

Vision

To enhance the nation's security and prosperity through sustainable, transformative approaches to our most challenging energy, climate, and infrastructure problems.

The Energy Security program area accelerates the development of transformative energy solutions that will enhance the nation's security and economic prosperity.

Goal: Complete a deep borehole disposal system demonstration project with industry that will transform nuclear waste management

A typical nuclear power plant generates around 20 metric tons of used/spent nuclear fuel in a year. The U.S. nuclear industry generates a total of about 2,300 metric tons of used fuel per year. Over the past four decades, the entire U.S. nuclear industry has produced about 62,500 metric tons of spent nuclear fuel. If used fuel assemblies were stacked end-to-end and side-by-side, this would cover a football field about seven yards deep.

In 1982, Congress passed legislation which established the Nuclear Waste Fund. Those who use electricity supplied by nuclear energy would pay for the used nuclear fuel disposal program. For every kilowatt-hour used, consumers of nuclear generated electricity contribute 0.1¢ into the waste fund—~\$750M per year. Congress assigned responsibility

to the DOE to site, construct, operate, and close a repository for the disposal of spent nuclear fuel and high-level radioactive waste.

The U.S. Environmental Protection Agency (EPA) was directed to set public health and safety standards for releases of radioactive materials from a repository, and the NRC was required to promulgate regulations governing construction, operation, and closure of a repository. An Office of Civilian Radioactive Waste Management (OCRWM) was established in the DOE to implement the law.



Currently, spent nuclear fuel is stored onsite at nuclear power plants, first submerged for months in pools to cool, then above ground in large casks.



Deep borehole disposal would entomb spent nuclear fuel and high-level nuclear wastes several kilometers below the surface where chemically reducing conditions will the transport of most radionuclides.



creating a solution that can be practically sited in a large number of locales;

- provide factual data to support analysis of cost savings; and
- create a permanent disposal method that is highly proliferation resistant.

Until recently, OCRWM was preparing a site at Yucca Mountain, Nevada, for this purpose. Sandia was the lead laboratory that assisted OCRWM in preparing the licensing application that was submitted to the NRC in the summer of 2008.

With the closing of the Yucca Mountain site, the nation is exploring the options for the safe disposal on this high-level radioactive waste by means of a Presidential Blue Ribbon Commission on America's Nuclear Future. Deep borehole disposal (DBHD) is a concept that has been discussed for many years, but never pursued despite several advantages, due to emphasis on mined repositories and reticence regarding retrievability. As the

U.S. policy apparatus revisits national policy on nuclear waste management, DBHD system concepts are being seriously considered, and need a leadership coalition to demonstrate feasibility. If adopted, DBHD systems could be a 'game-changer' in nuclear waste management around the globe.

A full-scale demonstration of a deep borehole disposal system will

- help maintain and reestablish U.S. leadership in repository sciences;
- enable closing of the fuel cycle with permanent, secure disposal of nuclear waste;
- address political/regional equity concerns over hosting a single repository by



A Sandia test to validate the DBHD concepts.

For more information please contact:

Andrew Orrell
E-mail: sorrell@sandia.gov
Phone: (505) 284-0897
Website: www.energy.sandia.gov