Backgrounder

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# Nuclear Waste Policy Amendments Act of 2008: Modernizing Spent Fuel Management in the U.S.

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The Nuclear Waste Policy Act of 1982[1] attempted to establish a comprehensive disposal strategy for high-level nuclear waste. Regrettably, that strategy has failed miserably. The government has spent billions of dollars without opening a repository, has yet to receive any waste, and is amassing billions of dollars of taxpayer liability.

On January 24, 2008, Senator James Inhofe (R–OK) introduced the Nuclear Waste Policy Amendments Act of 2008 (S. 2551) to help to provide the flexibility, clarifications, and authorizations that would allow the United States finally to set a rational policy for managing spent nuclear fuel.

## Wasting Ratepayer and Taxpayer Money

The strategy codified in the Nuclear Waste Policy Act seemed straightforward and economically sound when it was developed back in the early 1980s. It charged the federal government with the responsibility of disposing of spent nuclear fuel and created a structure through which nuclear energy users would pay for the service. These payments would go into the Nuclear Waste Fund, which the federal government could access through congressional appropriations to pay for disposal activities.

The federal government has since accumulated approximately $27 billion (fees plus interest) in the Nuclear Waste Fund and has spent approximately $8 billion to prepare the repository for operations. The fund currently has a balance of approximately $19 billion. Utility payments into the fund amount to

## Talking Points

- The Nuclear Waste Policy Act of 1982 attempted to establish a comprehensive nuclear waste disposal strategy, but it was based on the no longer valid assumption that nuclear power is a declining industry.
- The government has spent billions of dollars without opening a repository, has yet to receive any waste, and is amassing billions of dollars of taxpayer liability.
- Approximately 20 companies and consortia have released plans to build around 30 reactors in the U.S. If the U.S. modestly increases nuclear power production, Yucca Mountain could hold only a few more years of America's nuclear waste.
- Permanently disposing of spent nuclear fuel would be a monumental waste of resources. Recycling this spent fuel could power every U.S. household for about 12 years.
- The right mix of technologies, such as storage and recycling, could allow the Yucca repository to last almost indefinitely.

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about $750 million annually. That is nearly a $27 billion surcharge on electricity bills for which ratepayers are in danger of receiving nothing.

The story is no better for the taxpayer. The Nuclear Waste Policy Act of 1982 set January 31, 1998, as the deadline for the federal government to begin receiving spent fuel. Yet the repository has never opened, despite the expenditure of billions of dollars. The federal government's refusal to take possession of the spent fuel has created a huge taxpayer liability to the nuclear power plant operators. The courts have confirmed this liability. As a result the taxpayer has already paid $94 million in lawyer expenses and $290 million in damages. The government is appealing another $420 million award. Long-term liability projections are astronomical, reaching $7 billion by 2017 and $11 billion by 2020.[2]

The federal government's inability to fulfill its legal obligations under the 1982 act has often been cited as a significant obstacle to building additional nuclear power plants. Given nuclear power's potential to help to solve many of the nation's energy problems, now is the time to break the impasse over what to do with the nation's spent nuclear fuel. The Nuclear Waste Policy Amendments Act of 2008 would begin that process.

## A Lot Has Changed Since 1982

The Nuclear Waste Policy Act was written and amended under the assumption that nuclear power was a declining industry. This assumption is no longer valid.

Approximately 20 companies and consortia from around the world have recently released plans to build around 30 reactors in the United States. Some of these planned reactors may never be built. On the other hand, many more may be built. The U.S. is facing a 40 percent increase in electricity demand over the next 25 years. The pressure to reduce $CO_2$ emissions and dependence on foreign energy, combined with the inability of wind or solar power to meet the energy demand affordably or reliably, creates huge potential for nuclear power.

This potential growth in nuclear power will have significant ramifications for how the nation manages nuclear waste. More nuclear energy will lead to more spent nuclear fuel. The best way to manage spent fuel is determined by two factors: how much is being produced, which is a function of the amount of nuclear energy produced, and what disposal options are available.

The current strategy provides only one option: placing the spent fuel in the Yucca Mountain geologic repository. This would be a rational option if the United States was moving away from nuclear power. Absent a broad expansion of nuclear power in the U.S., Yucca's 120,000-ton physical capacity would probably be adequate to store America's current 56,000 tons of spent fuel as well all as future waste from the current fleet of plants, but the growing likelihood that the United States will expand its nuclear capacity, perhaps dramatically, brings this approach into question.

However, spent fuel can be both an asset and a liability. Relating spent fuel policy to future growth in nuclear power is essential for a sustainable strategy. The Nuclear Waste Policy Amendments Act would add flexibility to America's policy by providing for the time needed to develop a new spent fuel management regime that is more conducive to expanding nuclear power in the U.S.

## A More Reasonable Approach

The key provision in the Amendments Act would institute a phased licensing regime. The initial phase would last for 300 years. During this time, spent fuel would be placed in the Yucca repository, remain retrievable, and be actively monitored. The license could be amended through a process that would take place at least every 50 years to take advantage of operational improvements, technolog-

1. Public Law 97–425.
2. U.S. Senate, Committee on Environment and Public Works, "Ten Years Overdue: January 31, 2008 Marks the 10th Anniversary of DOE's Deadline to Dispose of Nuclear Waste," *Fact of the Day,* January 31, 2008, at *http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.Facts&ContentRecord_id=d1891f7e-802a-23ad-459d-26b0cbf6b04f* (February 28, 2008).

ical advances, and safety innovations. The repository would then be permanently sealed, thus concluding the second and final phase.

Keeping Yucca open for an extended period before final closure is not technically precluded by current statute. It allows for implementation of a phased approach. Extending the time between opening and final closure would largely eliminate the risk of premature closure. This is an important distinction given the long-term safety concerns over permanent radioactive waste storage and the vast energy resources that could be extracted from spent nuclear fuel.

One serious concern is the million-year licensing standard that the Environmental Protection Agency (EPA) has proposed for radiation safety at Yucca Mountain. This standard means that the Department of Energy must guarantee that the EPA's safety standards, including those for radiation release, can be sustained for that length of time.[3] Beyond the dubiousness of any million-year guarantee, this approach is filled with weaknesses. First it assumes technological stagnation. By allowing the repository to be filled and permanently sealed, the plan prevents applying any future technological innovations at Yucca.

The proposed phased approach would also provide additional time to gauge how best to integrate fuel-cycle technologies like recycling (fuel reprocessing) into the overall nuclear program. Until the future of nuclear power is better defined, it is impossible to know what will be the best technological solutions for managing spent nuclear fuel, but recycling spent fuel should clearly be considered.

**Securing a Future Resource.** The current U.S. policy is to dispose of all spent fuel permanently. This is a monumental waste of resources. To create power, reactor fuel must contain 3 percent to 5 percent enriched fissionable uranium (uranium-235). Once the enriched uranium falls below that level, the fuel must be replaced. Yet this "spent" fuel generally retains about 95 percent of its original content, and that uranium, along with other byproducts in the spent fuel, can be recovered and recycled.

Many technologies exist to recover and recycle different parts of the spent fuel. The French have most successfully commercialized a process. They remove the uranium and plutonium and fabricate new fuel. Using that method, America's 56,000 tons of used fuel stored across the nation contains roughly enough energy to power every U.S. household for 12 years.[4]

Other technologies show even more promise. Indeed, most of them, including the process used in France, were developed in the United States. Some recycling technologies would leave almost no high-level waste at all and lead to the recovery of an almost endless source of fuel. However, none of these processes has been successfully commercialized in the United States, and they will take time to develop. Until the future of nuclear power in the U.S. becomes clearer, it will be impossible to know which technologies will be most appropriate to pursue in this market.

Ultimately, these are decisions that the private sector should make in consultation with government regulators. Valuing spent nuclear fuel against the costs of permanent burial is a calculation best done by the companies that provide fuel management services. The Nuclear Waste Policy Amendments Act would give all of the involved parties the time needed to evaluate the market and the state of technology and to make the best decisions accordingly.

**Removing Artificial Capacity Constraints.** The United States has 56,000 tons of high-level nuclear waste stored at over 100 sites in 39 states,[5] and America's 104 commercial nuclear reactors are producing approximately 2,000 tons of spent fuel

3. For a full analysis of the EPA's million-year standard, see U.S. Environmental Protection Agency, Office of Air and Radiation, "EPA's Proposed Public Health and Environmental Radiation Protection Standards for Yucca Mountain," *EPA Yucca Mountain Fact Sheet* No. 2, October 2005.
4. This figure is an extrapolation based on the French experience with recycling.
5. Samuel W. Bodman, letter to The Honorable Nancy Pelosi, March 6, 2007, at *www.energy.gov/media/BodmanLetterToPelosi.pdf* (March 3, 2008).

annually. Putting aside the problems of opening the Yucca repository, its capacity is statutorily limited to 63,000 tons of commercial waste and 7,000 tons of Department of Energy waste. As currently defined by the Nuclear Waste Policy Act, Yucca will reach capacity in about three years unless the law is changed. Thus, even if Yucca was operational, it is not a permanent solution, and the nation would soon be back at the drawing board.

However, the repository's actual capacity is much larger than the current limit. The Nuclear Waste Policy Amendments Act would repeal the 70,000-ton limitation and instead use technology, science, and physical capacity as the primary limiting factors. Recent studies have found that the Yucca repository could safely hold 120,000 tons of waste. Some believe the capacity is even greater. According to the Department of Energy, Yucca Mountain could likely hold all of the spent nuclear fuel produced by currently operating reactors.[6]

Yet even with the expanded capacity, Yucca Mountain could hold only a few more years of America's nuclear waste if the U.S. increases nuclear power production significantly. According to one analysis, America's current operating reactors would generate enough spent fuel to fill Yucca's current capacity by 2010 and fill a 120,000-ton Yucca over their lifetime. If nuclear power production increased by 1.8 percent annually after 2010, a 120,000-ton Yucca would be full by 2030. At that growth rate without recycling any spent fuel, the U.S. would need nine Yucca Mountains by the turn of the century.[7]

With the right mix of technologies, such as storage and recycling, Yucca could last almost indefinitely. The Amendments Act would give the U.S. adequate flexibility to solve this problem as technology permits.

Setting a Deadline to Ensure Progress. The act would establish a deadline for the Secretary of Energy to submit a repository license application, which the Nuclear Regulatory Commission (NRC) must approve before the Department of Energy can begin constructing the repository and begin receiving spent nuclear fuel. This deadline is critical because it starts the clock moving on the NRC's consideration of the application. While this may seem arcane compared to some of the other provisions, it could be the most significant provision in the end.

NRC commissioners serve five-year terms and are appointed by the President and confirmed by the Senate. Submitting the application by the June 30 deadline would allow the current NRC commissioners to place the application on the NRC docket for consideration. This assures that, at a minimum, the NRC will have the opportunity to consider the Yucca Mountain construction application.

Waiting to submit the application would provide the opportunity to seed the commission with anti-Yucca political appointees who could choose not to place the application on the docket, thus avoiding its consideration and leaving the U.S. with no set policy for dealing with spent fuel.

## Modernizing Spent Fuel Management

To modernize spent fuel management in the U.S. and provide the flexibility, clarifications, and authorizations needed to move nuclear power forward in the United States, Congress should:

- Set a deadline requiring the Secretary of Energy to submit a repository license application for the Yucca Mountain repository within the next few months.
- Provide for a phased licensing regime for the Yucca repository that would store spent nuclear fuel, but actively monitor it and keep it available for retrieval. This would allow the U.S. to take advantage of operational improvements, technological advances, and safety innovations in managing the repository. It would also give the private sector the option of recycling and reusing the spent fuel, which would also significantly reduce the amount of nuclear waste that would need to be stored permanently.

6. *Ibid.*
7. Phillip J. Finck, Deputy Associate Laboratory Director, Applied Science and Technology and National Security, Argonne National Laboratory, statement before the Subcommittee on Energy, Committee on Science, U.S. House of Representatives, June 16, 2005, at *http://gop.science.house.gov/hearings/energy05/june15/finck.pdf* (January 17, 2008).

- Remove artificial capacity restraints on the repository. Technology, science, and actual physical capacity should be the primary limiting factors with respect to Yucca's storage capacity.

## Conclusion

The Nuclear Waste Policy Act of 1982 does not provide the clarifications, authorization, and flexibility needed to move nuclear power forward in the United States. However, Congress is currently considering the Nuclear Waste Policy Amendments Act of 2008, which would take some significant steps in addressing these problems.

In the end, the nation may need a complete overhaul of its approach to spent nuclear fuel. Congress should give full and prompt consideration to this important issue.

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