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Robert A. Levich[1], Russell L. Patterson[2], Ronald M. Linden[3] (1) US Department of Energy, Las Vegas, NV (2) US Department of Energy, Carlsbad, NM (3) Golder Associates, Inc, Las Vegas, NV

Closing the Uranium Fuel Cycle: Deep Geologic Disposal at Yucca Mountain and WIPP

To close the nuclear fuel cycle and safely dispose of spent nuclear fuel and long-lived radioactive waste, the US Department of Energy (DOE) developed the Waste Isolation Pilot Plant (WIPP) in southeastern New Mexico and is studying Yucca Mountain in southern Nevada as current or potential deep geologic repositories for nuclear waste

WIPP was developed for disposal of Transuranic (TRU) waste, contaminated sludge and refuse from nuclear weapons production that contains alpha-emitting radionuclides with atomic numbers above 92 and half-lives greater than 20 years. Both mixed (radioactive plus hazardous) and unmixed TRU wastes will be disposed of in WIPP. Waste is packaged in drums and boxes and placed in rooms and tunnels excavated in Permian age bedded salt formations 650 meters below the land surface. The low viscosity salt beds will eventually flow into the unoccupied spaces surrounding the drums and boxes, permanently entombing the waste.

Through characterizing the geology, hydrology and geochemistry of Yucca Mountain, an uplifted ridge of unsaturated Miocene age welded and non-welded silicic volcanic tuffs, DOE is determining its suitability as a potential repository for the disposal of spent nuclear fuel and high-level waste. The waste will be placed in robust bimetallic canisters in tunnels 300 meters below the crest, within welded tuff layers 300 meters above the water table. Studies to date indicate that the natural system plus supporting engineered barriers provide a safe environment to isolate waste. A potential repository at Yucca Mountain could receive waste in 2010.