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Can OC's nuclear waste problem be helped by deep boreholes and Bulgaria?

Teri Sforza

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News

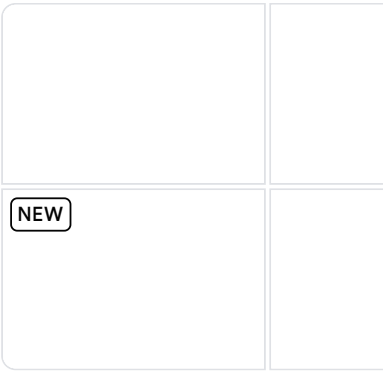


Dry storage of used fuel rods at the San Onofre Nuclear Generating Station on Thursday, December 16, 2021. (Photo by Jeff Gritchen, Orange County Register/SCNG)

As we continue to agonize over the [fate of highly radioactive nuclear waste](#) — and [local cities throw their weight behind an effort to move San Onofre's to higher ground on Camp Pendleton](#) — we'd like to call your attention to baby steps toward an actual long-term solution that provides glimmers of hope.

They involve a California company called [Deen Isolation](#) and well Bulgaria

Stay with us here.

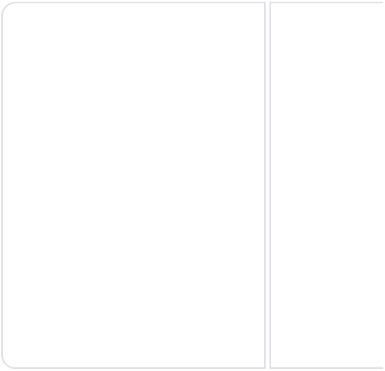


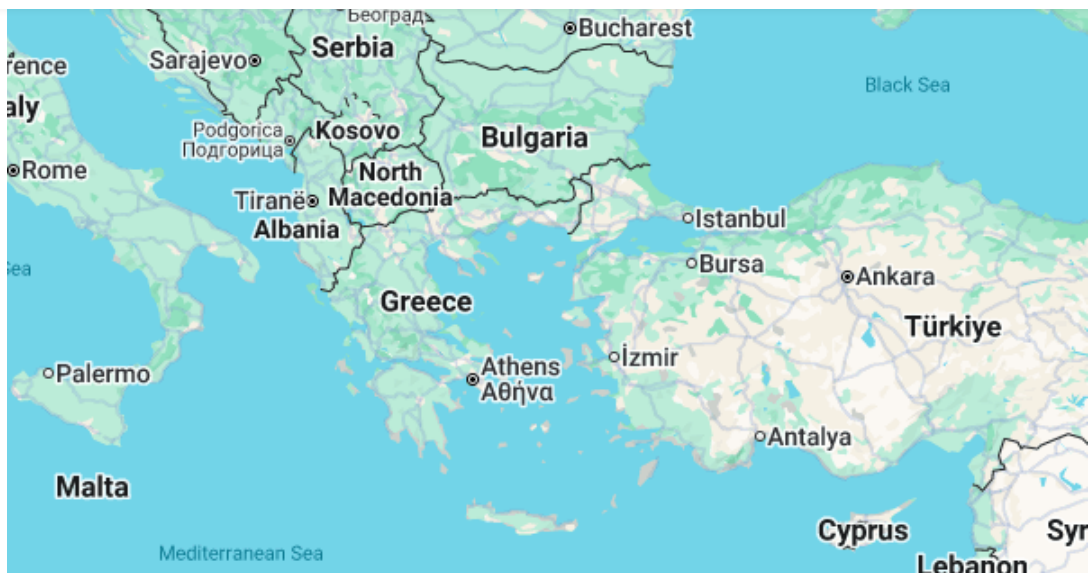
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Back in December, [the U.S. Trade and Development Agency signed a \\$1.2 million grant agreement with the Bulgarian government](#) to study the feasibility of underground disposal of nuclear waste. Deep Isolation — the Berkeley company specializing in deep borehole technology — was to carry out and cost-share the study.

Enter then the [Trump administration’s freeze](#) on government grants.

The Bulgaria study, and disbursements, hit the skids as the new administration scrutinized grants to ensure that dollars aligned with its values. Good news! [Nuclear](#) waste disposal is [apparently not “woke,”](#) so the study’s continuation was approved and disbursements resumed last month.

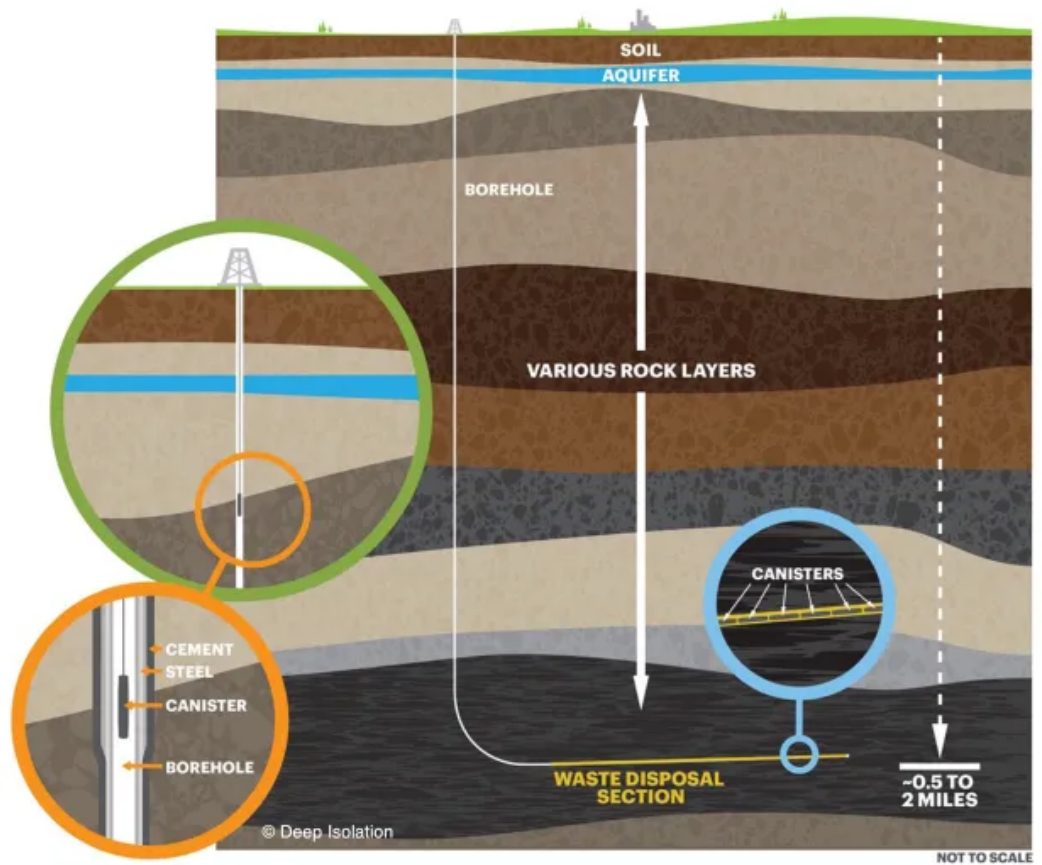




Deep Isolation puts a twist on miles-deep, vertical borehole technology, by curving the hole horizontally at the bottom so it resembles a capital “L”—a shape that, in theory, could isolate highly radioactive nuclear waste even further from the surface environment.

Working with Bulgaria’s State Enterprise Radioactive Waste organization, known as SERAW, the study centers on developing a delivery plan and commercial model for the siting, design, licensing, construction and operation of a deep borehole repository for existing waste at Kozloduy (Bulgaria’s main nuclear power plant). The deal also might handle new waste generated by two pressurized water reactors (designed by Westinghouse Electric) and future small modular reactor waste, Deep Isolation’s Laura Salerno said.

Deep Isolation also has received some \$4.2 million in grants from the U.S. Department of Energy in recent years. The company recently sold 11 million shares of common stock in a private placement offering at \$3 per share, raising some \$33 million, it said in a [recent filing with the Securities and Exchange Commission](#). The company is not profitable yet, but Deep Isolation will use money from the stock sale to fund a full-scale demonstration facility under development in Texas to validate the safety and feasibility of its deep borehole disposal technologies, it said.



(Courtesy Deep Isolation)



Among geologists, there are givens: Humans don't build things that last a million years. And only the bowels of Earth itself can be trusted to swallow — forever — the radioactive nuclear waste that humans have created.

We've known for generations exactly what must be done with this waste and how to do it: Bury it in deep salt beds (like at the [U.S. Department of Energy's Waste Isolation Pilot Plant in New Mexico](#), which handles waste from Cold War nuclear

America's problem is not a technical one, but a political one.



Illustration of deep borehole technology from Sandia National Laboratories' proposal to the U.S. Department of Energy. Waste would be far deeper in the earth in this approach than it would be at Yucca Mountain.

“We know what we have to do, we know we have to do it, and we even know how to do it,” said the [old Blue Ribbon Commission on America's Nuclear Future](#). “Rather the core difficulty remains what it has always been: finding a way to site these inherently controversial facilities ... in a manner that allows all stakeholders, but

have been adequately protected and their well-being enhanced — not merely sacrificed or overridden by the interests of the country as a whole.”

As there’s a San Onofre Community Engagement Panel session on waste storage slated for 5:30 to 8:30 p.m. Oct. 16, both in person (at The Casino, 140 Avenida Pico, San Clemente) as well as online (streamed via Microsoft Teams, see <http://bit.ly/3IEj1Yi>), it seems like all this might be particularly relevant.

Going deep

Right now, the world’s nuclear waste management menu has only two options: above-ground interim storage (which is how 3.6 million pounds of waste at San Onofre currently is kept) and mined repositories (which is what Yucca Mountain was supposed to be). Both are extremely costly and neither is a viable, long-term solution, Deep Isolation said in its SEC filing.

“Deep Isolation has developed a solution for the creation of permanent nuclear waste repositories by leveraging directional drilling to isolate SNF (spent nuclear fuel) and HLW (high level waste) in deep boreholes located underground in suitable rock formations,” the company said. “This technology allows for permanent isolation of nuclear waste through the use of corrosion-resistant canisters that serve as an engineered barrier to waste migration, and storage of those canisters in boreholes greater than 1 kilometer below the Earth’s surface, which is nearly double the typical depth of mined repositories. The ability to place nuclear waste deeper into the ground increases the safety of nuclear waste storage and isolates waste in geologic formations that have been out of contact with the biosphere for millions of years.

“Deep Isolation’s technology also allows for remote handling of waste that eliminates

The U.S. Government Accountability Office's map of sites storing spent nuclear waste in the United States.

intervention underground required with mined repository facilities.”

Boreholes are cheaper than interim dry storage or mine disposal, a study by the Electric Power Research Institute found. Boreholes could handle 1,000 pressurized water reactor assemblies for about \$276 million, while 20 years of interim spent fuel storage would cost some \$374 million, the company estimated.

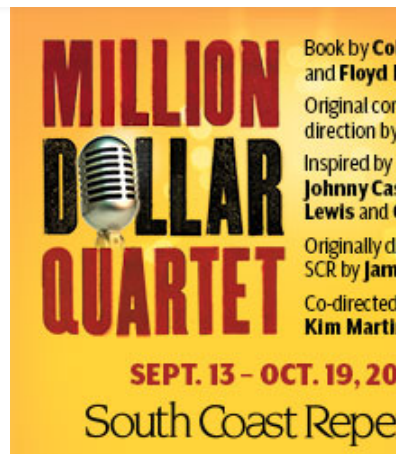


Mined repositories like Yucca, which are close to fruition in Finland, Sweden and France, involve the mining of miles of underground tunnels to create a centralized repository where all spent fuel will be packed into canisters and permanently placed.

Aerial view of an entrance to Yucca Mountain (New York Times Photo)

“This type of disposal is extremely capital intensive and time consuming,” the company said. “Construction of a mine can also cost billions to tens of billions of dollars alone. Further, mined repositories must be maintained and monitored for decades by a large staff of engineers and other personnel both onsite and underground, which leads to significant operating and monitoring costs due to the need for constant monitoring and human intervention underground.”

The site at Yucca Mountain, moribund as it is, cost some \$11 billion. Still, there’s [nearly \\$50 billion in the Nuclear Waste Disposal Fund.](#)



But federal rules make matters even more complicated.

The Nuclear Waste Policy Act prohibits the Department of Energy from conducting site-specific activities anywhere other than Yucca Mountain, unless authorized by Congress, something has yet to happen. And the U.S. divides responsibility for repository selection, construction, licensing and monitoring among disparate agencies — the Environmental Protection Agency, Nuclear Regulatory Commission and DOE.

Is there a scenario under which a private company can dig a borehole to store its own waste in the U.S. right now? we asked.



Store? Yes, Deep Isolation told us.

Dispose? No, not under current law.

But Congressman Mike Levin, D-San Juan Capistrano, has been working with colleagues to [push for nuclear waste-related action in congress](#). The [DOE has awarded \\$26 million to pursue “consent-based siting”](#) with communities willing to

Brakeman Leonard Jacobson watches the tunnel as a train with the media tours the proposed Yucca Mountain nuclear waste dump near Mercury, Nev. (AP Photo/Joe Cavaretta)

The [NRC has given the nod to temporary sites run by private companies](#), though that idea is profoundly unpopular in New Mexico and Texas, where those temporary sites would be.



All this is [costing U.S. taxpayers some \\$2 million a day](#), because We The People must pay private companies to store the waste, even though their ratepayers have already paid into the Nuclear Waste Fund for the federal government to do the job. As the law stands, that money can't be used for temporary storage.

"I'm a strong advocate for finding innovative solutions to the issues plaguing nuclear

Onofre,” Levin said by email. “We must modernize our nuclear waste management program and I’m fighting to provide the federal resources to do so, including by passing my [Spent Nuclear Fuel Solutions Research and Development Act](#) into law to foster innovation in the storage and disposal of spent nuclear fuel.”

Seriously, people. America has landed humans on the moon! We can do this. Make some noise.



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