Commission, I believe, do provide us a blueprint to follow, particularly when employing a consent-based method for site selection.

My state and what I am simply asking is that the State of Nevada be included in this framework of this legislation to be treated equally and fairly alongside all the other states. That is all we are asking. And I would like to ask you and Ranking Member Manchin to work with me as this bill proceeds.

Senator MANCHIN. You have my assurance on that and all of you all, I think, have basically expressed in your opening statements that the site selection has to have a buy-in to where states can either say yea or nay and I think that is important. But we have to move forward.

Mr. Norton, if I can, I want to make, go back on Senator Murkowski. I want to understand the economics of what we are dealing with. Do you all get paid by the Federal Government for storage onsite since it never did take the responsibility as far as putting it in a repository?

Mr. NORTON. Well, Senator, to be more clear, we have to sue to get that money.

Senator MANCHIN. You have to sue to get the money.

Mr. NORTON. Every five years we sue the Federal Government for the previous four years of storage costs, go through the process.

Senator MANCHIN. Okay, storage costs. You just said you are suing and received \$30 million when your actual cost is \$6.5 million.

Mr. NORTON. I'm sorry, again Senator, I might have confused you. I was trying to be clear. I think the differentiation of the—

Senator MANCHIN. Yes, the \$23.5 million.

Mr. NORTON. The difference between the actual cost to safely and securely store it versus the cost that we have to incur at the full cost. So we have, I'm sorry.

Senator MANCHIN. The cost you are incurring right now, you are incurring that cost by keeping onsite?

Mr. NORTON. Yeah, we have an onsite storage component to our litigation and—

Senator MANCHIN. Is it safe? Do you feel it is safe?

Mr. NORTON. It is safe, yes.

Senator MANCHIN. And I would assume since it is safe and you are able to do it and we have had no incidents there, then there is no urgency and maybe Congress has dragged its feet for 30 years for that reason. It hasn't become a critical mass.

Dr. Wagner, you might want to talk on that, would all consider it has been safe storage? I mean, what the corporations are doing?

Dr. WAGNER. Yes, your point is exactly right. It has continued to be safely stored, securely stored. And so—

Senator MANCHIN. The public is not threatened?

Dr. WAGNER. Exactly right.

So that's kind of a bit of a crux of the problem. We don't have a crisis, per se, in terms of safety or security as the utility and the private sector has done, you know, an outstanding job in terms of safety and security——

Senator MANCHIN. I am told, I guess, that some of these plants, I mean we have plants coming offline and we are talking about in climate change and we are talking about decarbonizing. And Bill Gates raised the bar very high in saying, you know, you think it is bad now, wait for another five or ten years, they are going to, we are going to zero. We are not going to more nuclear decarbonization energy. We are going to less.

So is it because you are running out of room? You have no place to store it? Your capacity?

Mr. FETTUS. No, Senator, it's not because they're running out of room.

Dry storage can be improved, and we have a whole set of suggestions on hardened onsite storage that we think would work better while we get a repository program on track along the lines of what the BRC suggested and NRC's suggestion.

And I would urge you, I think it's a long footnote three, your staff can review in our testimony. The actual waste issue, honestly, Senator, has not and is not what is holding up nuclear power's ability to compete in the market.

What is holding up nuclear power's ability to compete in the market are its gigantic upfront capital costs. The South Carolina reactors that are now in a \$9 billion hole in the ground at Summer and Vogtle, I think, is now pushing \$28 billion for two new units. The likelihood of building new nuclear power is vanishingly unlikely in this country for a while.

Senator MANCHIN. Let me ask this question then.

The existing nuclear power we have in decommissioned units that have gone offline, could they have been restored? Could they have been basically improved upon?

I'm——

Mr. FETTUS. It depends on how they went offline.

Ms. KORSNICK. The plants that are in the marketplace right now, the merchant plants that you're talking about, they're not shutting down relative to used fuel. Used fuel is a necessary issue that we need to address.

Senator MANCHIN. Sure.

Ms. KORSNICK. And as——

Senator MANCHIN. Why are they shutting down? Cost?

Ms. KORSNICK. It leads to building more nuclear plants and people's concerns about creating additional waste when the current waste is not being cared for.

Senator MANCHIN. No, I think my question is, is that we are decommissioning some nuclear plants.

Ms. KORSNICK. That's correct.

Senator MANCHIN. Are they, have they run their life cycle?

Ms. KORSNICK. Not all of them, no.

Senator MANCHIN. Could they be——

Ms. KORSNICK. They're being shut down because in the marketplace right now, the marketplace does not recognize the carbon-free attribute of nuclear. It's competing with——

Senator MANCHIN. So there is no value to carbon-free nuclear, is what you are saying?

Ms. KORSNICK. Not in the marketplace there's not. There should be and that would help.

Senator MANCHIN. Are any of these plants in basically controlled PSCs or basically they are all merchant?

Ms. KORSNICK. The ones that are shutting down, for the most part, are merchant, not all, but for the most part.

Senator MANCHIN. And I think we have gone to the DOE asking for some stability in that.

Ms. KORSNICK. That's correct.

Senator MANCHIN. Right? And that would be of utmost importance to save some of these plants from going offline.

Ms. KORSNICK. It would be very helpful.

Senator MANCHIN. Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator.

Before I turn to Senator Alexander, I wanted to respond to Senator Cortez Masto, because you asked a very direct question of me.

Know that I do understand the importance of this issue to you, your delegation and to your constituency and I want to be very clear that I am very open to working on this bill with you, with Senator Manchin, and any other Senators that are interested in working on it.

Senator Alexander, Senator Feinstein and I introduced this bill understanding that changes are going to be needed to bring it in line with current policies. I am aware of the language that you have offered along with Senator Rosen and Senator Manchin and that you believe it could improve the bill. Know that I look forward to discussing this language with you as we are moving forward, because I think we all want to find that practical path forward. So I look forward to that.

Let me turn to Senator Alexander.

Senator ALEXANDER. Thank you, Madam Chairman, and thanks to the witnesses.

Let me see if I can get down to what I think the crux of the problem is. We have a world concerned about climate change and the effect of carbon emissions on climate change and 60 percent of the U.S. electricity that is carbon-free is nuclear power, and 11 nuclear plants are closing by 2025 and most of them will close over the next several years for a variety of reasons and one of the reasons is we have nowhere to put the waste, no place to put the waste off-site which the nuclear law requires we do.

As a result of that, President Obama had a Blue Ribbon Commission that came up with several ways to move ahead including a new Yucca Mountain, in effect, a new permanent repository, new interim storage and there are a couple of private interim storage sites.

So there are four places to put this waste that we are talking about, waste that we have collected \$40 billion from ratepayers to store and that we are paying \$2.5 million a day in damages because we are not doing what the law says we are supposed to do. We have four tracks we could follow to do something: We could have a Yucca Mountain open, we could build a new Yucca Moun-

tain, we could have a public interim site, or we could approve a private interim site.

Now, the reason we don't have any of those is because some people have said that if you can't do Yucca Mountain, you can't do anything else.

So I am going to ask each one of you, do you agree with that?

Ms. Korsnick, do you agree that if we can't agree in the Congress to proceed ahead with Yucca Mountain, that we should stop trying to build a new Yucca Mountain, consent-based, a new public interim site, consent-based, or approving a new private site?

Ms. KORSNICK. We need a long-term storage answer as well as a short-term.

Senator ALEXANDER. No, that's not my—my question is if we can't do Yucca Mountain should we stop doing anything else? Should we stop trying anything else?

Ms. KORSNICK. I think we've spent an awful lot of money on Yucca, and I think it should move forward with—

Senator ALEXANDER. That is not my question. My question is if we can't do Yucca Mountain, which we have not been able to do for 35 years, should we stop doing all the other things that this legislation and the Blue Ribbon Commission said we could do?

Ms. KORSNICK. No, we should move forward.

Senator ALEXANDER. We should move forward.

Mr. Nesbit? Or let me just go down the line. If we can't do Yucca Mountain, should we stop trying any of these other tracks?

Mr. NORTON. Senator, we should not.

Mr. NESBIT. I agree, Senator. I also think the country should get a return on the \$15 billion.

Senator ALEXANDER. My question is should we stop if we can't do Yucca Mountain? Should we stop trying any other solution?

Mr. NESBIT. No, sir, we should not stop trying. But we should complete the licensing.

Mr. FETTUS. I agree, we should keep trying and we laid out a pathway in our testimony for you, Senator.

Senator ALEXANDER. Yes.

Dr. WAGNER. No, sir.

Senator ALEXANDER. Well, I mean, that is the issue in the appropriations process. I believe we should finish Yucca Mountain but what happens is the Senate won't agree to fund the next year's funding of Yucca Mountain which is only to determine whether it is safe or not. And so, the House won't agree to move ahead with a new repository, a new public site, a new private interim site. That does not make any sense at all. I mean, we ought to try all four tracks. That is what the Blue Ribbon Commission said.

Let me go to the private site. I think the private site is the site that is most likely to be open first, even if we were to move ahead with Yucca Mountain.

Ms. Korsnick, the language of the bill that is proposed has language that was written for Yucca Mountain which says, "This Act shall not affect any proceeding or any application for any license or permit pending before the Commission on the date of enactment of this Act." That basically said we are sidestepping Yucca Mountain. We are moving ahead with these permanent repository and

public interim sites. But today, that might affect the two pending private sites.

Would it be your opinion that the bill, as written, would mean that the provisions of the bill, including the consent-based procedures, would not apply to the pending applications from New Mexico and Texas for a private site?

Ms. KORSNICK. That's how we read it, that they're already pending applications so they would be excluded.

Senator ALEXANDER. Anyone else have an opinion on that?

Mr. FETTUS. That's precisely right, Senator. You asked the right question. Texas and New Mexico would both be barred from the consent process, clearly, by the terms of the bill.

Senator ALEXANDER. I would assume from your testimony you think they should be?

Mr. FETTUS. We think that would put us in precisely the same stalemate that's put us here for 50 years.

Senator ALEXANDER. Ms. Korsnick, in your testimony you thought the private sites, because of the promise they have, ought to have priority, is that correct?

Ms. KORSNICK. We do think they should have priority.

The challenge with the private sites right now is they don't want to be the de facto, long-term storage which keeps it connected to a long-term storage answer.

Senator ALEXANDER. Well, my own view, Madam Chairman and Mr. Ranking Member, is that the private sites are our best option, our fastest option. They should have priority and we should consider whether the consent-based provisions which, apparently, do not now apply to them, should and if they do, whether that would slow down the private sites which hold so much promise.

Thank you for your time.

The CHAIRMAN. Thank you, Senator Alexander.

I truly appreciate your commitment to working and pushing all of us toward solutions here.

Senator Heinrich.

Senator HEINRICH. Ms. Korsnick, you mentioned that the market right now just does not value carbon-free nuclear power.

Has NEI endorsed putting a price on carbon as a way to build that value into the market?

Ms. KORSNICK. Yes, we've had discussions about a variety of ways to value nuclear in the marketplace. In the states, for example, there are zero emission credits that have been discussed.

Senator HEINRICH. Right.

Ms. KORSNICK. And we have supported that in New York and Illinois.

Senator HEINRICH. But have you endorsed putting a price on carbon as a way to pull that in?

Ms. KORSNICK. Those zero emission credits actually do, place it—

Senator HEINRICH. As a federal—at the federal level, nationally.

Ms. KORSNICK. We have conversations around that.

Senator HEINRICH. You have had conversations, but you have not actually taken a position on that?

Ms. KORSNICK. From a member perspective there's different views about whether or not a price on carbon would go forward.

Senator HEINRICH. No, I get that. I am just asking what your position is as an organization. Has NEI endorsed putting a price on carbon at the federal level?

Ms. KORSNICK. Not an explicit tax on carbon.

Senator HEINRICH. Okay.

Ms. KORSNICK. Value on carbon, yes.

Senator HEINRICH. Okay. It is not a complicated question.

Why shouldn't the pending sites be part of the consent-based approach when we know that not using a consent-based process which, by the way, the Blue Ribbon Commission was adamant about, has been a path to failure over and over again as we see in Nevada.

Ms. KORSNICK. Is your question around Nevada specifically?

Senator HEINRICH. No, I am asking why shouldn't pending applications also be part of a consent-based approach?

Ms. KORSNICK. It was simply reflecting that as written, since it says it's a pending application, that needs to be evaluated because they are—

Senator HEINRICH. Yes, so I am not asking about the legislation. I am asking should we use a consent-based process for all applications?

Ms. KORSNICK. Yes, we're in support of consent-based process for applications.

Senator HEINRICH. So, Madam Chair, I guess I am a little frustrated because we have been doing the same thing over and over for a long time and not getting somewhere. And I am actually, you know, I have spent enough time at a nuclear reactor when I was getting my engineering degree that I am actually quite proud of the work that I did in one of the larger research reactors in the country.

But I think we have heard local input, state input, consent called just the politics. And I don't think, I think that is a mistake because the problem is, we have ignored the politics for decades.

And so, one of the things that is very concerning to me is that if we move forward on interim sites, especially if it is without consent, and you have a consolidated storage facility that is filled with waste and we never build the permanent site, what recourse is the state going to have if a permanent disposal facility is never built?

I think we owe it to this conversation to answer those questions before we expect somebody to take possession in what would be a permanent, you know, what could effectively be a permanent situation.

I want to enter a couple of letters into the record. I have a letter here from Governor Lujan Grisham from New Mexico, and I have a letter from the State Land Commission of New Mexico, both objecting to interim storage. I would just ask consent that they be included in the record for the hearing.

The CHAIRMAN. They will be included as part of the record.

[Letters objecting to interim storage follow:]



State of New Mexico

Michelle Lujan Grisham
Governor

June 7, 2019

The Honorable Rick Perry
Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

The Honorable Kristine Svinicki
Chairman
U.S. Nuclear Regulatory Commission
Mail Stop O-16B33
Washington, DC 20555-0001

Dear Secretary Perry and Chairman Svinicki:

I write to express my opposition to the proposed interim storage of high-level radioactive waste in the state of New Mexico. The interim storage of high-level radioactive waste poses significant and unacceptable risks to New Mexicans, our environment and our economy. Furthermore, the absence of a permanent high-level radioactive waste repository creates even higher levels of risk and uncertainty around any proposed interim storage site.

As you know, the Nuclear Regulatory Commission (NRC) is evaluating the issuance of a 40-year license to Holtec International for a consolidated interim storage facility in southeastern New Mexico. As proposed, this facility would store spent nuclear fuel (SNF) and reactor-related materials greater than low-level radioactive waste.

A facility of this nature poses an unacceptable risk to New Mexicans, who look to southeastern New Mexico as a driver of economic growth in our state. New Mexico's agricultural industry contributes approximately \$3 billion per year to the state's economy, \$300 million of which is generated in Lea and Eddy Counties, where the proposed facility is to be sited.

Further, the Permian Basin, situated in west Texas and southeastern New Mexico, is the largest inland oil and gas reservoir and the most prolific oil and gas producing region in the world. New Mexico's oil and natural gas industry contributed approximately \$2 billion to the state last year. According to the U.S. Energy Information Administration (EIA), Lea County and Eddy County were ranked the second and sixth oil-producing counties in the country, respectively, earlier this year, with production continuing to increase.

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June 7, 2019

The Honorable Rick Perry
The Honorable Kristine Svinicki

Establishing an interim storage facility in this region would be economic malpractice. Any disruption of agricultural or oil and gas activities as a result of a perceived or actual incident would be catastrophic to New Mexico, and any steps toward siting such a project could cause a decrease in investment in two of our state's biggest industries. For those reasons, the New Mexico Cattle Growers' Association, the New Mexico Farm and Livestock Bureau and the Permian Basin Petroleum Association have all sent me letters opposing high-level waste storage in southeastern New Mexico. I have attached their letters for your review.


In addition to significant economic concerns about this project's potential impact on agriculture and the oil and gas industry, I am concerned about the financial burden it could place on the state and local communities. Transporting material of this nature safely requires both well-maintained infrastructure and highly specialized emergency response equipment and personnel that can respond to an incident at the facility or on transit routes. The state of New Mexico cannot be expected to support these activities.

Finally, given that there is currently no permanent repository for high-level waste in the United States, any interim storage facility will be an indefinite storage facility. Over this time, it is likely that the casks storing SNF and high-level wastes will lose integrity and will require repackaging. Any repackaging of SNF and high-level wastes increases the risk of accidents and radiological health risks. Again, New Mexicans should not have to tolerate this risk.

Given the potential for adverse impacts to public health, the environment and our economy, I cannot support the interim storage of SNF or high-level waste in New Mexico.

I thank you for your consideration of these concerns and look forward to your reply.

Sincerely,



Michelle Lujan Grisham
Governor



Stephanie Garcia Richard
COMMISSIONER

State of New Mexico
Commissioner of Public Lands

310 OLD SANTA FE TRAIL
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SANTA FE, NEW MEXICO 87504-1148

COMMISSIONER'S
OFFICE

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June 19, 2019

Krishna P. Singh
President and CEO
Holtec International
Krishna P. Singh Technology Campus
1 Holtec Blvd.
Camden, NJ 08104

Dear Dr. Singh:

I write regarding Holtec International's stated plans to build and operate a nuclear waste storage facility in western Lea County, New Mexico, near the Eddy County line. In the course of applying for a 40-year permit from the United States Nuclear Regulatory Commission (NRC) to deposit in New Mexico up to 120,000 metric tons of highly radioactive waste from nuclear facilities across the United States, Holtec has stated that its proposal enjoys "overwhelming support" in the state. In fact, a number of New Mexico industry associations, from the New Mexico Cattle Growers' Association to the Permian Basin Petroleum Association, recently have expressed serious concerns about – and in some instances outright opposition to – Holtec's proposal. Along with elected officials and non-profit organizations, they have raised significant questions about the effect of the proposed nuclear waste storage site on New Mexico's oil and gas industry, farm and ranch economy, and environment. This letter will not restate those concerns, which are a matter of public record.

Instead, as New Mexico's Commissioner of Public Lands, with direct oversight of mineral leasing at the location of Holtec's planned facility, I write to express my safety concerns and to address several misrepresentations that Holtec has made to the NRC and New Mexicans about its control of the proposed disposal site as well as agreements that it claims to have secured from New Mexico State Land Office mineral lessees. The State Land Office has reviewed a number of Holtec's submissions to the NRC, including the company's Facility Environmental Report (FER) and Safety Analysis Report (SAR). Those

submissions contain statements that have the potential, intended or not, to mislead federal regulators and the public alike, and require immediate correction.

The site for Holtec's proposed nuclear waste facility (the Site) is located in Section 13, Township 20 South, Range 32 East, and portions of Section 17 and 18, Township 20 South, Range 33 East, between the cities of Hobbs and Carlsbad. Holtec has repeatedly and publicly characterized the Site as under its control. *See, e.g.*, FER 2.2.1. In fact, the subject land is a split estate; while Eddy-Lea Energy Alliance, LLC privately owns the surface estate, the State of New Mexico, through the New Mexico State Land Office, owns the mineral estate. The State Land Office's control of the Site's mineral estate is not disclosed in the FER or other NRC submissions. To the contrary, in its filings with the NRC, Holtec appears to have entirely disregarded the State Land Office's authority over the Site's mineral estate. Holtec sent notice of its initial license application in March 2017 to over 60 elected and appointed government officials, but failed to include the State Land Office. The company's subsequent filings continue to ignore the State Land Office's legal interest in the Site. For example, Table 1.4.1 of the FER lists all applicable regulatory requirements, permits and required consultations – but conspicuously omits any reference to the State Land Office.

As you know, the Site is located within the Permian Basin, one of the world's most productive oil and gas-producing regions, and there is significant oil and gas development (as well as potash mining) in the Site's immediate vicinity. Holtec claims throughout its NRC submissions that it has secured the agreements of mineral lessees on or near the Site to forebear from certain development activities. For instance, Section 2.4.2 of the FER states that “[b]y agreement with the applicable third parties, the oil drilling and phosphate extraction activities have been proscribed at and around the site and would not affect the activities at the site.” Along similar lines, Section 2.6.4 of the SAR notes: “With regard to potential future drilling on the Site, Holtec has an agreement [2.6.9] with Intrepid Mining LLC (Intrepid) such that Holtec controls the mineral rights on the Site and Intrepid will not conduct any potash mining on the Site. Additionally, any future oil drilling or fracking beneath the Site would occur at greater than 5,000 feet depth, which ensures there would be no subsidence concerns [2.1.8].”

Holtec's claim that it has secured third-party agreements for control of the Site is incomplete at best. Site control generally refers to ownership of, or a leasehold interest in, a right to develop a particular tract of land. Holtec does not “control” the “mineral rights on the Site.” Instead, Holtec only has an agreement with a single company, Intrepid, relating to that company's potash mining – an agreement that has yet to be approved by the State Land Office, under whose authorization Intrepid conducts its mining activities on the Site. The State Land Office's oil and gas lessees, meanwhile, confirm they have not entered into agreements with Holtec to suspend or limit their oil and gas development to accommodate Holtec's planned nuclear waste disposal facility. In addition, there are other mineral resources potentially present on the Site that may fall within the State Land Office's mineral estate that are not addressed in Holtec's filings at all.

In addition to misstating its control over the Site, Holtec also treats as a foregone conclusion the State Land Office's ability and desire to restrict oil and gas drilling on the Site. Holtec, through the Eddy-

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Lea Energy Alliance, has proposed that the State Land Office impose a negative easement called a “land use restriction or condition” on all mineral development on the Site, including a ban on oil and gas development between the surface and a depth of 3,000 feet, and a prohibition on any directional or horizontal wells bottomed beneath the site that Holtec believes might “disturb or conflict” with its use of the site. The State Land Office has not approved any such restriction, which would likely trigger legal challenges from businesses that already are conducting operations on the Site pursuant to their existing mineral leases.

The State Land Office’s oil and gas leases on and adjacent to the Site do not impose any depth restrictions on drilling activities. Contrary to Holtec’s assurances that “any future oil drilling or fracking ... would occur at greater than 5,000 feet depth,” the State Land Office’s analysis demonstrates the existence of numerous active oil and gas wells within a three-mile radius of the Site at depths of 5,000 feet or less.

In addition, two of the State Land Office lessees on or immediately adjacent to the Site, COG Operating, LLC and EOG Resources, Inc., raise significant concerns about the proposed project and the land use restriction that Holtec requires, particularly its implications for salt water disposal wells, pipelines, and horizontal wells underneath the Site that Holtec might determine – using unknown criteria – will “disturb or conflict” with its nuclear waste storage operations. Both companies advise that they will explore all legal options if the State Land Office were to impose a restriction on oil and gas activities that are permitted under their current leases, along the lines of what Holtec seeks. For those reasons, it is difficult to take at face value Holtec’s representation in its May 23, 2019 letter to the State Land Office that “Oil and Gas is not affected by the facility.”

The International Atomic Energy Agency appears to share the State Land Office’s and its lessees’ concerns about the unknown interaction between nuclear waste storage and preexisting oil and gas development on the very same tract of land. In a 2007 publication, it explains that “[a]ny potential site will require an adequately controlled single-use land area to accommodate storage facilities,” and that potential waste disposal sites should “avoid land with exploitable mineral and energy resources.” International Atomic Energy Agency, Selection of Away-From-Reactor Facilities for Spent Fuel Storage: A Guidebook, IAEA-TECDOC-1558 (Sept. 2007) at 3.2.2 (pp. 23-24) (emphases added). Despite Holtec’s assurances to the NRC and to New Mexicans, it does not appear that your company has undertaken a thorough and critical analysis of the possible conflicts between your nuclear waste storage proposal and the vital economic activities that are already taking place on the Site.

Finally, while I appreciate Holtec’s attendance at a February 19, 2019 meeting at the State Land Office to overview the company’s plans, a number of serious questions that I and my staff raised at that meeting remain unanswered. Holtec to date has not responded to our inquiry about the effects that its proposed operations will have on oil and gas lessees’ present or future fracking activities. In addition, we asked Holtec to identify the worst case scenario for an accident or other adverse event at the Site, and explain how the company would respond to such a contingency. To date, we have not received any

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meaningful response to this inquiry, an omission that requires the State Land Office to assume that Holtec has not sufficiently analyzed the risks posed by its planned operations or is unwilling to do so.

If Holtec's proposal moves forward, nuclear waste likely would remain in southeastern New Mexico until 2048 at the earliest, and possibly much longer since there is no designated permanent repository anywhere in the nation for high-level radioactive waste. As the Commissioner of Public Lands, I am deeply concerned about the misrepresentations Holtec made to the NRC about purported agreements and restrictions regarding mineral leasing at the Site that do not exist and may very well never exist. Understanding the extent of oil and gas operations and other mining activities that may be conducted at the Site is essential to accurately assessing the risks of Holtec's planned nuclear storage operations. Holtec's NRC filings are materially inaccurate in this regard. Given these safety concerns, and lack of consideration for the State Land Office's fiduciary responsibilities, I do not believe that Holtec's proposed nuclear storage project is in the best interests of the State Land Office, its lessees, and its beneficiaries.

Sincerely,



Stephanie Garcia Richard
Commissioner of Public Lands

cc: Hon. Rick Perry
Secretary, United States Department of Energy

Hon. Kristine Svinicki
Chair, United States Nuclear Regulatory Commission

Hon. Michelle Lujan Grisham
Governor of the State of New Mexico

Senator HEINRICH. Mr. Fettus, what should consent look like?

Mr. FETTUS. Consent should look like regulatory authority, as simple as that.

To the extent that there has been acceptance in New Mexico of WIPP.

Senator HEINRICH. Right.

Mr. FETTUS. Transuranic geologic repository, the only operating one in the world.

Senator HEINRICH. Why do we have that? Why do we have consent privileges?

Mr. FETTUS. The only consent, well, it's a little complicated and it's not nearly the consent that needs to be there and it's not the full regulatory authority but the state has——

Senator HEINRICH. But the state has——

Mr. FETTUS. ——hazardous waste permitting authority and the state can shut the place down and set terms by which it can operate after it had a fire and an explosion that shut it down and contaminated it for several years.

Senator HEINRICH. And we reopened that facility which, I will repeat, is the only, only, deep geological repository that has been successfully built that I am aware of in this country because of the state's involvement. And so, I think we need to look at that model and look at what you suggested in terms of a different regulatory approach if we are going to get out of doing the same thing and expecting a different outcome.

Mr. NESBIT. Senator, if I could interject.

I'd just like to point out that I don't agree with Mr. Fettus' intertwining the concept of regulatory authority with consent. I think you can have consent.

Senator HEINRICH. But I do.

Mr. NESBIT. Okay, fair enough.

But I think that the regulatory authority that's present in the United States is—can be handled in a separate manner. I think that consent goes back to contracts.

And if you look at the history of the nuclear waste matter, it is only because the generators of nuclear waste entered into a contract with the Federal Government that was a two-way contract, you pay money and you get something back, the waste removed from your site. That if it wasn't for that contract, then we would be an even a worse situation than we are today.

The CHAIRMAN. Senator Heinrich, I just want to reiterate what I mentioned to Senator Cortez Masto. When we introduced this legislation, we did so knowing that we were laying down a marker for conversation because, quite honestly, we need to restart this.

I appreciate the points that you have raised and they will be part of this ongoing discussion here. I want to make sure that colleagues know and understand, I don't view this bill as the end-all, be-all, but we have to start or restart at some point. So I thank you for that.

Let's go to Senator Lee.

Senator LEE. Thank you very much, Madam Chair.

The traditional forms of nuclear energy generated a whole lot more waste than many of the methods that we are talking about at today's hearing. The sheer volume currently in interim storage

around the country and also the lack of a permanent storage or permanent disposal solution are things that are frequently cited as reasons why we should not continue to develop our nation's nuclear energy capabilities.

Ms. Korsnick, I have a question for you.

Dr. Wagner mentioned several small reactors. How much more efficiently would these small reactors use fuel than reactors in past decades? And could you describe how these new forms of generating nuclear energy could possibly change our need for nuclear waste storage going forward?

Ms. KORSNICK. Yeah, so, I guess as you look forward, there's a variety of different types of small modular reactors that can be built, but some of the types of small modular reactors that can be built would actually be interested in using a different type of fuel. And some of that fuel could be, in fact, what we consider used fuel today. So in any solution set that we put in, we should remind ourselves that we want it to be retrievable. There's 95 percent still good energy in what we call used fuel. It's just in a different form. And some of these reactors that are being looked at for tomorrow will be able to harvest that energy.

Senator LEE. And we will be able to use it far below that 95 percent threshold that you described.

Ms. KORSNICK. That's correct.

Senator LEE. How low would they go?

Ms. KORSNICK. They should be able to use the majority of that good energy. I would say, you know, you'll be down to maybe the four to five percent "that's left" that would then need to be stored.

Senator LEE. Okay.

And that brings up another topic. I don't know whether that plays into what happens then. Could it be reprocessed or recycled? Is there another means of dealing with our need to have a disposal site for spent fuel that could be addressed through recycling or reprocessing?

It is my understanding that other countries that have relied on nuclear energy recycle their waste and that the U.S. has even developed the technology to do so here in the United States in a way that is deemed safe and clean.

Can you describe the process of how nuclear fuel is recycled and the history of why this process has been banned in the United States?

Ms. KORSNICK. Sure, so it, sort of, goes back to when we said there's a 95 percent still good energy in what we call used fuel. It's transformed. And so, instead of being, say uranium 235, it's turned into uranium 238 or it's turned into plutonium 239. So those isotopes can still release energy but they, not in the current way in our current light water reactors.

So in recycling what you do is you essentially take the fuel apart and you isolate what's good and can be used again. So that uranium, that plutonium, and it can then be mixed and you can use it in current reactors, that's called MOX fuel, or you can use it for other types of reactors. So again, it, sort of, closes the fuel cycle, if you will.

You're left with a very small amount that is not useful in a fuel and France, as an example, reprocesses their fuel. They turn that into a glass and then you store that inert glass.

Senator LEE. So the glass is inert?

Ms. KORSNICK. That's correct.

Senator LEE. It is not fissile at that moment, it is not emitting—

Ms. KORSNICK. It's radioactive, but it's not useful for fuel.

Senator LEE. Okay.

Ms. KORSNICK. So it's stored in accordance with—it would be in a deep geologic situation, but it would be a very small amount.

Senator LEE. So it reduces the overall volume of what is produced?

Ms. KORSNICK. That's correct. That's correct.

Senator LEE. So why wouldn't we do that?

Ms. KORSNICK. So in the United States, we've chosen not to. We've chosen the fact that, and this was made in the Carter Administration days, that the fact of reprocessing, they look at it as potential proliferation, even though there are many processes and things you could put in place to ensure that it's done without any kind of proliferation concerns. But that's why the United States doesn't currently go for reprocessing today.

Senator LEE. So if that decision was made in the Carter Administration, we are talking about 40 years ago or more.

Ms. KORSNICK. That's correct.

Senator LEE. What has changed since then that might cause us to need to reconsider that? Has the technology changed in such a way that what was perceived as dangerous would no longer, necessarily, be deemed dangerous?

Ms. KORSNICK. Well, I mean, I think we've proven on a lot of fronts that we have the capability of managing significant things. The government manages plutonium on a regular basis, so it obviously can be done and can be done safely.

Senator LEE. Thank you. Thank you very much.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator.

Senator Cortez Masto.

Senator CORTEZ MASTO. Thank you, Madam Chair.

First, I would like to enter into the record an analysis of this bill made by the Nevada Agency for Nuclear Projects and a statement expressing concerns of this bill by my Nevada colleague, Senator Jacky Rosen.

The CHAIRMAN. Those will be included as part of the record.

[Analysis and Rosen statement follow:]

Date: June 18, 2019

To: Office of Governor Steve Sisolak and Nevada Congressional Delegation

From: Bob Halstead, Fred Dilger, & Belinda Evenden, Nevada Agency for Nuclear Projects

Subject: S. 1234, THE NUCLEAR WASTE ADMINISTRATION ACT (NWAA) OF 2019 -

Final Comments before June 27, 2019 Hearing

Introduction

For the third time in the past six years, the U.S. Senate is considering comprehensive authorizing legislation to restructure the Federal high-level nuclear waste program created by the Nuclear Waste Policy Act (NWPA) of 1982 (Public Law 97-425, 42 U.S.C. 10101 et seq.).¹ The Nuclear Waste Administration Act (NWAA) of 2019, S. 1234, was introduced April 30, 2019 by Sen. Lisa Murkowski (R-AK), co-sponsored by Senators Lamar Alexander (R-TN), and Diane Feinstein (D-CA), and referred to the Committee on Energy and Natural Resources. The Committee has scheduled a hearing on S. 1234 for Thursday, June 27, 2019, Room 366, Dirksen Senate Office Building, 10 a.m. EDT. See:

<https://www.energy.senate.gov/public/index.cfm/2019/6/full-committee-hearing-to-examine-storage-of-nuclear-waste-and-the-nuclear-waste-administration-act>

The NWAA of 2019, S. 1234, is almost identical to previous bills of the same name. S. 1234 changes the dates in the title and schedules, and changes the word “insure” to “ensure” in the current statute [page 54, lines 11-12]. S. 1234 would create a new waste management organization called the Nuclear Waste Administration (NWA); directs the NWA to establish a consent-based siting process; and calls for operation of a spent nuclear fuel storage pilot facility by December 31, 2025, an interim storage facility for spent nuclear fuel by December 31, 2029, and a geologic repository by December 31, 2052 [page 64, lines 19-24]. These storage and disposal facilities would be regulated by the U.S. Nuclear Regulatory Commission (NRC), subject to standards established by the U.S. Environmental Protection Agency (EPA). Like previous bills of the same name, S. 1234 proposes some of the major changes recommended by the Blue Ribbon Commission (BRC) on America’s Nuclear Future in 2012.²

¹In March 2015, Senator Lamar Alexander (R-TN), with co-sponsors Senators Lisa Murkowski (R-AK), Dianne Feinstein (D-CA), and Maria Cantwell (D-WA), introduced the Nuclear Waste Administration Act of 2015, S. 854. Except for year, S. 854 was identical to a bill of the same name introduced in 2013, S. 1240. Like its predecessor, S. 854 was referred to the Senate Committee on Energy and Natural Resources. S. 854, like S. 1240 (2013), had its origin in a bill introduced in August 2012, by the retiring U.S. Senator from New Mexico, Jeff Bingaman, with the goal of starting a discussion on the BRC report. Bingaman’s bill, S. 3469 (2012) died in committee. In April 2013, the Committee on Energy and Natural Resources issued a “discussion draft” of legislation “intended to implement the recommendations” of the BRC. Over the next month, the Committee received more than 2,500 public comments on the discussion draft bill. In June 2013, S. 1240, was introduced and referred back to the Committee. S. 1240 represented the collaborative work of the Committee’s Chairman (Ron Wyden, D-OR) and Ranking Member (Lisa Murkowski, R-AK) and the Chairman (Dianne Feinstein, D-CA) and Ranking Member (Lamar Alexander, R-TN) of the Senate Appropriations Subcommittee on Energy and Water Development. It was originally scheduled for amendments and debate in early 2014. In March 2014, work on the bill was tabled due to a change in committee chairmanship. See: R. HALSTEAD, A. MUSHKATEL, K. THOMAS, “Remaking the U.S. Nuclear Waste Management Program: A Window of Opportunity for Change?” Waste Management 2015 Conference, Phoenix, AZ (March 15-19, 2015) http://www.state.nv.us/nucwaste/news2016/pdf/WM2015_RemakingWasteProgram.pdf

² Blue Ribbon Commission on America’s Nuclear Future, *Report to the Secretary of Energy* (January 2012) https://www.energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf

Implications for Yucca Mountain

S. 1234 has been deemed by some to be “Yucca Mountain-neutral” because it does not add any additional Yucca Mountain repository measures to those enacted in the Nuclear Waste Policy Amendments Act of 1987, appropriately called the “Screw Nevada” act. In that sense, S. 1234, like the BRC report, maintains the status quo on Yucca Mountain – the adjudicatory portion of the proceeding remains suspended, absent new congressional appropriations. Like the BRC Final Report, S. 1234 is conspicuously silent regarding future consideration of Yucca Mountain.³ S. 1234 mentions Yucca Mountain only in the findings section, and states “in 2009, the Secretary found the Yucca Mountain site to be unworkable and abandoned efforts to construct a repository.” [Pages 3-4, Sec. 101 (2), (3), (4) & (5)] Specific provisions would exclude Nevada from the newly created consent-based siting process that would apply to all other potential repository host states.

But three provisions of S. 1234 would directly impact the Yucca Mountain repository project, restart the NRC licensing proceeding when or if funding becomes available, and exclude Nevada from the newly created consent agreements:

- (1) Section 506 (a) states “This Act shall not affect any proceeding or any application for any license or permit pending before the Commission on the date of enactment of this Act.” [Page 67] This provision would exempt Yucca Mountain from the new consent-based siting process, and continue the status quo of the Yucca Mountain licensing proceeding as is;
- (2) Section 301 transfers to the new Administrator all functions vested in the Secretary of Energy by the NWPAA; these functions include the construction and operation of a repository at Yucca Mountain; [Page 27] and
- (3) Section 306(e) requires that the NWA Administrator enter into a written consent agreement with the Governor (or other authorized official) of the potential repository host state, and affected local and tribal governments, before submitting a repository license application to NRC. [Pages 45-47] Since the Yucca Mountain license application has already been submitted, this provision would allow the Administrator to proceed with the development of a repository at Yucca Mountain without a consent agreement with the State of Nevada, Nevada Counties, and affected Indian Tribes.

S. 1234 would require all host governments for storage and/or disposal facilities to sign a binding agreement at or before the beginning of the licensing process, before NRC staff completion of the required Safety Evaluation Report (SER), before completion of an Environmental Impact Statement (EIS) as required by the National Environmental Policy Act (NEPA), and prior to resolution of safety and environmental contentions by an NRC atomic safety and licensing board.

³ The BRC report “focused on developing a sound strategy for future storage and disposal facilities and operations that we believe *can and should be implemented regardless of what happens with Yucca Mountain.*” [p. viii, italics in original]

An alternative approach, the Nuclear Waste Informed Consent Act (NWICA), S. 649,⁴ would allow for signing of a consent agreement at any time before, during, or after the completion of the licensing process, prior to construction of a repository. This would allow the repository consent agreement to be informed by completion of the safety evaluations required by NRC regulations and by the environmental evaluations required under NEPA. The timing proposed in the NWICA would extend consent to Nevada regarding the proposed Yucca Mountain repository.

S. 1234 could be amended to extend the new consent-based siting process to Nevada regarding Yucca Mountain. Section 304, which says the siting process should allow “affected communities to decide whether, and on what terms, the affected communities will host a nuclear waste facility,” could be specifically extended to Nevada, by requiring that the binding consent agreement created by Section 306(e) apply to Yucca mountain. Section 506 could be revised to include (rather than exclude) the Yucca Mountain repository licensing proceeding pending before the NRC.

An additional consideration for Yucca Mountain is repeal of the statutory limit on the amount of waste that could be emplaced at the first repository. Section 509 of S. 1234 eliminates the current 70,000 metric tons of heavy metal limit on first repository emplacements until a second repository is in operation. [Page 71] The U.S. commercial spent fuel inventory already exceeds 80,000 metric tons and the total spent nuclear fuel (SNF) and high-level waste (HLW) inventory is expected to exceed 155,000 metric tons by 2050.⁵ Section 509 effectively eliminates any requirement for a second repository, allowing the first repository to become the nation’s only repository.

Removing the Nuclear Waste Program from DOE

S. 1234 would create a new executive-branch agency, the Nuclear Waste Administration (NWA), and transfer to it all responsibilities currently assigned to the U.S. Department of Energy (DOE) Office of Civilian Radioactive Waste Management (OCRWM). The NWA would be headed by an Administrator and a Deputy Administrator, appointed to a six-year term by the President with the advice and consent of the Senate. In this respect S. 1234 differs sharply from the 2012 BRC report, which recommended creation of a government-chartered corporation, modeled after the Tennessee Valley Authority (TVA), and from the recent Reset Report which recommended transferring the program to a waste management organization owned by a nuclear industry consortium.⁶

There is a strong case for removing the nuclear waste program from DOE. Because of the way DOE conducted siting for the first and second repositories, the Oak Ridge Monitored

⁴ <https://www.congress.gov/bills/116/congress/senate/bills/649?q=%7B%22search%22%3A%5B%22116th+Congress+S.649%22%5D%7D&s=3&r=1>
⁵ <https://www.gao.gov/assets/690/682385.pdf>

⁶ Center for International Security and Cooperation, Stanford University, *Reset of America’s Nuclear Waste Management: Strategy and Policy* (October 15, 2018) <https://cisac.fsi.stanford.edu/research/projects/reset-nuclear-waste-policy>

Retrievable Storage (MRS) facility, and the Yucca Mountain repository project, DOE has lost the trust and confidence of many potential repository host states and Indian Tribes.⁷ The recent contamination incident at the Waste Pilot Isolation Plant (WIPP) has damaged DOE's credibility in New Mexico. The National Academy of Sciences 2006 report recommended taking the nuclear waste transportation program out of the DOE OCRWM, even though NAS gave DOE high marks for its WIPP transportation program, developed with extensive input from the Western Governors Association, the Western Interstate Energy Board, and transportation corridor states.⁸

Nuclear industry opinion is divided regarding taking the program out of DOE, especially creating a new independent executive agency such as the NWA. There appears to be stronger congressional support for the NWA approach, than for the government-chartered corporation recommended by the BRC. There has been little public discussion so far of the private nuclear-industry management approach, based on European models, recommended earlier this year by the Reset Report. The Heritage Foundation has previously advocated something similar to the Finnish private sector program.⁹ The Nuclear Energy Institute previously supported the federal corporation approach.¹⁰ The S. 1234 approach has not in the past been endorsed by the nuclear industry or by state utility regulators, and their support will likely be needed. Possible solutions to gain support include phased implementation of the new management agency, perhaps after completion of licensing; enhanced oversight by Congress and stakeholders; and/or configuring the new management entity to more closely resemble the federal corporation model.

The advice and consent provisions in Title II of S. 1234 apply to the Administrator, the Deputy Administrator, the Inspector General, and a 5-member Oversight Board. This would require eight Senate confirmation proceedings to commence full operations and, because of staggered terms and term limits, one or more Senate confirmation proceedings would be required each year for the first six years of operation. These confirmations could provide a significant challenge to implementation of S. 1234.

Restructuring the Nuclear Waste Fund

Before turning to the S. 1234 funding provisions, it is useful to review repository costs. Our starting point is the DOE 2008 Total System Life Cycle Cost (TSLCC) Analysis¹¹ and the 2013 DOE

⁷ R.J. HALSTEAD, T.J. EVANS, M. WISE, "Rethinking the Nuclear Waste Program: Lessons from the Crystalline Repository Project," *Proceedings, Waste Management* 88, Vol. 2, Pp. 901-914, Tucson, AZ (1988); M.R. FITZGERALD, A.S. MCCABE, *The U.S. Department of Energy's Attempt to Site the Monitored Retrievable Storage Facility (MRS) in Tennessee, 1985-1987*, NWPO-SE-014-88, Report Prepared for Nevada Agency for Nuclear Projects (May 1988); R.B. and J.B. STEWART, *Fuel Cycle to Nowhere: U.S. Law and Policy on Nuclear Waste*, Nashville, TN: Vanderbilt University Press (2011) W.M. and R. ALLEY, *Too Hot to Touch: The Problem of High-Level Nuclear Waste*, New York: Cambridge University Press (2013)

⁸ NAS COMMITTEE ON TRANSPORTATION OF NUCLEAR WASTE, *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*, Washington, DC: The National Academies Press (2006) <https://www.nap.edu/catalog/11538/going-the-distance-the-safe-transport-of-spent-nuclear-fuel>

⁹ <https://www.heritage.org/environment/report/real-consent-nuclear-waste-management-starts-free-market>

¹⁰ NEI, "A Federal Corporation Should Be Developed to Manage Used Nuclear Fuel," (September 2010),

<http://nei.org/resourcesandstats/documentlibrary/nuclearwastedisposal/policybrief/fedcorp>

¹¹ DOE, OCRWM, *Analysis of the Total System Life Cycle Cost of the Civilian Radioactive Waste Management Program, Fiscal Year 2007*,

DOE/RW-0591, Washington, DC (July 2008). http://www.state.nv.us/nucwaste/news2018/pdf/FY_2007_TotalSystemLifeCycleCost_Pub2008.pdf

Fee Adequacy Report.¹² Nevada estimates \$100 billion in 2019 dollars to be the future total cost of Yucca Mountain. That includes \$2 billion over 4-5 years just for licensing.¹³ DOE studies prepared between 2010 and 2013 estimated that walking away from Yucca Mountain and constructing a repository in salt or shale could save tens of billions of dollars.¹⁴ The Energy and Natural Resources Committee should require an updated estimate of projected Yucca Mountain costs, and the estimate costs of constructing repositories in other rock types, with alternative repository designs, before making final decisions regarding Section 401, Working Capital Fund [Pages 52-54], Section 402, Nuclear Waste Fund [Pages 54-55], and Section 403, Full Cost Recovery [Page 55] of S. 1234.

The most recent DOE nuclear waste fund audit report (November 2018)¹⁵ says the revenue balance in the Nuclear Waste Fund (NWF) was \$41.9 billion on September 30, 2018, and that the fund earned \$1.5 billion in interest during FY 2018. The 2018 audit report provides an overview of the accounting procedures under which the NWF operates, the statutory provisions governing congressional appropriations for the NWF, and estimates DOE's outstanding liabilities due to partial breach of the Standard Contract with nuclear utilities, which obligated DOE to begin disposing of spent nuclear fuel on January 31, 1998 (\$28.1 billion).¹⁶

S. 1234 would partially restructure the NWF along the lines recommended by the BRC: "Current federal budget rules and laws make it impossible for the nuclear waste program to have assured access to the fees being collected from nuclear utilities and ratepayers to finance the commercial share of the waste program's expenses.... A long-term remedy requires legislation

Additional information is available in OCRWM, *Summary of Program Financial and Budget Information* (January 1, 2010). <http://www.state.nv.us/nucwaste/news2018/pdf/ocrwm-budget-summary.pdf>

¹² DOE, *Nuclear Waste Fund Fee Adequacy Assessment Report* (January 2013). http://www.state.nv.us/nucwaste/news2018/pdf/11-1066-2013-01_18.pdf

¹³ We start with the \$82.64 billion future cost in 2007\$, and increase by 21% to reflect the estimated increase in the CPI to 2019, resulting in a \$99.99 billion cost. The CPI increased 18 percent between 2007 and 2017, at an annual average rate of about 1.6 percent. The TSLCC estimated DOE licensing costs of \$1.66 billion in 2007\$. NRC recently estimated licensing costs at \$330 million. The 2008 TSLCC is the source for the commonly cited \$96 billion (2007\$) total cost for the Yucca Mountain repository project: historical costs of \$13.54 billion (2007\$) plus future costs of \$82.64 billion (2007\$). The DOE 2008 TSLCC Analysis provides detailed estimates, in constant 2007 dollars, of past nuclear waste program costs (1983-2006) and projects nuclear waste program costs (2007-2133). DOE uses same year constant dollars to remove the effects of inflation [TSLCC, 2] Separate defense appropriations would pay approximately 20 percent of the program cost for disposal of defense HLW and DOE-owned SNF. [TSLCC, 32-33] DOE would need ten years and \$13.51 billion (2007\$) to obtain a construction authorization and license to receive radioactive materials from the NRC, and complete required construction before receiving SNF and HLW. Even with historically low inflation, the CPI increased 18 percent between 2007 and 2017, at an annual average rate of about 1.6 percent. DOE would require \$32.55 billion (2007\$), or \$1.3 billion (2007\$) per year, for the next 25 years of repository construction and operations. Even if the inflation rate was low by historical standards, about 1.6 percent per year, DOE still would need to request an appropriation of about \$1.5 billion in the first year of full operations. If inflation continued at only 1.6 percent per year, by Year 25, the DOE annual appropriations request could be \$2.0 billion. If the inflation rate was the same as between 1983 and 2008, DOE would need to request about \$2.7 billion for Year 25.

¹⁴ "The direct repository costs in the UFD study is compared to an adjusted YM TSLCC values of \$51.3B (\$97.0 B less \$45.6B). A relative cost scaling factor for each of the alternative repository concepts is presented in Table 4-1. Overall the alternative repository concepts range from about half the cost of the YM repository (established by the lost cost for either a bedded salt repository or an open mode shale repository) to about 80% higher than the YM repository (established by the high cost for the shale enclosed repository). These factors are for the direct repository costs only. Transportation, consolidated storage and used fuel packaging/repackaging costs as required for an integrated SNF management system architecture are not included." Page 76. Salt repository compared to Yucca Mountain: Low Cost Scenario, 51.3 - 24.3 = 27.0 Billion less expensive; High Cost Scenario, 51.3 - 39.4 = 11.9 Billion less expensive. Shale repository compared to Yucca Mountain: Low Cost Scenario, 51.3 - 25.5 = 25.8 Billion less expensive; High Cost Scenario, 51.3 - 38.7 = 12.6 Billion. See Table 4-1, page 77. DOE, *Nuclear Waste Fund Fee Adequacy Assessment Report* (January 2013). http://www.state.nv.us/nucwaste/news2018/pdf/11-1066-2013-01_18.pdf

¹⁵ https://www.energy.gov/sites/prod/files/2018/11/f58/DOE-OIG-19-08_0.pdf

¹⁶ See especially the summary of finances as of September 30, 2018, on page 7; legislative background on page 16; and accounting policies on pages 17-18.

to provide access to the Nuclear Waste Fund and fees independent of the annual appropriations process but subject to rigorous independent financial and managerial oversight.” [Page viii]

Section 401 would create a new Working Capital Fund, comprised of annual utility fee payments under the existing Standard Contracts between DOE and utilities, which would be available to the NWA without congressional appropriations. But a Federal court decision in 2014 ordered DOE to suspend collection. Utility payments totaled \$765 million in 2012 and were projected to average about \$730 million (in 2012\$) per year over the next decade (2013-2022). Looking at actual U.S. nuclear net electric generation¹⁷ (around 780-800 million megawatt hours per year, despite recent plant closures) the waste fund would likely have received \$700-750 million per year between 2014 and 2018 if the fee had been reinstated and collected. The Working Capital Fund also would receive congressional appropriations for defense waste expenditures and interest on the unexpended balance in this new fund.¹⁸

Section 402 of S. 1234 would continue the current system under which the fees already collected and interest payments on the accrued fees would be made available to the NWA by annual congressional appropriation. The balance in the Waste Fund was \$41.9 billion in 2018. This amount, often referred to as the “corpus” of the Waste Fund, has grown significantly through interest earnings. Using the range of future interest rate estimates considered by DOE in its 2013 fee adequacy report, interest on the current balance would be expected to continue to accrue at \$1.5 billion or more per year.

The new Working Capital Fund, which would not require congressional appropriations, would likely receive at least \$700 million per year, and perhaps \$1 billion per year, over the first 10 years after enactment. This amount would likely support all activities authorized under the NWPA and transferred to the NWA, except for the actual construction and operation of a geologic repository. But future congressional appropriation of funds from the “corpus” of the NWF will likely remain a major political challenge.

Nuclear industry opinion is divided over resumption of the annual nuclear waste fee. Some segments of the industry, especially companies operating so-called merchant power plants in deregulated markets,¹⁹ are concerned that reinstatement of the fee could push more nuclear power plants into early retirement. Possible solutions include phasing-in restart over 5 years or delaying reinstatement until after the completion of licensing for the first storage or disposal facility. But, delayed fee reinstatement would likely complicate the resumption of annual appropriations for the waste program; there have been no new appropriations from the Nuclear waste Fund for DOE since federal Fiscal Year 2009.

¹⁷ <https://www.eia.gov/todayinenergy/detail.php?id=38792>

¹⁸ According to the BRC, cumulative defense appropriations for the waste program totaled about \$3.8 billion through FY2010, about 35 percent of total appropriations from the Fund; defense costs projected forward are estimated to total about 20 percent of life-cycle program costs.

¹⁹ <https://www.powermag.com/can-anything-save-merchant-nuclear-2/?pagenum=2> an industry source told us one particular company might have to pay \$50 million per year from its own revenues not recoverable from rate-payers.

Consent-Based Siting

The BRC Final Report recommended legislative action to establish a new facility siting process: “The NHPA, as amended in 1987, now provides only for the evaluation and licensing of a single repository site at Yucca Mountain, Nevada. The Act should be amended to authorize a new consent-based process to be used for selecting and evaluating sites and licensing consolidated storage and disposal facilities in the future” [Page viii]

Title III of S. 1234 would direct the NWA to assume responsibility for siting and operating a geologic repository for spent nuclear fuel and high-level radioactive waste, to site and operate a pilot spent fuel storage facility, and to site and operate one or more consolidated storage facilities. This title would create a consent-based site selection process for such new facilities, together with siting and licensing requirements. Separate subsections spell out the siting process for storage facilities (Section 305) and repositories (Section 306) and outline terms for written consent agreements between the NWA and state, local, and tribal governments.

The S. 1234 consent process would create a central role for State Governors. S. 1234 would require consultation with Governors of potential host states and public hearings would be required before selecting sites for development of storage facilities and for repository characterization. A written consent agreement with the Governor or other authorized official of the State, in addition to local and tribal governments, would be required upon a final determination of site suitability but before submission of a license application to NRC. S. 1234 is consistent with the Western Governors’ Association (WGA) policy resolution: “In the event that centralized interim storage, either private or federal, is deemed necessary, no such facility, whether publicly or privately owned, shall be located within the geographic boundaries of a western state or U.S. territory without the written consent of the Governor in whose state or territory the facility is to be located.”²⁰

S. 1234 does not require prior approval of the Governor (only consultation) for sites recommended by local governments or tribal governments. Failed past siting efforts suggest consent of the Governor must be obtained early in the siting process. S. 1234 does not require agreements to address spill-over impacts on neighboring local units of government and Native American lands. Adjacent and/or nearby counties, cities, and tribes could be heavily affected by transportation, socioeconomic, and environmental impacts.

Although not exactly the same as 42 U.S.C. 10101,²¹ the S. 1234 definitions of “Affected unit of general local government” and “Affected Indian Tribe” (pages 5-6) appear to be functionally equivalent to the current definitions. More analysis is needed regarding impacts on specific counties and Indian Tribes.

While Section 306 (a) of S. 1234 requires the Siting Guidelines to be consistent with NHPA 112(a), there is no requirement for consistency with EPA and NRC repository rules. Sections 306 (c), (d), (e) and (f) do not require the Administrator to prepare an Environmental Impact

²⁰ http://westgov.org/images/files/WGA_PR_2018-10_Radioactive_Materials_Management.pdf

²¹ [http://uscode.house.gov/view.xhtml?req=\(title:42%20section:10101%20edition:prelim\)](http://uscode.house.gov/view.xhtml?req=(title:42%20section:10101%20edition:prelim))

Statement (EIS) prior to submission of a license application to NRC, making NRC responsible for the draft EIS, final EIS, and the public review and comment process required under NEPA.

Spent Nuclear Fuel (SNF) and High-Level Radioactive Waste (HLW) Transportation

Section 309 of S. 1234 transfers to the NWA all nuclear waste transportation responsibilities currently assigned to DOE's Office of Civilian Radioactive Waste management.²² But S. 1234 ignores the past three decades of vigorous public debate over nuclear waste transportation safety and security and ignores existing regulatory gaps important to safety and security.

Building upon the 2006 National Academy of Sciences (NAS) transportation report, the BRC 2012 Final Report recommended legislative and administrative actions to enhance transportation safety and security and to address public perception of transportation risks. The NAS report found "no fundamental technical barriers to the safe transport" of SNF and HLW, but noted "a number of social and institutional challenges to the successful initial implementation" of large-scale shipping campaigns, and cautioned that "the challenges of sustained implementation should not be underestimated." [Pages 2-3] The NAS recommended 14 specific actions, some involving multiple steps, to be carried out before the beginning of shipments to a repository or centralized storage facility. [Pages 7-23]

"Of course, spent fuel transportation is not risk-free, and past experience is not necessarily a useful predictor of future performance. The fact that spent fuel transportation risks have been low in the past does not necessarily mean that risks will also be low in the future. Future risks depend on a number of factors including the quantities and ages of spent fuel transported, associated scaling issues related to the overall size of the transport program, transport modes, and the care taken in fabricating and maintaining transport packages and executing transportation operations. Ongoing vigilance by regulators and shippers will be essential for maintaining low-risk programs in the future, especially for the scale-up and operation of large-quantity shipping programs. Any accident or terrorist attack that results in the large-scale release of radioactive material into the environment would likely have worldwide implications and could result in a temporary or even permanent halt to ongoing transportation programs for spent fuel in the United States." [Pages 179-180]

The BRC Final Report endorsed adoption of the NAS 2006 transportation recommendations, including "full-scale cask testing, more systematic examination of social or societal risk and risk perception, making planned shipment routes publicly available, shipping stranded spent fuel

²²Under Section 309 of S. 1234, the NWA would be responsible for all transportation to storage and disposal facilities constructed under the Act. The NWA would be directed to provide financial and technical assistance to affected States and Indian tribes, including conducting "a program to provide information to the public about the transportation of nuclear waste." [Sec. 309(d)(1)] The NWA would be required to use transportation packages explicitly governed by some but not all NRC regulations. The NWA would be required to provide advance notification to affected States and Indian Tribes but is not explicitly subject to existing NRC regulations regarding notification. S.1234 fails to address regulatory gaps, for example the exemption of DOE shipments from the NRC transportation security and safeguards regulations (10 CFR 73.37) and creates a new regulatory gap by failing to mention NRC requirements for advance notification to affected States and Indian tribes (10 CFR 71.97). Moreover, the transportation assistance provisions do not require implementation through rulemaking, a key objective of most transportation-affected state regional groups (SRGs) for the past three decades.

from shutdown reactor sites first, and executing technical assistance and funding under NWPA, Section 180(c).” [Pages 81,150] The BRC noted stakeholder concerns that “DOE’s plans to use its own self-regulating authorities under the Atomic Energy Act” and recommended requiring full NRC and DOT regulation of future SNF and HLW shipments: “... a new waste management organization should be subject to independent regulation of its transport operations in the same way that any private enterprise performing similar functions would be – in other words, the new organization should not receive any special regulatory treatment. This will help assure regulatory clarity and transparency.” [Page 83]

The NAS and BRC transportation recommendations address widely held stakeholder concerns about large-scale, decades-long, and nation-wide SNF and HLW shipping campaigns. Both routine shipments and transportation accidents and incidents would create the potential for radiation exposures to workers and members of the public. Large-scale shipping campaigns would heighten perceived risks. Once regular shipments of SNF and HLW to a centralized storage facility or repository begin, dozens of states and Indian tribes would be affected, along with hundreds of local government jurisdictions.²³

The transportation provisions of S. 1234 simply fail to address the full range of transportation safety and security concerns identified by the NAS, the BRC, and Western States.

Defense Waste Disposal Options

Sec. 308 [Pages 47-49] of S. 1234 generally follows the BRC recommendations regarding defense waste disposal, but needs to be updated to reflect the March 24, 2015 Presidential determination²⁴ proposing a separate defense repository. S. 1234 requires the Secretary of Energy to report to Congress within one year regarding separate versus commingled disposal of defense SNF and HLW. The BRC Final Report urged the Administration “to launch an immediate review of the implications of leaving responsibility for disposal of defense waste and other DOE-owned waste with DOE versus moving it to a new waste management organization.” [Page 65]

The estimated defense waste share of the total repository inventory ranges from about 20 percent in 2008 to about 10 percent in 2017.²⁵ In 2015 DOE concluded²⁶ that a separate defense repository would be technically feasible, advantageous from a technical and institutional standpoint, and could be sited and developed by DOE under current law, although it would require a separate defense nuclear waste appropriation. DOE’s conclusions were challenged by a January 2017 report by the Government Accountability Office (GAO-17-174).²⁷ Nevada’s analysis of DOE’s findings and the presidential determination concluded that current

²³ SNF and HLW are currently stored at 76 sites in 34 states. The “representative routes” identified by DOE for shipments from those sites to Yucca Mountain would travel 22,000 miles of railways and 7,000 miles of highways, traversing 44 states, the District of Columbia, and more than 30 Indian nations. According to the 2010 Census, about 55 percent of the total US population, about 175 million people, lived in the 960 counties that would be traversed by those routes. [See: State of Nevada, *Report and Recommendations of the Nevada Commission on Nuclear Projects* (January 2017) http://www.state.nv.us/nucwaste/news2017/pdf/nv2017comm_report_final.pdf Pages 19-21]

²⁴ <https://obamawhitehouse.archives.gov/the-press-office/2015/03/24/presidential-memorandum-disposal-defense-high-level-radioactive-waste-se>

²⁵ DOE, 2008 TSLCC; GAO-17-174, 2017.

²⁶ http://www.yuccamountain.org/pdf/defense_repository_repor-2015t.pdf

²⁷ <https://www.gao.gov/assets/690/682385.pdf>

law provides no mechanism whereby the Yucca Mountain repository could be “re-purposed” to meet the current definition of defense HLW and SNF disposal, which is adopted in the S. 1234 [reference 42 U.S.C 10101, section 2].

S. 1234 directs that not later than 1 year after enactment, the Secretary of Energy will notify the President and Congress whether the Secretary intends to reevaluate the previous decision(s) by the President to commingle or separately store and dispose civilian and defense wastes. If the Secretary finds separate storage or disposal facilities are “necessary or appropriate for the efficient management of defense wastes”, the Administrator may proceed, with the concurrence of the President, to site, construct and operate one or more separate facilities for the storage or disposal of defense wastes.

The Committee may want to consider amending S. 1234 to (1) require specific congressional approval before any decision is made to construct and operate separate defense waste facilities; (2) expand the basis of the Secretary’s decision to include “cost efficiency, health and safety, regulation, transportation, public acceptability, and national security,” as specified in the section 8 of NWPA of 1982; (3) clarify that siting, construction and operation of separate facilities for defense wastes must fully comply with all other provisions in Title III of S. 1234 regarding siting, consent agreements, and licensing by the NRC; and (4) clarify the funding requirements for defense-only facilities.

Conclusion

S. 1234 proposes challenging but workable remedies to fix the broken high-level nuclear waste program. The Senate should proceed to fix the program, and extend consent to Nevada. The Nevada Commission on Nuclear Projects recommended this approach in 2017: “In the past two Congresses, the Senate Energy and Natural Resources Committee has drafted comprehensive legislation, entitled the Nuclear Waste Administration Act, to restructure the nation’s nuclear waste program following the BRC recommendations. This legislation is not acceptable to the State of Nevada because it would continue the status quo regarding Yucca Mountain. It would need to be amended along the lines of the Nuclear Waste Informed Consent Act, introduced by the Nevada congressional delegation. After extending the consent process to Nevada, the 115th Congress should resume action to implement the BRC recommendations, giving the highest priority to taking the federal nuclear waste program out of DOE, creation of a consent based process for siting high-level nuclear waste storage and disposal facilities, and adoption of measures to enhance transportation safety and security.”²⁸

²⁸ http://www.state.nv.us/nucwaste/news2017/pdf/nv2017comm_report_final.pdf [p.27]

JACKY ROSEN
NEVADA

United States Senate

Testimony of Senator Jacky Rosen
Committee on Energy and Natural Resources
Hearing to Examine Storage of Nuclear Waste and the Nuclear Waste Administration Act
June 26, 2019

COMMITTEES
HEALTH, EDUCATION, LABOR, AND
PENSIONS
COMMERCE, SCIENCE, AND
TRANSPORTATION
HOMELAND SECURITY AND GOVERNMENTAL
AFFAIRS
SPECIAL COMMITTEE ON AGING
SMALL BUSINESS AND ENTREPRENEURSHIP

Chairman Murkowski, Ranking Member Manchin, and Members of the Committee:

Thank you for holding today's hearing to discuss potential solutions to our nation's nuclear waste problem and to review S. 1234, the Nuclear Waste Administration Act of 2019.

As you know, in 1987, Congress amended the Nuclear Waste Policy Act and targeted Yucca Mountain, located less than 100 miles northwest of Las Vegas, as the sole site for our nation's high-level nuclear waste geologic repository, despite the fact that Nevada does not produce nuclear waste. For over 30 years, the state of Nevada and local communities have rejected this project on safety, public health, national security, and environmental grounds.

Numerous studies have since shown that Yucca Mountain is a physically unsuitable site that would threaten the health and safety of Nevadans, and would take half a century to complete. Notably, Yucca Mountain is located above an aquifer, in an area of moderate-to-high seismic activity and is subject to oxidizing and corrosive elements. In addition, the Yucca Mountain site is directly adjacent to the Nevada Test and Training Range (NTTR), the largest air and ground military training space in the contiguous United States. Establishing a nuclear waste repository in such close proximity to NTTR could threaten our national security and the readiness of our Air Force.

I recognize and understand the pressing need to address our country's nuclear waste problem, and I appreciate that S. 1234 proposes some of the major changes recommended by the Blue Ribbon Commission (the BRC) on America's Nuclear Future in 2012. However, this bill fails to properly implement the BRC's recommendation for a consent-based siting process because it effectively allows every state *except for Nevada* to decide and consent to hosting an interim or permanent site.

Our nation cannot progress toward achieving viable, sustainable, and innovative solutions for disposing of our spent nuclear fuel and high-level waste without first abandoning the now three-decade-old plan to dump waste at Yucca Mountain and recognizing that such a facility cannot be forced upon an unwilling host state. The need to store nuclear waste does not outweigh the rights of states to have a say in the matter.

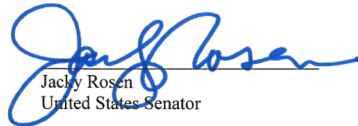
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I look forward to working with members of this Committee to improve this bill and find a solution to our nation's nuclear waste problem that does not involve forcing our nation's nuclear waste on Nevada or any other unwilling state or community.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jacky Rosen", is written over a horizontal line.

Jacky Rosen
United States Senator

Senator CORTEZ MASTO. Thank you.

I am sorry Senator Alexander had to leave. I do agree with him. I think we need a comprehensive approach here. I think we need to—it is safely stored what I am hearing now, spent nuclear fuel, and it is safely stored where it is. But we do need a comprehensive approach for the future.

But here is the one thing that I am seeking and this is why I so respect Senator Alexander. In 1987, I believe it was, Tennessee was able to successfully remove the Oak Ridge facility as an interim storage facility, change the law, and now in this bill Tennessee has equally the opportunity to say no like every other state, except Nevada. That is all I am looking for, in my state, are those similar opportunities, particularly with this bill it creates an equal consent-based siting process for all states, except for Nevada.

And let me just highlight for the record, Section 306(e) requires the potential host state to veto or approve a site before they are fully informed of a site's local impact prior to initiating a review licensing process. That essentially leaves Yucca Mountain as the default sole repository. Section 506(a) gives parity to all other states, except for Yucca Mountain in Nevada, which the consent-based process would not be applied to, but would be applied to states such as New Mexico, Texas and Utah to be kept on the list without requiring their consent. And Section 509 eliminates the legal 70,000 metric ton limit of waste to be stored at a repository so if no state wants to be a host, this guarantees all the waste goes to Yucca Mountain.

My request is that we all be treated equally. I so appreciate, again, the conversation today. That is why Jacky Rosen and I have submitted these recommended amendments to the Committee to this bill that treats Nevada equally.

Let me start with some of the questions and comments that I have heard today.

First of all, Mr. Fettus, let me ask you this. If we are to move forward in a comprehensive approach, and I think we have all agreed that we do need that approach, what is the best way to rebuild the American people's confidence in the Federal Government's ability to provide safe, long-term storage of high-level nuclear waste?

Mr. FETTUS. I think you've targeted the right issue, Senator, and that is confidence. And I'd also put it as trust. And we certainly support your idea of getting everybody treated equally under the consent.

We would take it a step farther in that if we just keep the current system of trying to keep it as consent, everyone will just say no because the entire burden is on. That's what we're trying to build, is a process where states and EPA can have trust and confidence and say yes in our process. And that's the specific point of our testimony.

Senator CORTEZ MASTO. Thank you.

Ms. Korsnick, would NEI support the new Nuclear Waste Administration Act, as created in this bill, if the NWA walked away from the Yucca Mountain project and demonstrated that a new repository project could be done more efficiently and rapidly than Yucca Mountain? Yes or no?

Ms. KORSNICK. Well, I guess I would reflect to say that we believe that Nevada does have a say in the process by continuing with the conversations around Yucca.

Senator CORTEZ MASTO. That was not my question. My question was this. Under this Act, would the NEI support this Act if the NWA walked away from the Yucca Mountain project and demonstrated that a new repository project could be done more efficiently and rapidly than Yucca Mountain? Would you support that?

Ms. KORSNICK. I don't see how another process could be done more rapidly with all of the analysis that's already been done on Yucca. But if you found such a magic place, yes, we could be—

Senator CORTEZ MASTO. Well, DOE studies have shown that walking away from Yucca Mountain and starting over with a repository in salt or shale could save billions of dollars over the life of the facility.

So, and this is the challenge I have had. We have had a stalemate over the last 32 years, and we have offered the opportunity to come in and work with us and find a solution for it. I think you have that today, but unfortunately what I see from the industry is the same old playbook and not willing to even admit there is an opportunity to move forward. There is not even a willingness to talk about the potential new technology that can be utilized to address the safe storage, and that is my concern.

We need time now for everybody to come together and move forward on this issue.

Ms. KORSNICK. We're happy to have those conversations.

Senator CORTEZ MASTO. Thank you.

The CHAIRMAN. Thank you, Senator.

Senator Risch.

Senator RISCH. Well, Madam Chairman, thank you for holding this hearing today.

You know, I joined this Committee 11 years ago and we were talking about this then. Unfortunately the discussion today does not sound a whole lot different than it did 11 years ago.

The CHAIRMAN. That is going to change.

Senator RISCH. Okay, going to change, thank you, Madam Chairman and maybe your bill will get us there.

First of all, let me say thank you for inviting Mr. Wagner here. He is really the appropriate person to have here, which I will address in a second.

I am also sorry that Senator Alexander left, because I was going to say he is the smartest guy on the panel. He left Tennessee and moved to Idaho and worked at Oak Ridge for 17 years, was it, Dr. Wagner? And now he is working at Idaho.

Senator KING. You are lucky Senator Alexander didn't hear that.

Senator RISCH. Yes, oh, he will hear it.

[Laughter.]

Anyway, it is appropriate that he be here because the Idaho National Laboratory, of course, is the birthplace of nuclear energy in America and in the world, indeed.

We still have the three light bulbs that we lit, the first three light bulbs lit with nuclear energy there. We don't use them regularly, but they are still there.

In any event, because they were the birthplace of nuclear energy, the site has been used for decades for various things in the nuclear energy business and in the nuclear arms business. We became a waste site for a lot of the waste that was developed during the Cold War.

But my point is this. In about the 1970s the State of Idaho was unhappy with the Department of Energy because they were not properly addressing, in our belief, that the waste should be handled properly. As a result of that, we, in Idaho, sued the Department of Energy and eventually entered into a consent decree with the Federal Government for cleanup at the Idaho National Lab. And all of us who were governors following that stood shoulder-to-shoulder behind that agreement and have executed that agreement. And the Department of Energy, although recalcitrant at the beginning, has now embraced the agreement. Of course, there has been a lot of turnover with the people who were involved and everything. But the bottom line is this. We have been very successful at the Idaho National Lab as far as cleanup is concerned. We have addressed virtually every problem there successfully. We're not done yet.

Isn't that correct, Dr. Wagner? Are we—we are a long ways down the road though, fair statement?

Dr. WAGNER. Absolutely.

Senator RISCH. Yes.

And so, it is important that the people who have, and we have had thousands of people, great people, over the years from all over the United States, from Idaho, who have worked on this and who are really smart at this. And we have proven that you can deal with nuclear waste and it can be cleaned up and it can be put into storage, semi-permanent, some temporary. But it has been done.

So it is discouraging after sitting here all these years and not really having moved the ball very far down the field. We have done that in Idaho. This is a serious problem, but my good friend from New Mexico says we have ignored the politics. Gosh, I would really disagree with that. I mean, it becomes a political issue every time there is a Presidential campaign and Nevada is in play, that becomes a political issue. So, and it is also true here. I have seen it over the years as the Senate races develop in Nevada.

There has to be a better way of doing this and I thank you for holding this hearing. Just as Dr. Wagner has done in Idaho, as we have done in Idaho, I think there is a solution but we are going to have to come together to do it. And hopefully, this bill will start the conversation.

So thank you so much for the hearing.

The CHAIRMAN. Thank you, Senator.

We really do not want this to be *déjà vu* all over again. It has been three Congresses now and, in the meantime, whether it is Yankee, it does not make any difference where you are, we have not been able to address the longer-term issues that must be addressed and folks are looking to us for that legislative direction.

We have an obligation to do it. Just because it is hard and just because it is politically charged, just because it's expensive—\$2.2 million a day that is just, kind of, going out the window—is not helping anybody.

Let's go to Senator King.

Senator RISCH. You know, Madam Chairman.

The CHAIRMAN. Go ahead.

Senator RISCH. You hit on a good note about the fact that we have an obligation to do this. It is discouraging to see that the nuclear energy business is going backward, that has been described by everybody here. Not only in America but all over the world people are backing away from nuclear energy and plants are closing. Some have reached the end of their life, some that have not. And yet, at the same time, there is this tremendous push to try to get carbon out of the air and quit discharging carbon in the air.

And look, solar and wind are great generators, but they just do not deliver the load. At some point in time, the carbon fuels will run out and nuclear is going to be there. It may not be in this century, but future human beings on the planet are going to rely, very heavily, on nuclear. It is up to us to come up with this, resolving this bottleneck that is causing us so much problem.

Thank you, Madam Chair.

The CHAIRMAN. I appreciate that. I think we all agree that nuclear should be a strong part of our mix.

But just as we are seeing facilities that are being shut down, what that then does to the workforce is it, too, dissipates and we lose the leadership that we once had. We once used to lead when it came to the manufacturing of nuclear components. We basically ceded that in so many different areas. We can't lose the workforce along with that.

Let's go to Senator King.

Senator KING. Thank you, Madam Chair.

I experienced and saw a similar thing happen in hydro. Major hydro developments were pretty much done in the '20s and when we got back into hydro in the '80s a lot of the expertise was gone, a lot of the engineers. There were very few firms that really knew how to do it. A lot of the technology was stuck in almost a century old.

I find this one of the most difficult issues, and I can argue it both ways.

Mr. Fettus, you present an appealing plan, state-based——

Mr. FETTUS. Thank you.

Senator KING. ——consent-based——yes, I haven't finished yet.

[Laughter.]

Don't get excited.

State-based, consent-based, getting rid of the exemptions, treating it like other pollutants.

However, what if every state says no? Which, I think, is not unlikely. I lived through in the '80s an effort to even discuss a low-level nuclear site in Maine and the outcry was unbelievable. What if every state says no, where are we then?

Mr. FETTUS. The same place we are now. And we have to try, just as Senator Murkowski is, I think, wisely leading this with a very open mind.

The reason why everyone has said no repeatedly, no matter who it is, whether it was then Governor Alexander in Tennessee or the fine State of Utah with the PFS site. We actually have a consolidated interim storage facility that's licensed in this country right

now that will never receive a gram of waste and the Committee is well aware of that and it's in Utah.

Senator Hatch helped put in a wilderness area in order to block it from ever receiving that waste.

The problem, and then I really appreciated the talk of the Committee that it's not just about politics. Politics are how we actually——

Senator KING. Politics are an expression of the public will.

Mr. FETTUS. Right.

Senator KING. I don't like it when somebody says we are not going to let politics block these things. That is the public speaking.

Mr. FETTUS. I couldn't agree more. And we have to take account of that.

And the way we've done that remarkably in this country with all kinds of difficult and controversial issues are through our bedrock environmental statutes where we have a strong EPA that sets a strong foundational floor of protective standards and then states have delegated programs whether it's air, water, something else. If you build a widget factory, Senator King's widget factory, and you have a set of methyl-ethyl death that gets emitted from your factory. If your—the state can actually protect its citizens, its environment, its waterways, whatever.

Senator KING. Okay, but let me—assume for a moment my hypothetical, that we can't find a state that says yes. They all say no. Then, as you say, we are back where we are now. We have 80 so-called temporary sites. We have one in Maine costing us \$10 million a year, costing the ratepayers and the Federal Government, the ratepayers through the Federal Government, \$10 million a year. That is, sort of, the fallback.

Mr. FETTUS. Well, can I do my quota, my time?

Senator KING. You don't have a countdown clock in front of you. You can do it if you can do it quickly.

Mr. FETTUS. Super-fast.

Senator KING. I am running out of time.

Mr. FETTUS. We have a vastly higher chance of actually having states get to yes if they don't have to take the entire burden. It also solves some of the transportation issues. They can do regional. They can do state.

Senator KING. Well, regional is better than one national anyway because of transportation.

Mr. FETTUS. Correct.

Senator KING. But the transportation routes to Nevada are, I have seen them, I mean, Chicago, Kansas City.

Mr. FETTUS. Almost every Congressional district.

And but the idea——

Senator KING. And it would be two or three trains a week for years to take care of what we have.

Mr. FETTUS. Correct. Yup.

Senator KING. Okay.

Mr. NESBIT. Senator, if I could interject——

Senator KING. Yes?

Mr. NESBIT. ——that part of the problem with consent is who consents?

If you look at the current situation in Nevada right now, the people who live closest to the repository have expressed their political consent for the facility there. But when you add——

Senator KING. I think the lady who sits next to me knows more about what the people of Nevada feel about——

Mr. NESBIT. I understand that, but what I was going to add is when you add the additional level of government in between at the state level, it becomes very difficult. And no one in the world has solved that conundrum to date.

Senator KING. Well and I understand that. That is why I asked my question, what if everyone says no? Because I don't think that is totally unlikely.

Let me ask a totally different question, a technical question.

Why is it that we are talking about now, forever and always, deep holes, mines? We have these sites around the country, like in Maine Yankee, that you all have said are safe. Why not use an interim technology instead of we have to solve it forever, something that will allow technology to develop over the next 20 to 30 years and yet still be safe at a more centralized site? It bothers me that we have 80 sites. I don't think that is very secure.

Mr. NESBIT. I think there's a couple of things there, Senator.

One is that if you don't have a permanent solution, the ability to convince a particular location, as we've talked about at this hearing, to accept all this waste——

Senator KING. But if the Maine Yankee site is safe, why not a larger, similar site that has the same technology you are telling me everybody says is safe, as an interim step until we figure out what the best—I don't understand why we have to go from 80 temporary to permanent. Isn't there a step in between that is a logical piece?

Ms. KORSNICK. Well, that's what consolidated interim storage is.

Senator KING. That is what I am talking about.

Ms. KORSNICK. Yeah. And the challenge is nobody wants to sign up for consolidated interim storage.

You mentioned New Mexico. The governor just recently wrote a letter. The last New Mexico Governor was in support of interim storage. The current New Mexico governor, not.

And the challenge is because they don't want to become the long-term repository. And until there is an idea of a long-term repository, anybody that raises their hands for their consolidated interim storage is de facto, the long-term——

Senator KING. I think that is a good point because these temporary sites are now the de facto long-term sites.

Mr. NORTON. That's correct.

Mr. FETTUS. Senator, though, the actual problem we also face, and the Obama Administration tried to look at deep borehole disposal in South Dakota toward the end of its second term and it turned into an absolute debacle where this is red state South Dakota was objecting.

And it gets precisely to the reasons that we've articulated today which is that when you're outside of the major functions or the normal functioning of environmental law, states have no control. So South Dakota erupted, just as New Mexico has, just as Nevada has been fighting for 35 years. And when you don't fix the institutional

framework to allow the process to get to yes, we're never going to solve this.

Mr. NESBIT. But I think it's important to recognize that a private company did conduct a deep drill hole test successfully. And I think what that points to is the need to get the management of the waste program away from the Department of Energy and put it into a single purpose.

Senator KING. Which is what you are suggesting.

Mr. NESBIT. Focused organization that is dedicated to actual success and we have submitted in our comments, in our testimony, comments along those lines.

And I think it goes—

Senator KING. The bill makes sense, but it bothers me that, as I understand it, the bill essentially says this is the way we are going to proceed except Yucca Mountain is still on a different track that does not require consent.

Anyway, Madam Chairman, thank you. This is a very important hearing. I appreciate your conducting it.

The CHAIRMAN. Yes, thank you, Senator King.

I am going to turn to Senator Manchin, who has to excuse himself from the Committee here.

Senator MANCHIN. I do, and I appreciate it so much.

I just want to have clarification, because something is not making a lot of sense to me.

You are telling me we are not filled up onsite right now so wherever the nuclear plants are, they are still able to have capacity to keep that storage there. Is that accurate?

Mr. NESBIT. Senator, we can continue to expand onsite storage as needed.

Senator MANCHIN. So we are not at critical mass there?

I kind of thought we were. I was led to believe that we had to do something immediately.

Mr. FETTUS. We are in the pools at several sites, Senator.

Senator MANCHIN. Okay.

Mr. FETTUS. In the spent fuel pools.

Mr. NORTON. If I could, Senator, what I'd like to add to that, however, is if you've got sites like mine where the reactor is fully decommissioned, all the spent fuel that's ever going to be generated at that site has been generated at that site. And yet, we sit there loaded, ready to be transported, waiting for some—

Senator MANCHIN. I understand. I am going to get to that next, because now you are talking about going to interim sites. That doesn't make any sense to me at all because an interim site has to be transported again to a permanent site.

Mr. NESBIT. Well, Senator, I would like to add and, in my testimony, I pointed this out, I'd like to note the difference between perceived risk and actual risk. And transportation of nuclear material is an area where perceived risk is orders of magnitude greater than the actual risk.

Senator MANCHIN. The only thing I am saying is it looks like you are just creating a business model for the interim since we have to get to permanent.

So why would you have these paying privately?

Ms. KORSNICK. It's really—it's all about timing.

Mr. NESBIT. The advantage of interim is an economy of state.

Ms. KORSNICK. It's just a timing issue.

If you decided today on a long-term repository site, by the time you license it, let's just select Yucca since we've talked about it, that would still be another three to five years just to license it today because all of the analysis has been done. And there's additional hearings that have to happen. Nevada has to have their say.

Senator MANCHIN. But if we are not at capacity, why would we have an interim site? If it is going to be three to five years?

Ms. KORSNICK. That's just to get your license. It's going to be another decade to build it, alright. So you're already talking you have 15 years if you were on go today. Thirty-five billion is what your obligation is today, and in 15 years it's going to be closer to \$50 billion.

So you have to manage the liability that you are building on a daily basis, and the best way to help manage that liability is that interim storage because once you start taking that fuel offsite, eventually that judgment fund comes down because you don't have to pay the judgment fee because you've taken the fuel in an interim state.

Senator MANCHIN. How far along are we on permitting the interim sites?

Ms. KORSNICK. You're nowhere.

Senator MANCHIN. So whether we started today with interim or permanent, it is the same timetable.

Mr. NESBIT. There's two sites that have applications in but whether they will actually go forward and construct those sites is an open question at this point.

Mr. FETTUS. Senator, there are applications but as Senator Heinrich just entered into the record, there will be a ferocious pushback for all the reasons that I've articulated today. And I couldn't agree more with the lack of wisdom of pursuing an interim site that's likely to become a de facto repository that doesn't solve what you and Senator Murkowski are trying to solve which is the long-term trajectory of how to solve this.

Mr. NESBIT. Senator, the advantage of an interim site is that if you provide security and monitoring at one location versus dozens of locations, there are economies of scale advantages for doing that if you're going to do it for a long period of time.

Mr. NORTON. That's correct.

Senator MANCHIN. Thank you.

The CHAIRMAN. Senator Cantwell.

Senator CANTWELL. Thank you, Madam Chair, and thanks for having this important hearing. I can say for the State of Washington, there is probably no more important discussion than the cleanup and disposal of high-level nuclear waste.

And for a state that did what it was asked of us and the people that were there in the development of Hanford, to the people who have done their best at cleanup, we too want to get answers to this.

I guess, I have been listening to most of the hearing, in and out of other things, but I agree with Senator Alexander that moving forward is a very necessary and positive thing. And I would say count me in the camp of the belief that consensus-based approaches are more likely to generate quicker results than the legal and long

process that we have to continue to play out. And that is even to say if you pass legislation, it just does not mean you have cleared the legal hurdles that continue to stymie us in these debates.

So one of the things that Senator Alexander and others have referred to, and some of the witnesses have had the Blue Ribbon Commission and, in their discussion, our former colleague, the late Senator Pete Domenici, a member of that.

One of the things that I liked about the Commission recommendations was that they thought that separating commercial and defense waste and dealing with that separately might be one of those near-term opportunities to make more progress.

Mr. FETTUS or anybody else, do you have a thought on continuing to look at that as a path forward?

Mr. FETTUS. I think that's a secondary issue, Senator, because I think fixing the—

Senator CANTWELL. Well, it is not secondary to us because we are the ones waiting. I forgot to put the big moniker out here. This is the largest nuclear waste cleanup site in the entire world.

Mr. FETTUS. Agreed.

Senator CANTWELL. It is complex. It is hard. We are making progress, but we need to get the high-level waste out.

So let's come up with a process of moving the defense waste out. The complexity of Senator Feinstein's concerns on the commercial side are going to take us a long time to figure out.

Just like Hanford is cleaning up some easy to clean up things and getting to the harder things, why can't we move forward on defense?

Mr. FETTUS. I think the challenge with the defense waste getting to a repository is going to be the same as the challenge with commercial spent nuclear fuel—that if you don't have the statutory and regulatory process that can allow consent in getting to yes, you won't solve it.

That's why I meant it a second ago—

Senator CANTWELL. I am saying, we are saying the same thing.

Mr. FETTUS. Yup.

Senator CANTWELL. I want a consent process that is faster. If they will take that, I am just saying, streamline defense so it can get done faster as you deal with all the other aspects.

Mr. FETTUS. If you can get all the waste out of the tanks and get it vitrified and get it ready, that would be great.

Senator CANTWELL. Well, this is, believe me, a day-to-day task—

Mr. FETTUS. Yes.

Senator CANTWELL. —for us in the State of Washington, but we are only doing it on behalf of the entire United States and part of stewardship. This should be every member of this Committee's responsibility. This is a responsibility of the United States of America, not just the State of Washington or environmental director.

But I will tell you as we fight every time on some idea that is shortchanging the cleanup process or an idea, we are desperate to move the defense waste in a way in which people are saying to us, we want it and we will take it and we want to explore those ideas and see if we cannot move forward.

So thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Cantwell.

Senator BARRASSO.

Senator BARRASSO. Thank you very much, Madam Chairman. It is good to be here. I want to thank you and Ranking Member Manchin for holding this important hearing this morning.

This Congress, this Committee has discussed exciting and innovative ways to address climate change. We have explored carbon capture technologies, renewable resources and advanced nuclear power and nuclear energy.

In several of the hearings, witnesses have stressed that nuclear energy is an essential part of our clean energy portfolio. If we are serious about addressing climate change, we must be serious about preserving and expanding the use of nuclear energy. We cannot do it without nuclear energy. So the lack of a nuclear waste management program limits the use and the expansion of nuclear power.

In May, I chaired an Environment and Public Works Committee hearing on my discussion draft legislation that would complement and could complement Senator Murkowski and Senator Alexander's nuclear waste legislation.

Eight states right now have new bans, bans on new nuclear until Washington permanently disposes of nuclear waste. Communities across the country are struggling to accept new nuclear plants because there is no permanent pathway to remove the nuclear waste.

I am glad this Committee is holding this hearing to address these challenges.

Ms. Korsnick and Mr. Nesbit, American ratepayers have now paid about \$15 billion to site, to study and to design a repository for the Yucca Mountain site. And of this funding, \$200 million was paid to the State of Nevada to develop their own scientific and technical analysis.

Ms. Korsnick, why is it important for the Nuclear Regulatory Commission to complete the independent safety review of the proposed Yucca Mountain repository?

Ms. KORSNICK. Well, you just mentioned the significant money that has been expended. We should have a fair hearing and, quite frankly, give Nevada a chance to have their hearing.

The process will require that it goes through the judges, et cetera, through the licensing process and for all this money that has been expended, let's understand the science and the licensing process and work ourself through it.

In the future, we might need another long-term repository, so let's learn everything that we can and understand the science and the licensing process for the one that's so far along.

Senator BARRASSO. Following up on that, Mr. Nesbit, why is it important—

Mr. NESBIT. I knew what you meant.

Senator BARRASSO. Okay.

You note that the Nuclear Regulatory Commission's Yucca Mountain licensing review is valuable. And it is valuable to inform safety regulations for a different repository site.

Is it also important to complete the pending licensing process to build that public trust?

Mr. NESBIT. Absolutely. I agree with everything that Ms. Korsnick said.

There's other reasons why it is beneficial for the American people to go forward and complete the licensing even if Yucca Mountain isn't built. I mean, we don't know what the answer is until we do it. I mean, if something is found that said this is not the right place to do it, we've got to go find another solution. But we need to go through the process in order to demonstrate the ability to license a geologic repository for used fuel and high-level radioactive waste here in the United States. We're going to learn a great number of lessons from that. And having invested \$15 billion already, I think it only makes sense to get a little more return for that huge investment.

And the only other thing I'll say along those lines is it is the law that we do that. I think that if we demonstrate that we're going to follow the law here, if we change the law and do something different later, then people will believe that we'll follow the law there too.

Senator BARRASSO. Okay.

Along those lines, back to you, Ms. Korsnick.

Like Senator Murkowski's bill, my Nuclear Waste Discussion Draft allows the Secretary of Energy to partner with private companies to store spent nuclear fuel on an interim basis. Mr. Nesbit just talked about other sites. The draft requires the interim storage program to proceed at the same time as the Nuclear Regulatory Commission's review of the Yucca Mountain license application.

Do you support a requirement that interim storage is connected to tangible action on a permanent repository for nuclear waste?

Ms. KORSNICK. Yes, in fact, we think it enables that interim storage because people will see, alright, you have this path for a long-term answer. I'm happy to participate in your shorter-term answer because I understand that this pathway exists.

Senator BARRASSO. Finally to Dr. Wagner, if I could.

The Idaho National Lab is a leader, a real leader, in developing advanced nuclear technologies. It is also the proposed site of the nation's first small modular reactor which is going to provide nuclear power to the intermountain West.

Advanced nuclear reactors can increase safety, I believe, can decrease cost, can reduce the amount of nuclear waste. So while advanced nuclear can reduce nuclear waste, will there still be nuclear waste products that must be permanently disposed of?

Dr. WAGNER. Yeah, the short answer is yes.

There's a variety of advanced reactor concepts that can significantly increase fuel utilization. There's also different concepts that Maria spoke about earlier that close the nuclear fuel cycle through reprocessing. But at the end of the day there are always going to be some small amount of material that requires deep geological repository.

Senator BARRASSO. Yes, thank you. Thank you, Madam Chairman.

The CHAIRMAN. Thank you, Senator.

I was going to ask a question about what is the number? How many additional storage facilities, long-term repositories, do we need?

As I am thinking about that, it is like, well, we don't know because of exactly what you have said, Dr. Wagner, moving forward.

What will the future of nuclear bring to us in terms of advanced nuclear and the prospect for less waste?

We have talked about reprocessing. I think we know what we know today, but the innovation, that is out there is still evolving, if you will. The view into the deep boreholes. We may be looking at Yucca as okay, this is the design for what we needed 20 years ago but is it the design that we need going forward? And so, I think we need to factor that into the calculus.

The question for those of you who have looked at the legislation that we have laid down here as our working document, do you think we do enough in this proposed legislation to be specific about the type of research and development that DOE or the Administration needs to move forward on? Do we need to do more in that we have been talking so much about this whole consent-based process and the interim and moving to permanent, but we have not really talked about some of the context of this bill that can move the industry forward. Do we have enough in there? Do we need to do more?

Mr. Norton?

Mr. NORTON. Yes, Senator, if I could.

Madam Chairman, a couple things I wanted to reflect on in your question, and I had this conversation with Maria's predecessor, Marv Fertel, probably six or seven years ago when my sites and the other decommissioning plant coalition sites, at the time there were five of us, were kind of the poster children of this problem, right?

The CHAIRMAN. Right.

Mr. NORTON. We operated the plant. We've decommissioned the plant. We're waiting.

I told him at that point in time there was less focus on it both at NEI and the industry than there is today, but I did tell him on the path we're at then and potentially the path we're on now, more than 50 percent of our nuclear fleet will be in the same condition I'm in before we solve this problem if we keep trying the same thing we've been trying for the last 20 years. And I don't think he believed me. But if he was watching it today, with the number of plants that have either shut down or announced shut down, my estimate is not going to be far off, even if we get moving from here.

And so, it is a clear problem. It is a clear issue. I think Senate bill 1234, although we have comments that would make recommendations on changes, is a good starting point for us to work together to figure out how to resolve this problem because what we have been doing for the last 20 years is not going to work.

I would also like to acknowledge my Senator from Maine, Senator King, and his question about are we really thinking about this the right way? And I think that needs to be asked.

I know there's scientists and others that may have a difference of opinion here, but I do think we have to challenge ourselves as to did we really plot the right course with our original plan for a repository and is there an alternative way to think about this? By consolidating this waste, looking at either reprocessing or other technical advancements, other options that other countries are looking at and take the blinders off and look at this more holistically.

The CHAIRMAN. I appreciate that.

Mr. Nesbit.

Mr. NESBIT. Senator, I'd just like to add a couple of things.

One is American Nuclear Society does support continued research into advanced nuclear energy systems and advanced waste management techniques. There's actually private companies out there that are working in this area as well.

I think the question of where that needs to reside, whether it's in your bill or in other legislation is a good question. I think the work that John Wagner and others are doing at Idaho is, they are looking at advanced energy systems in a holistic manner that includes the waste management issue, and I think they need to continue that work.

The CHAIRMAN. Got it.

Mr. Fettus.

Mr. FETTUS. And Senator, the Blue Ribbon Commission wisely cautioned against trusting in reprocessing as any meaningful solution for nuclear waste and the offramp, it's past time for the offramp on recycling of spent fuel in this country. It's both dangerous proliferation and security concerns. It creates more waste and it will not solve the waste problem, and no country has used it to solve their waste problem. And most of all, it's not economical and the BRC identified that it likely never will be.

The CHAIRMAN. Dr. Wagner, you want to respond to that?

Dr. WAGNER. Well, I would just comment that, you know, we don't currently recycle because it's not economical.

You know, one of the many benefits talked about with respect to consolidated interim storage is that whether in time it becomes economical with a substantial growth in nuclear energy or other technologies for waste disposal and design of repositories come into play. A consolidated interim storage facility allows you to make progress to move forward on this issue while some of those other things may or may not come to be other options for the material.

The CHAIRMAN. I appreciate that.

We have just had a vote start. I would like to allow my colleagues an opportunity for a last word, if they would like.

Senator Cortez Masto.

Senator CORTEZ MASTO. Actually, I do, thank you, Madam Chair.

Mr. Nesbit, I sat here and listened to you. Thank you for being here. The arguments you make are the same arguments I have heard for the last 30 years from the industry. But you make one argument that talks about Yucca Mountain being utilized to learn from the science and that is why it should move forward. I think we should learn from the science from Yucca Mountain because there are no natural barriers or man-made barriers that make it safe. But we keep hearing that all the time.

So let me ask you this, if we were to learn from the science of Yucca Mountain which would require still 40 more miles of tunnel to be, to dig the tunnel to bury the canisters, which by the way, the same canisters that are utilized for Yucca Mountain in the study can't be utilized because the industry does not use the same type of canisters. But what I am told it is so hot once it is stored and it leaks like a sieve because the hydrology shows already in exploratory tunnel, it leaks like a sieve. That once the canisters are

there, titanium drip shields will have to be created to put over the canisters. And by the way, those titanium drip shields would not be placed in that facility once the canisters are here until 90 years later and it cannot be placed by a man in there, so you have to build robotics to put the titanium drip shields to protect the water that goes down into the canisters that would go into the aquifer below. Is that the science you are saying that you would learn from that you should not have in any other repository?

Mr. NESBIT. What I was referring to, Senator, was completing the licensing process and having the concerns, such as you just expressed, evaluated by a panel of experts and ruled on in a manner that we can learn from them, if indeed we go on to develop other repositories elsewhere. That's all I'm talking about.

Senator CORTEZ MASTO. We already have the information, and that is my point.

Mr. NESBIT. Well, Senator, I don't agree with your concerns.

Senator CORTEZ MASTO. We have spent \$19 billion on a five-mile exploratory tunnel to study the geology and hydrology. We know that because it is a volcanic tuff and there are fractures through the rock that it's going to leak. So that is why the titanium drip shields are part of your plan for the canisters that will be placed there.

That is what I am saying. We already have the information that shows it is not safe. Why are we going to waste another 30 years with 218 contentions by the state and lawsuits that I know I was part of as Attorney General, against your department, or excuse me, against the Department of Energy, instead of looking forward in a comprehensive approach and utilizing the science to help us understand in moving forward on the new technology that is out there. That is all I am looking for, and I would love for the industry to come to the table and work with us on that.

Thank you.

Mr. NESBIT. The key question at Yucca Mountain is not whether it's built in volcanic tuff, but whether it can or cannot comply with the very conservative environmental standards that were laid down to protect the health and safety of the public. And that's the question that would be resolved in a licensing hearing before fair, impartial and qualified judges.

Senator CORTEZ MASTO. I disagree.

But now that I have more time, let me add a little bit more to this because I think for purposes of science, we really are, and I would ask the scientists here, isn't the intent here to decrease any type of unexpected opportunities with respect to science?

You want a place that is safe, that you are going to decrease any vulnerabilities with respect to that deep geologic site instead of adding to those vulnerabilities by man-made, alleged safety barriers or natural safety barriers. You are going to decrease those kind of vulnerabilities. And isn't that what you're really looking for, for any type of site, a deep geologic site?

And maybe, Mr. Fettus, I don't know if you have a response to that?

Mr. FETTUS. I couldn't agree more, Senator Cortez Masto.

The idea behind any geologic repository is to find geologic media that can isolate the waste for the length of time it's dangerous. And

the problem that the Yucca Mountain project has repeatedly run into is whenever it ran into the technical challenges that you so accurately describe, the response was to weaken the standards to allow the site to be licensed. So we don't look at that upcoming atomic safety and licensing board proceeding, if it were to ever go forward, as a full exercise in having the state have a fair say.

Senator CORTEZ MASTO. Thank you.

Ms. KORSNICK. If I could just add, since we were talking about drip shields, we do know that EPRI did an analysis back in 2008 and they found that the repository was capable of meeting the regulatory requirements without the drip shields, that they had sufficient defense in depth. The drip shields were designed simply as an additional redundant layer of protection. I just wanted to make sure that that was clear.

Senator CORTEZ MASTO. Right, but still the drip shields are there as a redundant layer and that is the point. And you are supposed to be reducing those types of additional redundancies, aren't you, as supposedly having the natural redundancies there and then adding them as necessary.

Again, I am all for moving forward. I think we have to have a solution here, and I think we have to be smart about it.

This is waste that is going to be there for millions of years, for generations to come for our children and our grandchildren, and we have to do right by them. We have to be coming together, particularly in this country, to address this issue.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator.

And to our panel, we appreciate your contribution this morning. We all acknowledge that we have an issue that has been a longstanding issue that has not been resolved and our effort will be to defy the skeptics and to change the status quo which, quite honestly, has been going on for far too long.

I do not want Senator Risch to be sitting here in this Committee five years from now in a similar hearing and saying, I remember back in 2019 we were talking about it and it was the same as it was when I first came to the Committee.

We have an obligation. We have good folks working on things. So let's try to address this very longstanding problem.

With that, the Committee stands adjourned.

[Whereupon, at 11:55 a.m. the hearing was adjourned.]

APPENDIX MATERIAL SUBMITTED

U.S. Senate Committee on Energy and Natural Resources
June 27, 2019 Hearing: An Examination of Options for the Interim and Long-Term Storage of
Nuclear Waste and to Consider S. 1234, the Nuclear Waste Administration Act
Questions for the Record Submitted to Ms. Maria Korsnick

Questions from Chairman Lisa Murkowski

Question 1: Many of the individuals who worked on the initial efforts to site a permanent repository are approaching retirement age or have already retired.

- a. What efforts, if any, are being made to capture their institutional knowledge on this topic?

The Department of Energy (DOE), the National Labs, and the Nuclear Regulatory Commission (NRC) are still employing many of the experts who worked on the Yucca Mountain repository project and are applying their expertise in related areas. DOE and NRC appear to be appropriately maintaining the scientific and technical documentation associated with the repository program and much of this information is available through the Commission's Yucca Mountain Licensing Support Network.

Further, industry and DOE are pursuing a number of technical issues related to used fuel management including for example, research to provide the basis for longer licenses for dry cask storage systems as the casks must now be kept at reactor sites for longer periods of time. The industry's work with DOE and the labs on used fuel issues does not, however, alleviate my concern about the erosion of our human capital in this area. The lack of funding for a repository program is a disincentive for experts to dedicate even part of their career to work on fuel management and disposal issues.

- b. If we are to move forward and begin siting interim storage facilities or a second repository, what type of workforce will we need?

Because interim storage uses the same technology as the dry storage systems currently deployed at reactor sites, the workforce for interim storage is already in place. The three U.S. suppliers of storage technologies—Holtec, Orano, and NAC International—are well staffed with the right expertise to complete any interim storage project in the next several years.

Conversely, as noted above, the repository program is a different story. You basically need scientific and engineering professionals from every discipline and they must be specifically trained to apply their expertise to a repository. There are unique geological, material science, chemical, structural, nuclear, environmental, hydrological, mechanical, and other challenges to building and operating a repository. Although DOE, the National Labs, and NRC are still employing experts in many of these areas, there is reason to be concerned about the erosion of our human capital in the repository development area if the program is not funded and reinstituted in the next few years.

Question 2: In September 2017, a report was prepared for DOE's Office of Integrated Waste Management that analyzed 14 shutdown reactor sites. It found that these 14 sites used "designs from four different suppliers, including 11 different storage systems that would require nine different transportation

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cask designs.” What kind of challenge will the lack of uniformity among used fuel storage pose when we are able to move it to an interim storage site or a repository?

The industry is well situated with technical capability that can handle packaging and other issues associated with the various storage systems now in use. While the lack of uniformity potentially will require different approaches, the technical issues are well understood and the actions necessary to address them are similarly well understood. It is also important to point out that these systems all store fuel in an inert environment in sealed canisters with no moving parts, and are manufactured to meet the same exacting safety standards. We do not believe we will encounter significant technical challenges caused by multiple designs, and strongly believe the benefits of having used fuel casks in one place far outweigh any related challenges the differing systems might pose.

Question from Senator Mazie Hirono

Question: On June 13, 2019, you testified before the House Subcommittee on the Environment and Climate Change. You spoke about the importance of achieving "equity" for nuclear utility ratepayers and for communities neighboring nuclear power plants and spent nuclear fuel storage facilities. There is also a question of equity regarding the proposed Yucca Mountain repository site. Would the Nuclear Energy Institute support amending the Nuclear Waste Administration Act (S. 1234) to extend to Nevadans the same right of consent to store waste in their state that the bill would establish for all other potential interim storage and repository host states?

The Nuclear Waste Policy Act of 1982, as amended (NWPA), created a process for granting Nevada certain rights with respect to the Yucca Mountain repository, including the right to veto the Department of Energy's siting decision, if not overridden by both houses of Congress. Nevada exercised that right in 2002 but both houses of Congress voted to continue the licensing process at the site in Nevada. President Bush signed the joint resolution approving the development of the Yucca Mountain repository site.

Congress developed an equitable process that provided the state with the opportunity to disapprove moving forward with a disposal site within its borders but also recognized that the United States must have a permanent geological repository for our nation's legacy defense waste and commercial spent nuclear fuel. As a practical matter, Congress also was very much aware that no state seemed willing to consent to host a repository even if there was local support (as in the case of Nye County, Nevada, even now). One need look no further than the rejection of potential sites by Kansas, Michigan, Texas, Utah, Louisiana, Mississippi, Washington, Tennessee, and Nevada, among others.

In addition to Nevada's opportunity to present its case when it issued its notice of disapproval in 2002, Nevada will again have an opportunity to demonstrate why it should not host the Yucca Mountain repository when the adjudicatory hearing on the license application resumes. The proceeding for the Yucca Mountain license review pends before NRC administrative judges who are selected from the NRC's independent arm, the Atomic Safety and Licensing Board Panel, which is charged with reaching determinations on the Yucca Mountain repository application's scientific/technical merit and compliance

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with regulatory requirements. Nevada has already shown itself to be a strong litigant in that proceeding, focusing contentions on safety and environmental issues it believes are not technically justified and compliant with the applicable regulations. The judges will consider the 288 remaining contentions admitted into the proceeding as well as DOE's responses. The features of this approach reflect Congress's effort to be fair and provide a reasonably efficient process for stakeholders. After the NRC rules on the application and the agency issues its final decision, Nevada will have the opportunity to challenge the NRC's decision in the federal court of appeals. In short, the NWPA's process allows Nevada the right to consent or not to consent to host the facility at the outset and, through the hearing process, also reasonably balances that right with Nevada's obligation to demonstrate its technical or regulatory bases for its objection.

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Questions for the Record Submitted to Mr. Wayne Norton
Mr. Wayne Norton Responses

Questions from Senator John Hoeven – Mr. Wayne Norton Responses

Question 1: You state in your testimony that continued Congressional inaction in relation to finding permanent storage for nuclear waste is now costing American taxpayers \$2.2 million dollars a day. How does S.1234 reduce this large burden?

Response: Thank you for the question. As I indicated in my testimony, the current average per day cost to taxpayers from the federal government's default on its statutory and contractual obligations under the Nuclear Waste Policy Act, as amended to begin removing spent nuclear fuel and greater than class c waste (SNF/GTCC) from commercial nuclear energy facilities by 1998 is now \$2.2 million. For almost a decade, the Congress and the Administration have been unable to agree on continued funding for the Yucca Mountain licensing application review before the NRC. Yucca Mountain, under the Nuclear Waste Policy Act as amended, is currently the only repository site that would allow the government to begin meeting its disposal obligation and begin reducing taxpayer liabilities.

Section 305 of S. 1234, in recognition of this continuing federal stalemate, directs the head of the newly established Nuclear Waste Administration, within 180 days of enactment, to issue a request for proposals for private sector engagement in the establishment of a pilot program for the consolidated storage of the spent nuclear fuel (SNF/GTCC) at permanently shut-down reactors. The development of consolidated storage capacity for this newly defined class of "priority waste" – undertaken without regard to the status of repository siting and/or licensing efforts, would allow the government to meet its obligation to take title to the SNF/GTCC at an expanding list of facilities and thereby relieve the taxpayer of further damage claims that are awarded out of the U.S. Judgment Fund.

Question 2: Further, how does it ensure that any interim used nuclear fuel storage site does not become a cost-ineffective de facto permanent site?

Response: Thank you for the question. While Section 305 of S. 1234 directs the immediate establishment of a consolidated interim storage program for priority waste – that is, the spent nuclear fuel and greater than class c waste (SNF/GTCC) from permanently shutdown nuclear energy plants, it links further storage efforts to: (a) the obligation of funds to begin implementing the repository siting provisions of Section 306 during the first ten years after enactment; and (b) the selection of at least one repository site for evaluation under Section 306 after the first ten years of enactment. In addition, any storage site for priority waste developed under Section 305 must have the consent of affected local, state and tribal officials – and one might reasonably assume that these officials would seek some additional assurances in any consent agreement regarding the "temporary" status of any storage facility

Given the experience of the Yankee shutdown plants, where the average annual cost of maintaining and securing the fuel in storage approaches \$7.5 million per site, and given that we are approaching two dozen stranded independent spent fuel storage installations (ISFSIs) around the country, a consolidated storage facility capable of safely maintaining that fuel pending the development of a disposal facility, will provide a cost-effective alternative to the status quo.

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Responses to Questions for the Record Submitted to Mr. Steven P. Nesbit

Questions from Chairman Lisa Murkowski

Question 1: Many of the individuals who worked on the initial efforts to site a permanent repository are approaching retirement age or have already retired.

- a. What efforts, if any, are being made to capture their institutional knowledge on this topic?

Response 1(a): Repository site investigations began in 1954 under the auspices of the Atomic Energy Agency. Extensive work was performed in the 1980s pursuant to the Nuclear Waste Policy Act of 1982 (NWPA). In 1987 an amendment to the NWPA ended investigations of sites other than Yucca Mountain and focused site characterization activities on the Yucca Mountain site. Most of the repository work was carried out by national laboratory and United States Geological Survey (USGS) personnel and was documented in formal reports. The 1996 Oak Ridge National Laboratory Report ORNL/TM-12940, "An Account of the Programs of Federal Agencies and Events That Have Led to the Selection of a Potential Site for a Geologic Repository for High-Level Radioactive Waste," provides a summary of geologic repository siting work through 1987. Detailed records of Yucca Mountain site characterization work are captured in periodic project reports and in the Yucca Mountain license application. Another useful reference is a two-volume history of the Yucca Mountain project written by Michael Voegele and Donald Vieth and published by the Nye County, Nevada Press in 2016: Waste of a Mountain: How Yucca Mountain was Selected, Studied, and Dumped. **In summary, the extensive repository site investigation work in the United States is well-documented.**

Personnel is a bigger concern. There was a substantial cadre of repository expertise in various institutions involved in Yucca Mountain licensing when the Obama Administration stopped work on the project and disbanded the Office of Civilian Radioactive Waste Management in 2010. Nine subsequent years of no funding except for limited generic repository research has reduced the available expertise in the Department of Energy (DOE), the national lab complex, the USGS, and the Nuclear Regulatory Commission (NRC) and its contractors. To the best of my knowledge there is no formal government program of knowledge transfer and retention specifically for repository siting. **The personnel situation is yet another reason Congress should promptly restore funding for substantive geologic repository work.**

As noted in my testimony, identifying and developing a second repository will require updating a number of the federal government's generic repository regulations: DOE's siting guidelines in 10 CFR Part 960, the Environmental Protection Agency's (EPA's) environmental standards in 10 CFR Part 191, and the NRC's licensing requirements in 10 CFR Part 60. **Updating the regulatory framework for geologic repositories would contribute positively toward the goal of capturing and preserving institutional knowledge.** Furthermore, updating the regulations should not require developing a major legislative consensus. There would be no need for additional authorization for the cognizant agencies; the effort could be initiated simply by Congress appropriating the modest sums required for DOE, EPA and NRC to perform the work.

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- b. If we are to move forward and begin siting interim storage facilities or a second repository, what type of workforce will we need?

Response 1(b): The workforce required for siting interim storage facilities or a second repository covers a range of technical, managerial and social disciplines. From a technical perspective, the workforce required for siting surface interim storage facilities is substantially different from the workforce needed to site a geologic repository deep under the earth's surface. Interim storage facilities are simple and proven – there are more than 70 dry spent fuel storage facilities in existence in the U.S. today. Siting interim storage facilities does require seismological, meteorological, surface hydrology and civil/structural engineering expertise to verify that storage canisters will not be adversely impacted by external events.

In contrast, a geologic repository requires cross-disciplinary performance analysis to determine the ability of a site to meet requirements related to waste isolation and the protection of public health and safety. These analyses encompass the performance of the waste form itself (spent fuel or vitrified high-level radioactive waste), the engineered barrier system around the waste, and the near-field and far-field geological environment. At a minimum, expertise will be needed in nuclear analysis, material science, geology, hydrology, geochemistry, and seismology. Depending on the site, expertise in other disciplines such as volcanology may be required as well.

Beyond the technical fields discussed above, both interim storage and geologic repository projects require competent leadership and strong project management to succeed. Also, expertise in communications and the social sciences will be needed to support interactions with stakeholders and the general public.

Note that my assessment of workforce expertise required for both interim storage facilities and geologic repositories applies only to the siting phase of the project – i.e., identifying a candidate site and determining with some confidence that it is suitable for waste storage and/or disposal. Proceeding with design, construction, and licensing will require additional areas of technical expertise such as civil, mechanical and electrical engineering and, for a repository, mining engineering. Nuclear engineering expertise will be required for activities such as criticality analysis, shielding design, and licensing.

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Question 2: In September 2017, a report was prepared for DOE's Office of Integrated Waste Management that analyzed 14 shutdown reactor sites. It found that these 14 sites used "designs from four different suppliers, including 11 different storage systems that would require nine different transportation cask designs." What kind of challenge will the lack of uniformity among used fuel storage pose when we are able to move it to an interim storage site or a repository?

Response 2: The lack of uniformity among storage systems will drive additional resource requirements for transportation and will reduce flexibility for storage. All of the fuel at shutdown sites is stored in dual purpose (storage and transportation), welded canister systems. Transporting the fuel for storage at another location does not require repackaging (i.e., the fuel can remain inside the welded canister in which it currently resides). However, the canisters must be removed from the storage overpacks and placed inside a design-specific transportation overpack for shipping, and this evolution requires a design-specific transfer cask. Each transportation overpack has design-specific impact limiters to minimize damage in the event of a postulated accident. When the fuel arrives at its new location it must be placed back into a design-specific storage overpack, again using the design-specific transfer cask. These evolutions require rigging and lifting equipment, much of which is design-specific. The fuel handling crews must be trained to use the procedures and equipment associated with the specific system being moved.

Each storage system design has its own design criteria that determine where and how it can be used. For example, each system will have acceptable seismic loading specified in its certificate of compliance. **To the extent there are differences among designs, not all storage systems may be usable at a given site or facility.**

One vendor has indicated it will be able to transport and subsequently store other vendors' canisters, which, if feasible, might simplify matters. However, obtaining regulatory approval for the approach will be challenging. Absent such a capability, there will need to be a level of cooperation between vendors to store systems of one vendor's design at an interim storage facility associated with another vendor.

The lack of uniformity among storage systems is an outgrowth of the failure of the federal government to remove used fuel in accordance with its contractual obligations, coupled with the historical lack of integration in the DOE spent fuel management program. Twice DOE began to address the issue by developing standardized canisters for storage, transportation and disposal, but both efforts were aborted well before coming to fruition. The situation was not improved by the Obama Administration abolishing DOE's Office of Civilian Radioactive Waste Management in 2010 and Congress failing to fund a spent fuel management program since then.

While unfortunate, the lack of uniformity is a complication that can be overcome through additional resources. The common thread between Questions 1 and 2 is that continued congressional inaction on used fuel and high-level waste management makes both situations – institutional knowledge and lack of uniformity – worse.

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Question for the Record Submitted to Mr. Geoffrey H. Fettus

Question from Senator Mazie Hirono

Question: You testified that “deep geologic repositories are the solution for nuclear waste and must remain the focus” of the effort to protect the public and the environment from the hazards of high-level radioactive waste. You also testified about the shortcomings of previous efforts to site a nuclear waste repository. What lessons would you advise policymakers learn from previous efforts to design and build deep geologic repositories?

Answer from NRDC:

The Failures of Previous Efforts

Thank you for the question Senator Hirono. Previous efforts to design and build deep geologic repositories can teach us much and as the old maxim instructs, “those who fail to heed history are doomed to repeat it.” After more than 50 years of effort, the federal nuclear waste program in this country has failed to deliver a final resting place for highly toxic, radioactive waste that will be dangerous for millennia. Over the years, there have been numerous efforts to attribute the failure of the repository program to certain Senators, to Nevada Governors of both parties, to NRC Commissioners, and even to the public for failure to accept its part in disposing of nuclear waste. All of this is wrong.

Failure cannot be laid at the feet of any one person or entity or the public, and this defeat has many causes. Several agencies (including the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE), the NRC, and the U.S. Department of Justice (DOJ)) and Congress repeatedly distorted the process established in the NWPA, including for developing licensing criteria for a proposed repository. In each instance, such action weakened environmental standards rather than strengthening them, and always to ensure the site would be licensed, no matter the end result. These actions both precipitated and gave traction to ferocious resistance from Nevada, Tennessee, New Mexico, Washington, Texas, Louisiana, Mississippi, Utah, Georgia, Maine, Minnesota, New Hampshire, North Carolina, Virginia, Wisconsin, and Indian tribes. But even those actions are not the reason we remain locked in a virtual *cul de sac*, witness to repeated attempts to try and force the same the result by the same fashion – *i.e.*, transferring the entirety of the nation’s nuclear waste to an above ground parking lot in a resistant New Mexico, or to the technically inadequate attempt at a repository in Nevada.

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A. Science & Politics Are Both Necessary.

Nuclear waste remains a third rail of American politics for a singular reason – **a deep misunderstanding of federalism and the necessary role of states in the process of solving this challenge.** If you take one message from our appearance before your committee and the lesson from past experience you ask us to impart, it is that there is another way to try and cut this Gordian Knot, but it must be done in a fashion that respects the extraordinary history of cooperative federalism in environmental law.

We urge the Committee to appreciate the metamorphosis of Congressman Mo Udall's (D-AZ) NWPA, the organic subject of today's hearing. Indeed, NRDC views the original incarnation of the NWPA as a remarkable, nearly visionary piece of legislation that contained one tragic, fatal flaw: a deep misunderstanding of federalism and the necessary role of states. And that flaw is the single clear conclusion that we have drawn from the history of failures associated with nuclear waste.

As the Committee is aware, the enacted 1982 NWPA set forth obligations and duties for EPA, DOE and NRC, with Congressional oversight and checkpoints along the way. The law attempted to place science in the forefront and balance political power in a way that might allow for this fraught, difficult process of finding and developing disposal sites for nuclear waste. But, importantly, the NWPA never challenged or altered in any way the AEA's provision for exclusive federal jurisdiction over radioactive waste. Despite this baked-in oversight, the NWPA's attempt at the legal balancing act was unprecedented at the time and that observation remains true today. And as we all know, the balancing act was upset as the NWPA was repeatedly altered and the process was finally abandoned by the previous administration in 2009.

But why the repeated derailments? A myriad of answers get offered, generally suggesting that "not in my backyard" (NIMBY) sensibilities and associated politics are responsible for the failure to license and open Yucca Mountain. But as noted at the outset – this is wrong. The deep misunderstanding of federalism and the necessary role of states at the heart of the NWPA just kept getting lost over the years. The federal

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exclusivity over nuclear waste regulation was simply presumed *a priori*, without consideration as to whether that might be at the root of the problem.

So how is the misunderstanding of federalism at the root of the problem? The relationship of the federal government to the governments of the 50 states that comprise our republic is the fundamental fact of American politics. Our political system has never easily digested or durably solved profound national problems like voting rights, health care, gun control, carbon restrictions, or the disposal of nuclear waste, by either federal fiat or, conversely, by turning matters over to the states entirely.¹ And in every instance of national decision making on these and other complex issues, heavily compromised laws or regulations have taken into account the needs and perspectives of states.

Bedrock environmental laws reflect this fact. With the notable exceptions of the AEA (the organic act for nuclear power) and its progeny, the NWPA, there is federalist intention at the heart of environmental statutes and a role expressly reserved for the states. As examples, the Clean Water Act, Clean Air Act, and Resource Conservation & Recovery Act (RCRA) allow states authority to implement those air, water, and waste programs, respectively, in lieu of a federal program. States that obtain “delegated” authority from the federal government must meet minimum federal standards (and the federal government retains independent oversight and enforcement authority). And generally, depending on state law, those delegated states can impose stricter requirements or different, but no less protective regulatory mandates that meet the needs of the state in question. Nuclear waste should be no different, but under the AEA and the NWPA, it is different.

So, where do these observations leave us? It is NRDC’s firm conclusion that Congress is right to take up these matters, that new nuclear waste legislation must be written, and that a new process must be created. Consistent with the expressed statements of Ranking Member Carper and former Senate Energy &

¹ For perspective on the ever-present interplay of the constitutional principles of federalism and equal sovereignty of the states and the extraordinary controversies that still attend such matters, see the 2013 landmark (5 votes to 4 votes) Voting Rights decision and its vigorous dissent, *Shelby County, Ala. v. Holder*, 133 S. Ct. 2612 (2013).

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Natural Resources Committee Chairman Bingaman, whatever results must be “consent based,” concordant with President Obama’s bipartisan Blue Ribbon Commission (BRC),² and take into account the needs of the industry and their federal champions. But this time, any new legislation must also take into account the fundamental need for public and state acceptance and there is only one way to do that, as we explain next.

B. It Is Past Time to Normalize the Treatment of Nuclear Waste Under Environmental Law.

State consent and public acceptance of a nuclear waste solution will never be willingly granted unless and until power to make such a decision as to how, when and where such waste is disposed of is shared rather than decided by federal fiat. There is only one way that can happen consistent with the protective, cooperative federalism at the heart of environmental law. Specifically, Congress must finally end the AEA’s exemptions from environmental law. Our hazardous waste and clean water laws must have full authority over radioactivity and nuclear waste facilities so that EPA and – most importantly – the states can assert direct regulatory authority. This will necessarily alter the federalism oversight that has been central to the failure of the NWP.

The long history of the NWP’s (and AEA’s) misunderstanding of the importance of federalism is at the heart of the repository program’s failure. This is the past we must learn from if we are to succeed in finally disposing of nuclear waste. If we don’t find a way to give EPA and the states regulatory power over nuclear waste – and that is accomplished only by doing away with the environmental exemptions in the AEA – we will not solve this dilemma. Lack of consent from an unwilling host state selected in an expedient demonstration of legislative and administrative power over the (statutorily defined) powerless is a recipe for inaction and, ultimately, disaster in this country, whether the issue is nuclear waste or any other great public concern.

² President Obama’s “*Blue Ribbon Commission on America’s Nuclear Future - Report to the Secretary of Energy, January 31, 2012*” (hereafter “BRC” or “*Final Report*”); see online at https://www.energy.gov/sites/prod/files/2013/04/R0/brc_finalreport_jan2012.pdf.

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Questions from Chairman Lisa Murkowski

Question 1: Many of the individuals who worked on the initial efforts to site a permanent repository are approaching retirement age or have already retired.

- a. What efforts, if any, are being made to capture their institutional knowledge on this topic?

The “retirement cliff” is a constant concern across the nuclear industry, including at nuclear utilities, vendors, and national laboratories. Almost all nuclear-focused companies have implemented specific programs to ensure knowledge transfer between retirement age staff and early and mid-career staff. To meet these goals, INL hosted a knowledge transfer workshop in 2015, 2016, and 2019 to transfer selected technology history and experience to the next generation of leaders.

The US Department of Energy (DOE) continues to maintain an archive of Yucca Mountain related documents (<https://www.energy.gov/yucca-mountain-archival-documents>) as well as licensing-specific materials, which are available on the Nuclear Regulatory Commission’s website (<https://www.nrc.gov/waste/hlw-disposal/yucca-lic-app.html>). Related to siting a permanent repository and/or interim storage facility, in 2013 the DOE developed a siting experience database, which contains more than 650 documents related to siting facilities, not only in the United States but also internationally. More recently in 2019, DOE initiated a knowledge management program for nuclear energy fuel cycle programs at Sandia National Laboratories to ensure a more efficient and rigorous approach to transferring and cataloging institutional nuclear waste management knowledge. This program intends to host a knowledge management workshop before the end of 2019 as a first step in systematically capturing and preserving knowledge in the nuclear waste management program.

- b. If we are to move forward and begin siting interim storage facilities or a second repository, what type of workforce will we need?

Siting a facility requires a range of experts with skills in communication, community outreach, environmental regulation and compliance, nuclear compliance, and a range of scientific disciplines (nuclear engineering, geology, chemistry, hydrology). The maturity of the technology to be deployed at the facility will impact the numbers of experts in each field. For example, if an interim storage facility is similar to the current dry storage facilities, the number of engineers and scientists would likely be less than if the facility was based on an unlicensed or a first-of-a-kind technology.

Question 2: I understand that some types of advanced reactors can reuse nuclear waste as fuel much more easily than existing reactors.

- a. Can you describe what types of advanced reactors are best equipped to reuse nuclear waste as fuel?

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There are many types of advanced reactors that are well-suited for reuse of nuclear fuel. Fast reactors, such as those with sodium, lead, and gas coolants, as well as molten salt fueled reactors, have been designed to use a wide range of fuels. That includes materials recovered from used fuels. For these types of reactors, roughly 95% of the materials recovered from used light-water reactor fuel, predominately uranium, could be reused as a resource. Through DOE's research and development program, significant research has been performed to demonstrate that reuse of fuel can be done effectively and provide significant benefits in used fuel management by consuming long-lived actinide materials. Most notably, the Experimental Breeder Reactor – II (EBR-II), a sodium-cooled fast reactor, demonstrated the use of recycled fuel in 1965.

Many of these reactor types are being developed by private-sector organizations in collaboration and cooperation with DOE and its national laboratories. However, reuse of nuclear materials from used fuel currently is not economically competitive in comparison with market costs for electricity. Further research and development will be needed to reduce costs. That R&D includes demonstrating the integration of these reactors with materials recovery. The Nuclear Energy Innovation Capabilities Act (NEICA) and the Nuclear Energy Leadership Act (NELA) call for the establishment of a National Reactor Innovation Center (NRIC) and near-term demonstrations that would support development of these reactors.

- b. Can you describe the current activities of the department working to convert waste to advanced reactor fuel?

DOE supports programs at INL to recover uranium from used fuel from non-commercial reactors to be used in advanced reactors. Today's U.S. nuclear fleet uses fuel that is enriched up to 5 % Uranium-235. Tomorrow's reactors need fuel in a range of forms that contain between 5 % and 19.75 % U-235 high-assay low-enriched uranium (HALEU) fuel.

INL has used fuel feedstocks with large amounts of residual highly enriched uranium (HEU) that currently must be disposed of at a cost to taxpayers. INL is examining the feasibility of recovering and down blending HEU from these feedstocks, which would allow DOE to provide an interim HALEU supply so that fuels for advanced reactors can be further tested. This solution allows the HALEU market to evolve through timely private industry investment when the advanced reactor vendors come to market.

Recovery methods – available or under development at INL – are determined by characteristics of the feedstock and may include:

- Electrometallurgical process*
- Hybrid process known as ZIRCEX*
- Others*

The final HALEU composition is determined by the fuel specifications and fabrication needs for individual advanced reactor types. It includes, but is not limited to, metallic and oxide forms.

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Question 3: In September 2017, a report was prepared for DOE's Office of Integrated Waste Management that analyzed 14 shutdown reactor sites. It found that these 14 sites used "designs from four different suppliers, including 11 different storage systems that would require nine different transportation cask designs." What kind of challenge will the lack of uniformity among used fuel storage pose when we are able to move it to an interim storage site or a repository?

This lack of uniformity will introduce licensing, procurement, and operational complexities when spent nuclear fuel is moved from reactor sites to an interim storage site or repository.

Each transportation cask design, and its contents, have specific licensing requirements. All will need to be renewed on a timely basis throughout their useful lives. The licensing process is detailed, content specific, and, in order for the spent nuclear fuel assemblies to be transported, will need to cover all unique conditions. The use of so many different cask designs will directly impact the regulatory review burden.

In addition, procurement of the various transportation casks (nine for the currently shutdown sites, likely more when considering the entire commercial nuclear power plant fleet) will be necessary. It takes a minimum of two to three years to procure a single transportation cask, with additional units of the same cask model being completed every two to three months thereafter. Thus, the order in which transportation casks will be acquired to pick up spent fuel from sites must be fully understood in advance, and all procurement actions will need to be completed based on this order. As such, system flexibility, at least initially, will be significantly impacted.

The variety of cask systems will add to the complexity of transportation operations. Each transportation cask system deployed will require system-specific lift points, lifting approaches (vertical vs. horizontal), handling equipment (such as crane yoke attachments), ancillary equipment (seals, bolts, etc.), transfer casks (for shielding during operations), and cask-carrying cradles used to attach the cask to a railcar. Operational procedures and trained crews specific to the operation of each system will have to be maintained throughout the lifetime of a transportation campaign.

While the transportation of spent nuclear fuel to either an interim storage site or repository will be a complex endeavor, sufficient planning and commitment of resources would reduce the impacts of these complexities. DOE's Office of Spent Fuel Management and Waste Disposition is acutely aware of the complexities inherent in the currently deployed systems and has been developing tools and strategies to lay the groundwork for establishing a national system for the transportation of spent nuclear fuel.

Questions from Senator James E. Risch

Question 1: INL is leading the charge when it comes to researching and developing the next generation of advanced nuclear reactors, which must be part of our future energy landscape. You mention in your testimony that the current nuclear waste stalemate is negatively impacting your mission to develop and deploy new innovative technologies. Can you please explain what you mean by that statement?

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The lack of a solution for nuclear waste has a significant negative impact on the public perception and acceptance of new nuclear energy, which adds to the cost risk and uncertainty of nuclear projects. This impacts utility decision-making relative to new nuclear deployment and results in a significant cost and operational burden on current nuclear utilities.

For companies and countries that do not already have spent nuclear fuel, it is a significant deterrent to pursuing a nuclear power project. Because of this, the Russian offering to take back spent nuclear fuel is a significant competitive advantage in the international market.

As the nation's nuclear energy RD&D laboratory, circumstances that affect the commercial nuclear energy industry also impact our mission.

Question 2: INL is performing important R&D that is focused on storing and transporting nuclear waste. Can you please explain some of the research that you and the other labs are working on related to these activities?

In support of the U.S. Department of Energy's long-term storage and transportation research program, the national laboratories have focused on understanding, predicting, and evaluating the performance of spent fuel and canister materials during extended storage, as well as transportation following extended storage. These activities include experimental studies and computational analyses. At the national laboratories, DOE funds these activities, but the laboratories and industry are working collaboratively on a number of projects. In some cases, industry contracts directly with DOE. In others, industry provides its own funding. University researchers also are actively investigating many of these topics in parallel with the national labs, through the DOE-funded Nuclear Energy University Programs (NEUP). Specific examples include:

- *The High Burnup Demonstration Project and associated high burnup fuel performance testing. This is a collaboration between the U.S. DOE Office of Nuclear Energy and the Electric Power Research Institute (EPRI) to obtain data from actual spent fuel on how high burnup fuel ages during long-term storage.*
- *Development of improved methodologies for state-of-the-art best-estimate thermal analyses.*

As part of the High Burnup Demonstration Project mentioned above, 63 thermocouples were placed inside a dry storage cask to measure temperatures during the drying process and during the 10 years of dry storage. These data are being used to validate and benchmark the thermal models used by DOE, the Nuclear Regulatory Commission (NRC), and cask vendors.

- *Understanding potential stainless-steel canister corrosion and development of identification, mitigation, and repair techniques.*
The dry cask storage systems in use today were designed to store fuel for a few decades. Due to the current lack of a permanent geological disposal site, the storage systems may be used for several decades, and perhaps longer, which necessitates a review of potential canister corrosion. The national labs have an extensive testing program underway to understand the conditions needed for corrosion, timeframes of corrosion, and potential cracking, as well as the consequence

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to workers and the public if a corrosion crack were to occur. The national labs, EPRI, and industry have worked with nuclear power plants around the country to obtain samples and test tools to identify, measure, and mitigate corrosion of the stainless-steel canisters. This has also been a significant area of university-led research through the NEUP.

- *Railcar development and testing.*
The national labs and industry are working together to design, build, and test railcars that can transport spent nuclear fuel canisters and casks from their storage sites to a final repository or temporary consolidated storage site.
- *Fuel stress during transportation.*
In order to understand the potential for fuel damage during transportation, the national labs and industry collaborated to measure the shocks and vibrations a fuel and transportation system experienced over a 1,450 kilometer trip by heavy-haul truck, barge, ship, and train. Results showed that, under normal conditions of transport, fuel could be moved more than a billion times across the nation before reaching the fuel's yield point. These data indicate little likelihood that fuel would be damaged during normal transportation conditions.
- *Direct disposal of dual-purpose storage and transportation canisters.*
The current spent nuclear fuel storage systems were not designed to be directly placed in a permanent repository. With Yucca Mountain's uncertain future, fuel has been loaded into approximately 30 different designs of so-called "dual-purpose" canisters (DPCs) certified for storage and transportation, but not for disposal. Opening up and transferring the fuel into different disposal-specific containers may be unavoidable, but the national labs are investigating the feasibility of safely disposing of some portion of the DPCs without repackaging. That will potentially allow for reductions in worker exposure, cost, and the amount of secondary low-level waste.
- *Development and evaluation of future alternative storage configurations.*
Currently a broad set of options exist for spent fuel storage facilities and configurations. As part of examining options for both commercial and non-commercial spent fuel, designs and technologies for these facilities are being investigated.
- *System engineering evaluations to explore tradeoffs between management approaches.*
With the uncertainty related to disposal and/or consolidated storage, the national labs have developed a broad set of system analysis software tools to compare the impacts of the timing and selected technology for spent fuel management. The national labs also are actively using these tools to provide insight to DOE and other interested parties on tradeoffs related to management approaches.
- *Development of improved understanding of spent fuel performance during extended storage periods.*
In addition to the focus on commercial spent fuel, INL manages a broad range of non-commercial and defense-related spent fuel. As part of the safe and secure storage and management of this material, INL is investigating the performance of spent fuel in longer-than-expected storage timeframes.



June 27, 2019

The Honorable Lisa Murkowski
United States Senate
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The Honorable Lamar Alexander
United States Senate
455 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Diane Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

Toi Hutchinson
State Senator
Illinois
President, NCSL

Jon Heining
General Counsel
Legislative Council
Texas
Staff Chair, NCSL

William Pound
Executive Director

Dear Chairwoman Murkowski, Chairman Alexander, Ranking Member Feinstein:

On behalf of the National Conference of State Legislatures (NCSL), the bi-partisan organization representing the legislatures of our nation's states, commonwealths, and territories, we applaud your continued efforts to develop much needed bipartisan legislation that would establish a program to manage the nation's spent nuclear fuel and high-level radioactive waste. The release of the Nuclear Waste Administration Act of 2019 (NWAA) represents a much-needed step forward in this conversation, and NCSL urges Congress to move expeditiously to debate and act on this legislation.

NCSL has long supported efforts by both Congress and the administration to develop a solution that addresses spent nuclear fuel storage and high-level radioactive waste management. NCSL recognizes that nuclear power is an integral part of a national energy plan and that the nuclear industry continues to safely and securely store used fuel at its facilities, but also understands the need to address certain issues including transportation, storage and disposal of used nuclear fuel. State legislators can and do play a significant role in developing nuclear energy policy, whether it be in statehouses across the country, town hall meetings with our constituents or meetings with our respective congressional delegations.

Most importantly, NCSL strongly supports this bill's goal of implementing a consent-based siting process for disposal of spent nuclear fuel and high-level nuclear waste. Such a process mirrors recommendations made by both the Blue Ribbon Commission on America's Nuclear Future (BRC) in 2012, and the Department of Energy in 2013. Although neither this bill, nor NCSL, takes a position on the Yucca Mountain Nuclear Waste Repository, it has been a pillar of NCSL's Radioactive Waste Management policy that the siting of facilities for both interim storage and long-term disposal, be the result of a consent-based approach and that it involve all affected levels of government, including state legislatures. Ensuring such consultation respects the traditional role of state legislatures in the appropriation of funds and performing program oversight.

Further, NCSL encourages federal action to develop consolidated interim storage facilities to temporarily store high-level radioactive waste inventories until a permanent repository is

operational. With respect to the issue of establishing a linkage between progress on development of a repository and progress on development of a storage facility, NCSL neither supports nor opposes such a linkage. However, NCSL does believe that consolidated interim storage facilities should be licensed for a specific, limited period of time not to exceed 25 years.

Additionally, NCSL endorses the creation of a public-private partnership to manage the back end of the nuclear cycle, as was recommended by the final report of the BRC, rather than the establishment of a new federal agency. NCSL also supports your efforts to direct annual funding within the Nuclear Waste Administration Working Capital Fund and the Nuclear Waste Fund for their intended purpose of managing radioactive wastes. These funds should be isolated for developing storage facilities as well as for the use of financing mechanisms and incentives to voluntary host communities.

NCSL supports the bill's language providing for advanced notification to states through which transportation of spent nuclear fuel and high-level radioactive waste will take place. Further, we support provisions that would enable assistance to states from the administrator of the Nuclear Waste Administration to train public safety officials, acquire safety response equipment, and other safety programs related to the transportation of nuclear waste.

NCSL has an extensive history of working on issues related to nuclear waste management and welcomes the opportunity to continue working with Congress to enact a realistic solution to storing our nation's nuclear waste. Please feel free to contact NCSL staff Ben Husch (202-624-7779 or ben.husch@ncsl.org) for more information.

Sincerely,



Representative Stephen Handy
NCSL Natural Resources and Infrastructure
Committee Co-Chair
Utah House of Representatives



Representative Andrew McLean
NCSL Natural Resources and Infrastructure
Committee Co-Chair
Maine House of Representatives

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June 26, 2019

The Honorable Lisa Murkowski
Chairman
Committee on Energy & Natural Resources
United States Senate
304 Dirksen Senate Office Building
Washington DC, 20510

The Honorable Joe Manchin
Ranking Member
Committee on Energy & Natural Resources
United States Senate
304 Dirksen Senate Office Building
Washington DC, 20510

Subject: Nye County Comments of Senate Bill 1234

Dear Chairman Murkowski and Ranking Member Manchin:

Thank you for the opportunity to write you regarding S.1234, legislation your committee is considering to amend the Nuclear Waste Policy Act (NWPA). I am Leo Blundo, a member of the Nye County Commission and the designated liaison commissioner for nuclear waste issues. I was elected last year to my commission seat. The Nye County Commission remains in support of the proposition that the Yucca Mountain licensing proceeding should be completed so that the science behind the proposed repository can be fully explored and evaluated by qualified scientists and technical experts. Waste keeps accumulating and the cost and risks keep climbing, it is past time for Congress to act and solve this problem.

We appreciate the opportunity to comment on S. 1234, the Nuclear Waste Administration Act of 2019. The purpose of amending the NWPA to move forward with a solution to the impasse on nuclear waste issues is commendable. However, we need to learn from history and realize that in practice a consensual process is not easy to achieve. Interim storage has been tried before under different names and one thing is very clear, to get any consent and commitments from state and local governments on interim storage will require a compulsory process to build a permanent repository. Interim storage does not solve the real problems, it just leaves the problem for our kids and grandkids to solve.

We support the stated purposes and a new organization with long term management and funding is a clear improvement and the draft bill sponsored by Senator Barrasso addresses some of our concerns. But we think several amendments will be needed for this bill to solve the waste problem:

1. **We need to base decisions on Nuclear Waste on the Facts.**
Nuclear waste storage and disposal is the ultimate NIMBY issue. The anti-nuclear and NIMBY activists will use misinformation, exaggeration, half-truths and outright lies to

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scare the people who are uninformed on the real risks and facts about nuclear waste and radiation.

Sadly, some of our elected officials parrot this misinformation to support their political positions.

We need Congress to trust the science and put processes in place to allow decisions to be made on facts and science by unbiased experts.

2. **Calling for universal consent is an excuse to do nothing.**

To believe that any controversial project in the 21st century will get consent from every level of government – state, counties, cities, tribes – is unrealistic. To believe that the consent will stand over the years of reviews and licensing is even more unrealistic. What if a State consents but one of its Senators opposes the project? What if one Member of Congress from that State objects? A very relevant example can be found in the State of Nevada itself. In the 1970s, the Federal government was seeking interim storage sites because the repository program at that time had just failed. In 1975, in response to the Environmental Statement for the Retrievable Surface Storage Facility, the Nevada legislature passed Joint Resolution 15, which strongly supported the project and made a strong bid to have the facility built at the Nevada Test Site. Letters supporting the Retrievable Surface Storage Facility were also submitted by the City of Las Vegas, Clark County, Nye County, and Lincoln County.

Historically, New Mexico has been receptive to nuclear waste facilities, as evidenced by the success of the Waste Isolation Pilot Plant. Very recently the new Governor of New Mexico sent a letter to the U.S. Department of Energy and the NRC opposing an interim site, throwing years of work into jeopardy. Clearly, "consensus" can change with time.

To pass legislation requiring universal consent for a nuclear waste repository before proceeding simply means nothing will happen. Consensus is nice, but nuclear waste is a national security issue and the nation needs a path forward on nuclear waste even if consent cannot be reached.

3. **Authorizing Interim Storage without a permanent repository is not a solution.**

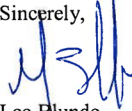
Given the unlikelihood of getting consent for a permanent repository, if an interim site is authorized, it will become a de facto final resting place for nuclear waste. As a result, States and local governments will likely be unwilling to accept interim storage. This also means that any waste stored at an interim site will not be stored with the safety features and assurances that a deep geological repository would guarantee. One real question to be answered is, if we have a permanent repository process moving forward do we really need an interim storage facility? Yucca Mountain and any other repository will have storage and staging areas as part of the design. These storage and staging areas are interim storage by another name and we may not need the extra transportation, handling and cost of a separate interim storage facility.

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4. **The Nuclear Waste Policy Act is the law.**

Congress has never repealed the NWPA. The act was a careful balancing act protecting the State of Nevada and the local counties while moving ahead on a national security mission. The provisions of the Act were violated by the last administration when it ended the license proceeding without proper cause. A federal court of appeals subsequently declared the action improper. The draft bill proposed by Senator John Barrasso, the Nuclear Waste Policy Amendments Act of 2019, and its House companion bill (H.R. 2699) would make important changes to see that the full intent of the NWPA is maintained. We support that legislation. We call on Congress to fund the license proceeding and not be diverted by proposals like universal consent and interim storage without the backdrop of a permanent repository.

Sincerely,



Leo Blundo,
Nye County Board of Commissioners
Nuclear Waste Issues Representative

LB/

Statement for the Record

Submitted to the United States Senate Committee on Energy and National Resources
For the June 27, 2019 Hearing to “Examine Storage of Nuclear Waste and The Nuclear Waste
Administration Act”

Edwin S. Lyman, PhD
Senior Scientist and Acting Director, Nuclear Safety Project
Union of Concerned Scientists
Washington, DC

Dear Chairman Murkowski, Ranking Member Manchin, and the other distinguished Members of the Committee:

On behalf of the Union of Concerned Scientists and our half-million supporters, I appreciate the opportunity to offer comments on the critical issue of safe storage and disposal of nuclear waste.

In our view, spent nuclear fuel can be stored safely and securely at reactors in dry cask facilities for many decades, provided that the Nuclear Regulatory Commission (NRC) conducts rigorous oversight. However, it is indisputable that this is not a satisfactory permanent solution, considering both radiological safety and nuclear security. Ultimately, one or more deep geologic repositories must be developed to provide for long-term isolation of spent nuclear fuel and other high-level radioactive wastes.

UCS does not take a position on the technical suitability of the Yucca Mountain site, or for that matter, any other potential site in the United States. With regard to political suitability, we concur with the assessment of the Blue Ribbon Commission Report that the process by which Yucca Mountain was selected was flawed and contributed the erosion of trust in the program that caused it to stall. Congress should pursue a different and less adversarial approach that will be more likely to lead to selection of sites that are both technically suitable and broadly acceptable to the public. Once a process is in place, Yucca Mountain could then compete with other repository proposals on a level playing field. Fortunately, there is time to get it right.

One unfortunate aspect of the nuclear waste dilemma is that it pits local communities and states against each other. It is understandable why members of the public and their elected officials are eager to get spent nuclear fuel out of their districts or states as soon as possible. But proposals that may benefit some in the short-term could have unacceptable impacts on others or could damage the prospects for a sound long-term approach. Therefore, Congress needs to come together to develop a new and science-based national nuclear waste management and disposal policy—one that allocates risks and benefits fairly.

The main elements of such a policy should include (1) a process to establish and maintain political momentum and financing for development of geologic repositories; (2) a process for repository site selection and approval that is consent-based, fair and technically sound; (3) requirements that spent nuclear fuel will be managed safely and securely at reactor sites until a repository becomes available; and (4) requirements for the safe and secure shipment of spent nuclear fuel from reactor sites to a final repository. Current laws and regulations do not adequately address any of these issues.

To this end, S. 1234, the “Nuclear Waste Administration Act of 2019,” is a good first step. It establishes a new waste management organization, and a more consent-based process for siting of waste management facilities, including geologic repositories. However, the bill lacks elements that UCS believes are critical for the success of a nuclear waste strategy. Consequently, we cannot support it in its current form.

1. Interim storage facilities: S. 1234 authorizes the Department of Energy (DOE) to establish and fund interim storage facilities for spent fuel with, at most, only very weak links to development milestones for a geologic repository, unlike current law. The Nuclear Waste Policy Act (NWPAct) of 1982 rightly imposed tight constraints on DOE’s authority to build monitored retrievable storage facilities, addressing the concern that sending nuclear waste to interim storage facilities away from reactors could derail further efforts to develop geologic repositories and cause the interim facilities to become de facto permanent disposal sites.

The NWPAct currently prevents the DOE from constructing an MRS facility until the NRC has

issued a construction license for a geologic repository, and also imposes a capacity limit. S. 1234 would significantly weaken these linkages by allowing the DOE to site, construct, and operate one or more interim storage facilities (with no capacity limits) for “nonpriority” waste, provided that the repository siting program receives funding within the first 10 years after enactment, and after that, provided a candidate repository site is selected. However, even selection of a repository site hardly assures ultimate success. We do not believe these conditions are strong enough to protect the repository program from the competitive pressure of an unbounded interim storage program. The current linkage, or a comparably effective alternative, should be retained.

In addition, shipment of spent fuel to interim storage facilities will increase spent fuel transportation safety and security risks because spent fuel would have to be shipped again when (or if) repositories become available. It is unclear whether the safety and security benefits of spent fuel consolidation, if any, would outweigh the risks associated with the additional shipments. Congress should mandate a study to shed light on this question before authorizing interim storage.

2. Safety and security of interim spent fuel storage: A comprehensive strategy for nuclear waste management must also address the safety and security of spent fuel storage at reactor sites. Even if an interim storage site or repository were to receive a license tomorrow, constructing the facilities and developing the transportation infrastructure would take time, and large quantities of spent fuel would likely remain at many reactors for decades to come. Also, as long as reactors operate, there will be a need to store recently discharged spent fuel on site.

Unfortunately, the Nuclear Regulatory Commission continues to allow spent fuel to be stored in dangerously overloaded pools, exposing millions of Americans to needless risk. If an earthquake or a terrorist attack were to damage a spent fuel pool, causing it to rapidly lose its cooling water, the spent fuel could heat up and burn, releasing a large fraction of its highly radioactive contents into the environment. The public health consequences of such an event would be truly disastrous, and the impact on the American economy profound: likely far worse than the estimated \$200 billion in damages caused by the much smaller release of radioactivity from the damaged Fukushima Daiichi plant.

The consequences of a terrorist attack or large earthquake would be greatly reduced if nuclear plants thinned out their spent fuel pools by transferring the older fuel to dry storage casks. Yet the NRC has refused to require nuclear plants to do so, insisting in the face of all evidence that the risk is tolerable. And the industry will not voluntarily spend the money to buy additional dry casks, despite their modest cost in relation to the potential economic damages from a pool fire. To this end, we urge Congress, as part of any nuclear waste management reform package, to take action to reduce the unacceptably high risk of a spent fuel pool fire by either requiring nuclear plants to thin out their densely packed spent fuel pools by expediting transfer to dry cask storage, or by creating strong incentives for nuclear plants to do so on their own.

While the risk of a large radiological release is greatly reduced when spent fuel is moved from high-density pools to dry casks, it does not go to zero. One must also be concerned about sabotage attacks on dry casks. Indeed, during security reviews following the 9/11 attacks, the NRC discovered ways to sabotage dry storage casks that could cause significant radiological releases. Accordingly, it began developing new requirements for protecting dry cask storage facilities—both at reactor sites and at centralized sites—from sabotage. However, in 2015 the NRC delayed development of these new requirements for at least five years, citing resource constraints. And it is our understanding the NRC has decided not to follow through with upgraded security requirements for dry storage facilities. This is also a concern for spent fuel transportation. Any new nuclear waste legislation should require the NRC to promptly address these vulnerabilities.

3. Repeal of repository capacity limit. Section 509 of S. 1234 would remove the NWPA limit of 70,000 metric tons heavy metal of spent fuel/high-level waste for the first repository (currently designated as Yucca Mountain). While it has always been acknowledged that this is a legal and not a technical limit, to simply remove it without further analysis of the implications is premature. Instead, Congress should ask the DOE to conduct a new study to determine the likely physical storage capacity of Yucca Mountain and the safety and programmatic impacts of replacing the statutory limit with a technically based limit. The DOE submitted a report along those lines to Congress in 2008, but it is worth revisiting in the current context.

