

# ***Yucca Mountain:***



## **DUMPED AND WASTED?**

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## By Nancy J. Zacha

**W**ell, it's official. According to the U.S. Department of Energy's fiscal 2010 budget request, "All funding for the development of the Yucca Mountain facility would be eliminated, such as further land acquisition, transportation access, and additional engineering." The budget request of \$197 million "implements the Administration's decision to terminate the Yucca Mountain program while developing nuclear waste disposal alternatives." The budget request will support only enough activity to continue with the licensing process for the program.

This latest statement merely validates what Energy Secretary Steven Chu said earlier this year in congressional testimony: Yucca Mountain—the nation's site for a high-level waste and spent fuel repository—is no longer "an option." When pressed for a reason as to why the administration is scuttling the repository program, he simply stated: "We can do better."

And we can't say we hadn't seen it coming. The program has lost approximately \$100 million per year in funding since the fiscal 2007 budget (which was around \$500 million). And presidential candidate Sen. Barack Obama (D-Ill.) stated up front that closing down the Yucca Mountain project was one of his priorities. This was a campaign promise that you knew was going to be kept, because it would make the project's most visible (and vocal) opponent, Senate Majority Leader Harry Reid (D-Nev.), very happy.

So, after more than a quarter century, all there is to show for the U.S. HLW/spent fuel disposal program is a large hole in a mountain on the Nevada Test Site, into which the nation's nuclear power ratepayers have stuffed some \$10 billion–\$12 billion. Which, to a lot of people, is "real money."

### HOW WE GOT HERE

It all started out so promising. The passage of the Nuclear Waste Policy Act of 1982 (NWPA) was meant to solve the nation's HLW/spent fuel disposal problem by creating a finely nuanced program that balanced East and West, government and commercial interests, and state and local views. It called for investigations of several potential sites to host a waste repository in the western United States, characterization of the "best" three of these sites (in different geologic media), and ultimate selection of one site, based on scientific criteria. A second site, located in the eastern United States, would also be developed, at a somewhat later time. The act also directed the DOE to evaluate monitored retrievable storage (MRS) to provide temporary storage for spent fuel and HLW, if such storage should be needed. (The chances were very good that it *would* be needed, because many nuclear plants were running out of pool storage space, and there was no such

thing at that time as onsite dry cask storage.) The costs for all this investigation and for development and operation of the repository would be borne by the people whose electricity was generated by nuclear power, in the form of a 1 mill per kilowatt-hour surcharge on their electric bills. (The government would chip in a certain share each year to cover the cost of defense HLW disposal.) A final repository would be opened in 1998, the legislation mandated, when the DOE would take possession of commercial spent fuel. All in all, most industry experts felt it was a fine piece of legislation.

This was not the beginning of the government's efforts to find a disposal site for nuclear waste, however. As far back as 1956, the National Academy of Sciences recommended deep geological disposal of long-lived radioactive waste from nuclear reactors, suggesting that buried salt deposits and other rock types be investigated for permanent repositories. In the 1960s, the U.S. Atomic Energy Commission (AEC, predecessor agency of the DOE) began investigating the buried salt beds of the Salina Basin beneath Michigan and Ohio, but those studies were ter-

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minated because state and local officials objected. In the early 1970s, the AEC announced that a salt mine, in Lyons, Kan., would be developed as an HLW repository, only to reverse that decision after Kansas state geologists discovered the site to be riddled with abandoned oil and gas exploration boreholes. After that, the DOE began studying several other sites in various geologic media.

After passage of the NWPA, in 1983, the DOE named nine previously screened potentially acceptable repository sites in six states, and in 1985, the DOE nominated five of these sites from the original nine and then whittled the list down to the final three.

The three sites ultimately chosen for characterization were in Deaf Smith County, in far western Texas (in salt, part of the huge Permian Basin that was the site of the 1970s effort in Kansas and that today is home to the Waste Isolation Pilot Plant in southeastern New Mexico); in Richland, Wash. (in a basalt ridge on the Hanford Reservation); and in a volcanic tuff mountain formation on the edge of the Nevada Test Site in Nevada.

But politics began to crack the bipartisan façade of the original legislation. In 1986, the DOE indefinitely postponed the screening program for the second repository site because of strong objections from states in the northern Midwest and East, where potentially acceptable sites, in granite, had been proposed. And in 1987, with rising site characterization cost projections of \$1 billion per site, both the Senate and the House of Representatives began to rethink the original legislation, with the Senate consid-

ering *sequential* rather than *concurrent* characterization of the three sites and the House looking at a siting moratorium and a policy review. As a consequence, late in the

Not surprisingly, there is a political aspect to this story. As it happened, in that year the stars aligned in such a way that the House's two most powerful members, Speaker of the House Jim Wright and Majority Leader Tom Foley, both Democrats, happened to be from the states of Texas and Washington, respectively. Even though the original 1982 legislation was passed by a bipartisan majority, Democrats traditionally have been less supportive of nuclear energy matters than have Republicans. Wright and Foley, each adamant that he did not want a nuclear waste repository in *his* state, crafted the Amendments Act to remove the Texas and Washington sites from the characterization

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year a House-Senate conference committee drafted, and Congress adopted, the Nuclear Waste Policy Amendments Act, which was designed to put the repository program "back on track." This act named Yucca Mountain as the only site to be characterized for development as a repository.

list. (Which is why, to this day, this legislation is referred to in Nevada as the "Screw Nevada" Bill.) The legislation also, among other things, ended the second repository screening program and prohibited studies of repository sites in granite. The nuances of the original legislation had been effectively crushed by political considerations. Fu-



It was a big day for the Yucca Mountain project when the tunnel boring machine reached daylight in April 1997. Today, the machine sits abandoned at the Yucca Mountain site.



ture Senate Majority Leader Reid was, at that time, the newly elected junior senator from Nevada, and it would be nearly two decades before he acquired the political clout to undo the results of this legislative coup.

## THE NEXT 20 YEARS

For the next 15 years, the DOE conducted characterization studies at Yucca Mountain. A tunnel-boring machine cut into the mountain, and laboratories were opened inside the tunnel. Yucca Mountain undoubtedly became the most studied piece of property on the planet.

In 2002, the DOE finally officially recommended that Yucca Mountain be licensed to become the nation's spent fuel and HLW repository. As provided for in the enabling legislation, the host state, Nevada, vetoed the selection, but a majority in Congress overrode the veto, and on July 23, President George W. Bush signed House Joint Resolution 87, allowing the DOE to take the next step in establishing a safe repository in which to store the nation's nuclear wastes. The license application, expected to be submitted to the U.S. Nuclear Regulatory Commission in 2003, was finally submitted in June 2008. It was formally docketed by the NRC in September.

Over the years, however, the operating date for the repository slipped from 1998 to 2003 to 2010 to 2017 and finally to 2020 or beyond.

By the time the license application was filed, it was becoming apparent that political winds were definitely blowing against the repository. No Democratic presidential candidate had supported Yucca Mountain, and several promised to eliminate the program if elected. Republican candidates were somewhat more supportive, but only Sen. John McCain (R-Ariz.)

showed any enthusiasm at all for the facility. Once Sen. Obama was officially nominated to be the Democratic presidential candidate, and poll after poll showed the Democrat to be the likely winner, Yucca Mountain's fate was certainly sealed.

And, presumably, Sen. Reid is now happy—even though the recession-mauled state of Nevada has lost hundreds of high-paying jobs with the shutdown of the program, and the city of Las Vegas, which some say is the U.S. city with the most housing foreclosures in the nation, now has hundreds more homes for sale because of the departing Yucca Mountain workforce.

## BACK TO THE BEGINNING?

So what happens now? Secretary Chu has said the DOE will convene a "blue-ribbon panel" to discuss new options for nuclear waste management. Such a panel sounds awfully similar to the National Academy of Sciences group that recommended deep geological storage in the first place more than 50 years ago.

There are many who are skeptical of such a panel. In a recent interview conducted by the online nuclear resource *Nuclear Street*, William Tucker, author of *Terrestrial Energy: How Nuclear Power Will Lead the Green Revolution and End America's Energy Odyssey*, stated that "appointing a blue ribbon panel is the oldest trick in the book, just kicking the can four or eight years down the road. Nothing will ever come of it. I think the administration's strategy is to ignore nuclear in the hope that wind and solar will make it all unnecessary in another four years."

Some Republican senators are not quite ready to give up on Yucca Mountain. In April, a group of 17 senators sent a letter to Secretary Chu asking why Yucca Mountain was no longer an option. They specifically asked whether he had discovered new research to discredit all that came before in support of Yucca Mountain, pointing out that neither the National Academy of Sciences, the Nuclear Waste Technical Review Board, nor any of the national laboratories has "concluded that there is any evidence to disqualify Yucca Mountain as a repository."

What options are there for HLW and spent fuel? Well, for spent fuel, everyone is talking about reprocessing (or recycling) again. The U.S. actually did some reprocessing of commercial spent fuel in the early 1970s, and a new reprocessing facility was under construction at Barnwell, S.C., when President Carter made the decision to stop re-

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processing because of concerns over nuclear weapons proliferation. (Most reprocessing processes include a step where plutonium is isolated; many people fear that this plutonium could then be diverted to weapons production.) President Reagan overturned that decision, but by then, utilities had already decided that with fresh uranium costing around \$10 a pound, reprocessing was too expensive.

That was nearly 30 years in the past, however. Speaking at a recent conference sponsored by EnergySolutions, David Jones, senior vice president of nuclear development for Duke Energy, noted that for the past 20 years, U.S. waste policy has focused on one thing: "Yucca, Yucca, Yucca." Now, he said, the new landscape supports U.S. spent fuel recycling.

Many nuclear utilities are showing a growing interest in recycling, he said, but a few utilities don't want *any* change that would increase the nuclear waste fee, and introducing recycling might lead to a fee increase. On that issue, Jones pointed out that many people believe that no new coal plants will be built unless they feature technology for carbon capture and sequestration. The cost



*View of the first curve of the main drift at Yucca Mountain. If the project is truly dead, it is hoped that lessons learned over the years can benefit future waste disposal projects.*

for this technology is estimated to be about \$40/MW, which puts the \$1/MWh nuclear waste fee clearly at an advantage.

The lack of a regulatory framework to license a recycling facility has been identified as the largest obstacle to recycling, according to Jones. The NRC recently held its first public meeting on recycling in decades, and the agency estimates that no new regulations will be issued until 2012 at the earliest, he said.

Speaking at the same conference, Alan Dobson, senior vice president of Fuel Cycle and Spent Fuel Management for EnergySolutions, said a “very small increase” in the waste fee (to 1.25 mills/kWh) would handle the cost of developing a recycling facility. The key steps to recycling include the following, Dodson stated:

- Putting in place a suitable regulatory framework. This would require political support, he said.
- Creating a new government authority to oversee the project. (Many people in the industry are pushing for the establishment of a new government entity—along the lines of the U.S. Enrichment Corp.—to take over responsibility for spent fuel from the DOE. This entity, with a name something like the U.S. Nuclear Fuel Management Corp., would replace the DOE’s Office of Civilian Radioactive Waste Management and would be operated under private company principles.)
- Industry participation in developing and demonstrating advanced fuel cycle technologies. We must continue the research into those advanced technologies, Dobson said.

(It should be noted here that this time around, mind-

ful of the proliferation-related objections in the past, many reprocessing proponents are supporting a recycling regime where plutonium is never isolated from uranium, thus eliminating the possibility for plutonium diversion.)

Of course, reprocessing doesn’t eliminate the need for a repository. It just changes the size and shape of the repository needed. According to Ken Kobloch, president of the Union of Concerned Scientists, writing on a *National Journal* expert blog on energy and the environment, “Because the process for reviewing potential repository sites can take decades, DOE should begin now to assess other sites based on their technical and political acceptability. Some may argue that doing so isn’t possible, but there really is no alternative. Nuclear waste will be with us for a very long time, and there is no technological magic bullet that will avoid the need for a repository.”

The president of the Nuclear Energy Institute (NEI), Marvin Fertel, writing on the same blog, stated, “[E]ven with recycling, a geological repository will be needed for the ultimate disposal of the waste byproducts. However, the characteristics of the waste form requiring disposal will influence the design of the repository.”

Losing Yucca Mountain will definitely create a problem for the DOE as far as defense HLW is concerned. Many facilities have been built, or are being built, to prepare the waste for disposal at Yucca Mountain. If there is no Yucca Mountain, then should this work continue, given that waste acceptance criteria could change in the fu-

ture? In addition, the DOE has agreements with many state governments on time frames for removing this waste from its larger sites; having nowhere to send the waste will certainly affect those agreements.

And then there's the money. Some in the industry have speculated that the only reason the Obama administration is providing enough funding to the Yucca Mountain project to continue the licensing process is that as long as licensing activities continue, the administration doesn't have to worry about the disposition of Nuclear Waste Fund dollars. The Nuclear Waste Fund has collected some \$30 billion from the surcharge on nuclear-generated electricity. Ultimately, what will happen to those funds? Can they be returned to the ratepayers? Republican Sen. Lindsey Graham, of South Carolina, has proposed the Rebating America's Deposits Act in the Senate, which specifies that within 30 days of its passage, the president would have to either confirm that Yucca Mountain remains the preferred choice for spent fuel and HLW disposal or begin rebating all funds currently in the Nuclear Waste Fund. While there's little chance that such a bill will pass in this session of Congress, it does raise some interesting questions. At the state level, several states are pondering withholding the surcharge monies unless there is a confirmed repository program in place.

In addition, there's the money the DOE owes U.S. utilities for failure to take possession of commercial spent fuel in 1998, as set out in the original NWP. The current liability is \$11 billion, and it is projected to rise to about

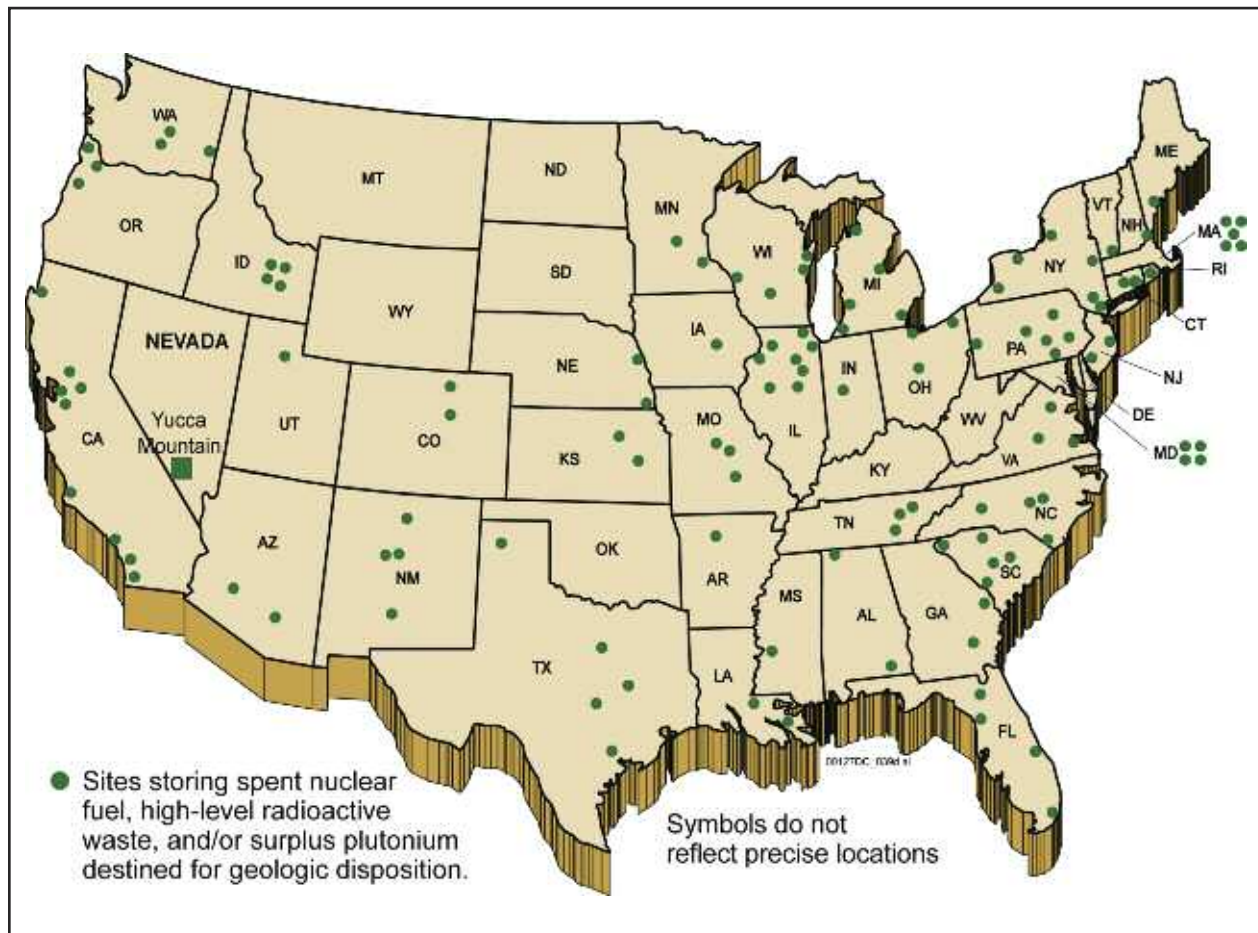
\$100 billion if Yucca is truly dead. That money must come from U.S. taxpayers, not from the Nuclear Waste Fund. Of course, the DOE can eliminate that cost if it takes possession of the spent fuel and moves it to some centralized interim storage facility.

### SO, WHAT ABOUT INTERIM STORAGE?

As noted previously, the original NWP also provided for the study of monitored retrievable storage. The DOE undertook the study and in 1986 proposed that an interim MRS facility strictly for commercial spent fuel be authorized for development at a site in Tennessee, despite adamant opposition from the state. The 1987 Amendments Act, however, prohibited the siting of the MRS in Tennessee and instead established the Office of the Nuclear Waste Negotiator to seek volunteer states or Indian Tribes to host either a repository or an MRS.

For several years, the negotiator worked with states and Tribes, most notably the Mescalero Apache Tribe in south central New Mexico, to develop an MRS site, but in late 1992, the energy secretary announced that the negotiator had failed to find a volunteer to host the site. The negotiator office was terminated in 1994.

Today, the concept has been renamed centralized storage or interim storage, but it's the same idea in a new basket. And it may be getting some new life. According to Marshall Cohen, senior director of Legislative Programs



U.S. map showing current waste locations.



for the NEI, “we can do interim storage in the U.S., and we can do it *soon*.” Cohen, speaking at the EnergySolutions conference, stated that there are many communities willing to host such a facility, although they are “not ready to go public.” The key to getting a willing host community is to add an incentive to the package—for example, a cask manufacturing facility that would bring jobs to the community. Nuclear Waste Fund dollars could be redirected to bring this about, Cohen said, perhaps as part of an economic development package. The NEI will continue to move on this effort, he said, to ensure that politics, which “killed Yucca Mountain,” doesn’t kill interim storage as well.

Certainly, interim storage of some sort is essential for owners of decommissioned plants, which today are storing spent fuel in on-site dry storage facilities. Until the spent fuel is off their property and off their hands, these plant owners will continue to incur costs to maintain and guard the storage facilities, costs that total several million dollars annually for each facility.

In early May, the National Conference of State Legislatures (NCSL) advocated efforts to establish volunteer interim storage facilities, with incentives for the host communities coming from the Nuclear Waste Fund. The organization urged the DOE to work with volunteer communities and also to allow state legislators to participate in any blue-ribbon panel to study spent fuel management options. NCSL is a bipartisan organization representing more than 7000 state legislators

A commercial effort to site and license a spent fuel storage facility on Goshute Indian Tribal lands in the state of Utah, Private Fuel Storage LLC (PFS), succeeded in obtaining a license from the NRC, but ran into problems with the Bureau of Indian Affairs (BIA), which failed to approve the facility. A lawsuit against the BIA, accusing the agency of bowing to political considerations (the Utah congressional delegation is ardently against the facility, as is the LDS Church, the predominant religion in the state) rather than what might be best for the Tribe concerned, is currently in progress. Here is a case in which it becomes evident that Republican senators are just as likely as Democratic ones to pull political strings when a nuclear waste facility comes too close to home: Utah Sens. Orrin Hatch and Bob Bennett are widely viewed to be behind the BIA decision against PFS.

#### LOOKING ON THE BRIGHT SIDE?

In the same *Nuclear Street* interview quoted earlier, William Tucker stated that “On the whole, I don’t think the loss of Yucca was terribly devastating. It was a ridiculous project to begin with, building a network of a hundred miles of caves to bury material that is 95 percent natural uranium. If we reprocessed, we wouldn’t need

anything more than the French have, which is one building.”

At the EnergySolutions conference, Christopher Guith, president of the Federal Services Group at the U.S. Chamber of Commerce, said that the death of Yucca Mountain is perhaps a good thing, because it “was a solution when we had a finite number of plants running a finite number of years and yielding a finite amount of waste. We have already moved past that situation, with license renewals, so we need a new solution that reflects today’s situation.”

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And it’s true, Yucca Mountain was legally limited to 70 000 tonnes of spent fuel and defense HLW. Physically, however, the actual capacity of the mountain was estimated to be anywhere from two to ten times that amount. No one knows today what the actual inventory of U.S. spent fuel will turn out to be. Will all the currently operating plants renew their licenses? (Industry experts estimate that about 100 of the 104 operating plants will undergo license renewal.) And how many new plants will be built? None? Two? A dozen? Scores? And how long will *those* plants run? Are we talking about 40-year plants, 60-year plants, 100-year plants, or “perpetual” plants?

At this point, there are just too many unknowns to outline a definitive plan for a new repository. What we *do* know is that in the next stage in the waste management process, what will be needed is a flexible plan that can take into account reprocessing (or not), a growing spent fuel inventory, and a political process that provides more barriers than entry gates. Whether a blue-ribbon panel, a dedicated government corporation, or any other entity can develop such a plan remains to be seen.

And, because the licensing process *is* still continuing and may continue for many years into the future, despite the three-to-four-year schedule for licensing written into the NWPA (after all, the PFS licensing process took nine years), there’s the final possibility—however remote—that a future president, in four or eight years’ time, might decide that, once again, Yucca Mountain *is* an option. But that’s a subject for another day. ■

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