

OPINION

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Yucca Mountain redux

By Victor Gilinsky (1)

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The Republican takeover of the Senate and consequent sidelining of the Democratic majority leader, Nevada Sen. Harry Reid, will undoubtedly increase calls for reviving the Energy Department's proposed nuclear waste repository at Nevada's Yucca Mountain. The project got a big boost from the Nuclear Regulatory Commission (NRC) staff when it recently concluded that the Energy Department has "demonstrated compliance with NRC regulatory requirements" limiting long-term radioactive leakage from the proposed repository. This result produced headlines like this one, which ran in the New York Times in October: "Calls to use Yucca Mountain as a nuclear waste site, now deemed safe."

US Rep. John M. Shimkus, Republican of Illinois, said, "Today's report confirms what we've expected all along: Nuclear waste stored under that mountain, in that desert, surrounded by federal land, will be safe and secure for at least a million years." But the hosannas are premature. The NRC staff did not explain, and no one in the media seems to have caught on, that its favorable conclusion reflected the Energy Department's pie-in-the-sky design for Yucca Mountain—not the repository as it is likely to be configured. The likely repository configuration doesn't come close to meeting NRC requirements.

The key design element in question is something the Energy Department calls a "drip shield." This is a kind of massive, corrosion-resistant titanium alloy mailbox that is supposed to sit over each of the thousands of waste canisters in Yucca Mountain's underground tunnels. In NRC's definition, it is designed "to prevent seepage water from directly dripping onto the waste package outer surface."

The name drip shield itself is a giveaway that there is a water problem at Yucca Mountain. There is indeed a lot more water, and it is flowing faster, than the Energy Department imagined when it picked the site, which is why it added the drip shield to the original design. Without the titanium shields, dripping water would corrode the waste canisters placed in the repository and release radioactive waste, and the moving underground water would carry it to the nearby environment.

Using the corrosion data in the Energy Department's license application, one can calculate that this corrosion would take not the "million years" cited by Mr. Shimkus, but about 1,000 years.

Although the Energy Department has included the drip shields as part of the repository design, and NRC has accepted them for license-review purposes, the Energy Department doesn't actually plan to install the shields until at least 100 years after the waste goes in. Presumably, this delay is based on financial considerations; installing the shields early in the project would add hugely to the repository's cost and thus threaten its funding prospects in Congress. If you look more closely into the situation, you can't escape the conclusion that it is highly implausible that the drip shields will ever be installed. In fact, as a practical matter, it may not even be physically possible to install them.

According to Energy Department's plan, after the radioactive waste canisters are placed in the repository tunnels, the site would receive minimal attention for many decades. After a hundred years or so, before the repository was permanently closed, the Energy Department would install the protective drip shields. So it says. Because of the radioactive underground environment, it would take highly specialized robotic equipment to install the shields with the required precision. None of this equipment has been designed, or even thought through.

Realistically, a century into the project, the underground tunnels would have deteriorated considerably and collapsed in part. Dust would sharply limit visibility. The tunnels would have to be cleared of rubble for a remotely operated underground rail system to transport robotic equipment and the five-ton drip shields to the waste canisters. The shields would then have to be installed end-to-end, so as to form a continuous metal cover inside the tunnels, obviously a delicate, complex, and extremely expensive operation. Is it reasonable to believe that after 100 years, with the nuclear waste in the repository long out of the public mind, that Congress would appropriate enormous sums of money for the Energy Department to go back into the tunnels to install the shields? Can we really rely on an agency that hasn't yet cleaned up a nationwide radioactive mess that dates from World War II to keep a promise that it will do something a century into the future? Will there even be an Energy Department in 100 years?

Naturally, because it would be fatal to the project, the Energy Department does not display a computer simulation that shows what happens at Yucca Mountain without drip shields. More surprising, the NRC has not asked for such a simulation. The result for the no-drip-shield situation can, however, be extrapolated from simulations that the Energy Department has run for other contingencies. The former head scientist for the Yucca Mountain project confirmed to me in 2008 that the extrapolation result

obtained in this way is correct. (Disclosure: I was then working for the State of Nevada, which of course opposed the project.) The Energy Department argued, however, that such a calculation was irrelevant, because the NRC cannot, in its review of the Yucca Mountain project, look past the promise of its "sister agency" that it would install the crucial drip shields. That argument seems to have worked in keeping simulations of the behavior of a no-drip-shield Yucca Mountain out of NRC proceedings, and out of the public eye.

A truly independent regulatory agency—one truly representing the public interest—would not have been silent on the low likelihood that drip shields will ever be installed and would have insisted on getting the Energy Department's calculations on what happens if the drip shields don't get installed. What it comes down to is this: The NRC is going along with a shell game to advance the political fortunes of the Yucca Mountain project.

VICTOR GILINSKY (1)

A physicist, Victor Gilinsky is an independent consultant and formerly advised Nevada on matters related to the proposed nuclear waste repository at Yucca Mountain. His expertise spans a broad range of energy issues. From 1975 to 1984, he served on the Nuclear Regulatory Commission, having been nominated by President Gerald Ford and re-nominated by President Jimmy Carter. Earlier in his career he was head of the physical sciences department at the Rand Corporation; he was also an assistant director for policy and program review at the Atomic Energy Commission.