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Almost 2,000 capsules of cesium and strontium are stored underwater at the Hanford Waste Encapsulation and Storage Facility. **Courtesy DOE**

[HANFORD](#)

# North Dakota deep borehole test could help Hanford

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The Department of Energy is preparing to drill a test borehole more than 3 miles deep in a North Dakota rock formation to study a disposal method that could be used for some of Hanford's radioactive waste.

A team led by Battelle Memorial Institute in Columbus, Ohio, has been chosen to drill the test borehole near Rugby, N.D.

“This is an important first step to increasing our scientific understanding of the the potential uses for crystalline rock formations, including the feasibility of boreholes as an option for long-term nuclear waste disposal,” said Energy Secretary Ernest Moniz, in a statement.

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He previously has discussed deep boreholes as a promising option for disposal of 1,936 radioactive cesium and strontium capsules stored underwater in central Hanford.

The material was removed from high-level waste tanks at Hanford in 1972 to reduce the temperature of the waste inside those tanks. The waste is left from the past processing of irradiated fuel to remove plutonium for the nation's nuclear weapons program.

**(HANFORD CAPSULES) COULD BE VERY WELL-SUITED PERHAPS FOR MUCH EARLIER DISPOSAL THROUGH A BOREHOLE APPROACH.**

Energy Secretary Ernest Moniz in 2015 House hearing

DOE plans a \$35 million, five-year project to test the boreholes on about 20 acres of state-owned land in North Dakota.

The field test will look at science and engineering challenges, including drilling techniques, stability and sealing of the drilled hole, and rock characterization deep underground.

Researchers will collect extensive data during drilling to allow for specialized scientific testing after drilling is complete, according to DOE. No radioactive material will be used in the test project.

Scientists have discussed the possibility of disposing of radioactive weapons waste in deep boreholes since the 1970s.

The idea also came up in 2012 as the Blue Ribbon Commission on America's Nuclear Future recommended research into using boreholes for waste that has no potential for reuse.

A DOE assessment of the option in response to the recommendation said testing would be needed to confirm safety and feasibility.

Commercial drilling technology is available. But challenges exist in the development of remote handling equipment for placing waste in the borehole, although such equipment is in the realm of current technology, the report said.

**17 inches** minimum diameter of borehole at 3.1 miles deep

Moniz said last year that Hanford's cesium and strontium capsules possibly could be disposed of sooner if boreholes prove a viable method.

The capsules had been planned to be sent to the proposed repository at Yucca Mountain, Nev., before the Obama administration stopped work on that facility.

The cesium and strontium capsules contain about one-third of the total radioactivity of the waste at Hanford.

However, their comparatively small total volume of less than 140 cubic feet makes them a possible candidate for deep borehole disposal. They have less than 1 percent of the projected volume of Hanford's vitrified high-level radioactive waste now held in underground tanks.

As proposed in DOE's assessment, waste would be placed in the lower 1.2-mile portion of the borehole in crystalline rock that would help isolate the waste from the environment. The borehole would need a diameter of at least 17 inches at the bottom for placing containers and would be lined with steel casing.

### **BATTELLE, UNIVERSITY OF NORTH DAKOTA, SHLUMBERGER AND SOLEXPERTS COMPRISE RESEARCH TEAM.**

The test project will also be used to assess the potential for geothermal energy development.

Many regions in the United States have large, geologically stable rock formations similar to the North Dakota test site. The work there will help increase understanding of similar locations across the country, according to DOE.

DOE officials have said that they will look for communities willing to volunteer as sites for disposal of radioactive waste, whether in boreholes or by other methods.

In addition to Battelle, the research team includes:  
the University of North Dakota Energy and Environmental Research Center of Grand Forks, N.D.;  
Shlumberger of Houston, Texas;  
and Solexperts of Switzerland.

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