

## new reasons why Yucca be licensed

agency for Nuclear Projects, spends much of his time fighting a Nevada, a state that produces no waste of its own. The Yucca Mountain issue in the Silver State, is inescapable for Halstead as well.

Yucca Mountain, about 80 miles northwest of Las Vegas, was first designated as the nation's sole nuclear waste storage site in 1987, and it has been opposed by the Nevada congressional delegation for years. Today, largely due to the efforts of the delegation and state politicians, the repository is not in use. What exists there now is little more than a 5-mile hole in the ground.

The debate over Yucca Mountain continues, however, with multiple bills on the table in Congress. Sens. Lisa Murkowski, R-Alaska, Lamar Alexander, R-Tenn., and Dianne Feinstein, D-Calif., have sponsored the Nuclear Waste Administration Act of 2019, which would create a consent-based process for the creation of any nuclear waste repository. This bill would not grandfather in Yucca Mountain, at least not yet. Democratic members of the state's congressional delegation have backed the Nuclear Waste Informed Consent Act, which would grandfather in Yucca Mountain to a consent-based process.

On the pro-Yucca side, the Nuclear Waste Policy Amendments Act of 2019, sponsored by Rep. Jerry McNerney, D-Calif., and more than 20 others, including Rep. John Shimkus, R-Ill., would essentially restart the licensing process for Yucca Mountain. Shimkus has been one of the most vocal proponents of the repository.

In a recent interview with the Sun, [Nye County officials detailed why they were open to the project](#). Halstead took issue with some of their remarks and talked with the Sun to break down some of the state's issues with the repository, including potential seismic activity, rail access and transportation of any potential nuclear waste and potential effects to groundwater.

Is there a concern that the bill backed by Reps. McNerney and Shimkus could overshadow efforts to pass a consent-based process?

Yes, in fact, the bill is being intentionally used by Shimkus — and the most die-hard Yucca supporters — to prevent us from having an honest compromise that the people who want a repository and the Nevadans who want equal treatment could agree to. That's why they brought the Shimkus bill to the Senate in April ... and staged a hearing on May 1 without much notice. Both of our senators were able to get themselves well prepared. They gave beautifully eloquent testimony. We had a letter from the governor there.

That actually, in my opinion, was an effort to prevent the compromise that they knew was being developed between Sens. Alexander, Murkowski and Feinstein, and Sens. (Catherine) Cortez Masto and (Jacky) Rosen (both Nevada Democrats). Some of this goes back to the work that was done in the previous Congress when Sen. Cortez Masto and then-Sen. Dean Heller (R-Nev.) were engaged in discussion particularly with Sen. Murkowski, who is the chair of the Energy and Natural Resources Committee. So, absolutely, the whole timing of the way the Shimkus bill has been handled is to try to prevent a consent-based approach from prevailing.

Can you talk a little bit about potential seismic activity at Yucca Mountain?

Earthquakes are a problem for nuclear waste transportation, storage and disposal in all phases. In the storage and handling phase, earthquakes are a problem because you either have bare spent fuel assemblies in water-filled pools or you have them in dry casks. Then when you transfer them, you have to put them in a situation where the spent fuel assemblies are literally dangling from a crane in the process of being moved from one container to another. If you should be unlucky enough to have an earthquake occur when you're handling spent fuel, you could have very serious consequences both in terms of radiation exposure to workers and the release of radiation into the environment.

Similarly, in transportation, we're concerned about the types of accidents that might occur. In particular, where an overhead overpass or bridge deck might fall on top of a crane or a truck and the crush forces would exceed those that the cask is designed to withstand.

It's a little more complicated to explain all the earthquake hazards at the repository itself. Earthquakes could interrupt the process of putting waste in the tunnels. Remember, Yucca Mountain doesn't work as a natural barrier. You have to put all of these engineered barriers in there to prevent groundwater contamination. So, these thousands of five-ton titanium drip shields — one over each of thousands of packages — have to fit together with a hand-and-glove type of connection at the top so they create a waterproof barrier over the packages. So, imagine the complications if you have an earthquake when you're installing the waste packages.

Then, over thousands of years, you're concerned about the way earthquakes will affect the fracturing of the rock above the repository horizon and perhaps accelerate both the rate and the amount of water that infiltrates from the top of the mountain. You're concerned about earthquake impacts on the water table beneath the repository and about earthquakes creating new pathways for groundwater movement.

Here's what's wrong with the way the Department of Energy handled these hazards. First, they did a probabilistic assessment of earthquake hazards and it came out showing such extreme hazards that they realized they would have to walk away from the site. Then they reworked all of their analyses using expert judgment groups, and one of the contentions that we've filed that's been admitted for adjudication in the license proceeding is they biased the way those groups considered earthquake risks.

I just felt it was inappropriate for people in Nye County to say that by talking about earthquake risks at Yucca Mountain, the state is somehow not concerned about earthquake hazards in Las Vegas. Nothing could be further from the truth, and in fact one of the useful things that happened for us is that since the July earthquake, we have gone back and looked at some of the new technical literature that's been done in the past five years.

While most of Nevada's earthquake experts are at UNR, there are several at UNLV. In particular, there's a recent Ph.D. dissertation from 2014 that takes another close look at Las Vegas and says you have to have a much more sophisticated model of what drives seismic risk. Previously, it's mostly been (thought that) the risk at a point is based on the distance from that point to the nearest known fault and what we know about the likelihood and magnitude of possible earthquakes on that fault.

This new research shows that that's only half the qu  
liquefaction in severe earthquakes — magnitude 6 a  
different soil zones in Las Vegas that are between p

earthquakes, which is the Frenchman Mountain fault state that is certainly in earthquake country.

Are there any concerns that potential groundwater contamination could affect Las Vegas?

The groundwater impacts from Yucca Mountain would not directly affect Las Vegas and they would not directly affect Pahrump, based on what we know now. There are some questions about the interactions between the hydrographic basins that are centered over Pahrump and the ones centered over Amargosa Valley. The only way you could argue an impact on Las Vegas with groundwater is that at some future date, it's possible that the groundwater resources affected by Yucca Mountain might be seen as a potential source of water for Las Vegas. That is far-fetched compared with the other groundwater sources in eastern and northern Nevada and a whole range of other things that have to do with managing the Colorado River, and even things that sound exotic but might not be 10 years from now, like advanced desalinization projects.

Concerns over groundwater have everything to do with the Amargosa River and the area immediately down-gradient from Yucca Mountain for about 30 miles in Amargosa Valley. It's not only that this is an important groundwater resource in and of itself, but until recently we did not have the information to show the direct impacts on the Timbisha Shoshone tribe.

When the maps of contaminant plumes were overlaid with land ownership, all of a sudden we see this groundwater contamination would affect the trust lands at Furnace Creek and possibly at Death Valley owned by the Timbisha Shoshone tribe. That's a whole major new licensing issue. And frankly, had that been known back in 2008, I'm not so sure the license application could have gone forward.

Ground contamination is a major concern for future uses in the agricultural and recreational and mining and drinking water uses in Amargosa Valley. It is, in particular, a special concern to the members of the Timbisha Shoshone tribe and members of other tribes — the Moapa Paiutes in particular and some of the Shoshone and Paiute nations that are as far away as Duckwater and Pyramid Lake, (which) have cultural and spiritual connections to this area in Death Valley.

I was sad that in the Nye County discussion, I don't believe they even mentioned the existence of the Native American interests.

Can you talk a bit about the inclusion of Native American tribes in the consent-based bills?

Oh yes. That's a further acknowledgment — the law actually gives them the right to be part of the licensing proceeding.

I don't mean to imply the tribes don't have a role in this now; they do as part of the licensing proceeding. We're seeking to have them be fully recognized along with the state and the host county as full parties to any written agreement that would be signed that would be necessary for repository construction to go forward.

Would this waste be shipped toward Las Vegas?

The plan that DOE has on the table obviously puts shipments through Las Vegas. You have to dig into the DOE documents to find them actually admitting that under all scenarios, they ship 100% of their truck shipments through Las Vegas and about 8% of their rail shipments. That's just a matter of fact that the Nye County folks are wrong on.

More importantly, we're concerned that the routes the department shows in their license application and their environmental impact statement are not the routes that in 2008, which are now obsolete, they assumed they were going to use. We're concerned about our understanding the kinds of impacts they were going to have. Midwesterners long to figure this out when they rev

To reduce the shipments through Las Vegas, DOE s

Chicago, 25% through downtown and another 3% through west Chicago and the southwest suburbs, and altogether about half of the rail shipments go through Illinois and through Missouri and have very big impacts in very politically powerful parts of the country.

Now, there's a lot of uncertainty about the rail routes that would be used, and the argument we have always made is that the only way that you can ensure there are no shipments through Las Vegas by rail is to pick a rail route that makes it physically impossible to make them go through Las Vegas. DOE considered some routes like that early on, routes that came down from the north central part of Nevada. The ones that were the most workable were the so-called Carlin route that comes down from the middle of the state and several variations of the so-called Mina route that comes down basically from the west central part of the state.

Of course, that's a matter of shifting the shipments from Las Vegas to now having a large number of shipments go through Reno and Sparks, so there's no free lunch. The physical geography of Nevada limits the number of transportation corridors that are available either for highways or railroads.

If it were easy to avoid Las Vegas, my thinking is DOE would've done it. Why would they pick this fight? In theory, it's possible to avoid Las Vegas with all the shipments. It would be extremely difficult and it would certainly increase trucking costs. It's not exactly clear in the rail area. They just decided they were making a political decision and, basically, they were saying facts be damned.

What are the concerns with running this waste through populated areas?

It is so complicated, and frankly it is so potentially devastating, particularly in the case of a successful terrorist attack using military weapons. Even DOE acknowledges the possibility that it would cost \$10 billion or more to clean up. It would take a year-and-a-half to do that, and you would basically have to shut down the affected area while you were cleaning it up.

If you had a zero-release rate on the casks, it wouldn't be feasible to move them. The regulations allow the equivalent of a chest X-ray — 10 milligrams per hour — at 6.6 feet. And that radiation goes on for 800 meters (and) falls off the further you get from the cask.

Secondly, while the casks are very robustly constructed, they're not tested physically full-scale, so it's a matter of computer modeling to know how they would actually behave in a severe accident — particularly one involving a long-duration, high-temperature fire. The other big concern, of course, besides an accident, is a terrorist attack. There's a whole (spectrum) of different human actions that range from what we traditionally think of — industrial sabotage, say during a labor dispute, up to a terrorist attack using explosive devices. Taken as a group, those events are probably the most serious threat to an urban area.

Then you have the particular threat in Las Vegas — the Homeland Security folks and the transportation folks have identified what are called high-threat urban areas for terrorist attacks. Las Vegas is one of them. In addition to the inherent hazard of the vulnerability of the casks to these weapons, you have certain locations that would be attractive targets. And even if the attack was unsuccessful, the social and economic impact of the attack could have horrific economic consequences.

This is such an important topic, it deserves a discussion of its own.

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