

fact sheet

Safely Managing Used Nuclear Fuel

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Key Facts

Nuclear power plants generate electricity for one in five U.S. homes and businesses, collectively producing about 2,000 metric tons of used nuclear fuel rods each year. If this volume were divided among individuals served by nuclear energy, the annual total would amount to about a single soda can per person. All the high-level nuclear waste produced by the U.S. nuclear energy industry in more than 50 years of operation would, if stacked end to end, cover a football field to a depth of less than 10 yards. Used nuclear fuel rods are stored safely and securely at reactor and storage sites around the country, either in enclosed, steel-lined concrete pools filled with water or in steel-reinforced concrete containers. The U.S. Nuclear Regulatory Commission has determined that it is technically feasible to continue to store used nuclear fuel safely at power plant sites or consolidated interim storage facilities for an indefinite period. On-site storage of used nuclear fuel was never intended to be permanent. In 1992, Congress mandated that the U.S. Department of Energy develop a deep geologic repository for used nuclear fuel and some defense program wastes at a site in the Nevada desert. Given that the repository Congress mandated to be built by 1998 still does not exist, containers are safely and securely stored at plant sites until such time as a repository is ready.

Water Storage Provides Cool-Down Period for Used Fuel

Nuclear power plant fuel storage pools are designed to provide a temporary place to cool used fuel before it is placed in containers for storage and subsequent transport to a permanent repository.

Water is an effective natural shield that protects workers and the environment from the radioactivity and heat produced by used fuel rods. To maintain radiation levels near the pool below the limits specified in NRC regulations, the used fuel at least 20 feet below the water's surface. The water is filtered and purified. It circulates through a heat exchanger for cooling and then is returned to the top of the pool.



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Used fuel storage pools are robust concrete and steel structures that are designed—like the nuclear plants they are part of—to withstand extreme events such as earthquakes, floods, hurricanes and tornadoes. A 2013 NRC report said that an extremely powerful earthquake has a low probability of damaging a pool to the extent that it would lose water. In the event that pools lost water, the report said that “existing emergency procedures would keep the population around the plant safe.”

The safety of used fuel storage pools was proven under severe conditions in 2011. Despite the strongest earthquake in modern Japanese history, a tsunami estimated at 45 feet in height, loss of all off-site electric power for weeks and explosions resulting from hydrogen buildup in containment structures, all seven pools at the Fukushima Daiichi power plant in Japan remained intact and the used fuel in the pools remained safely covered with cooling water.

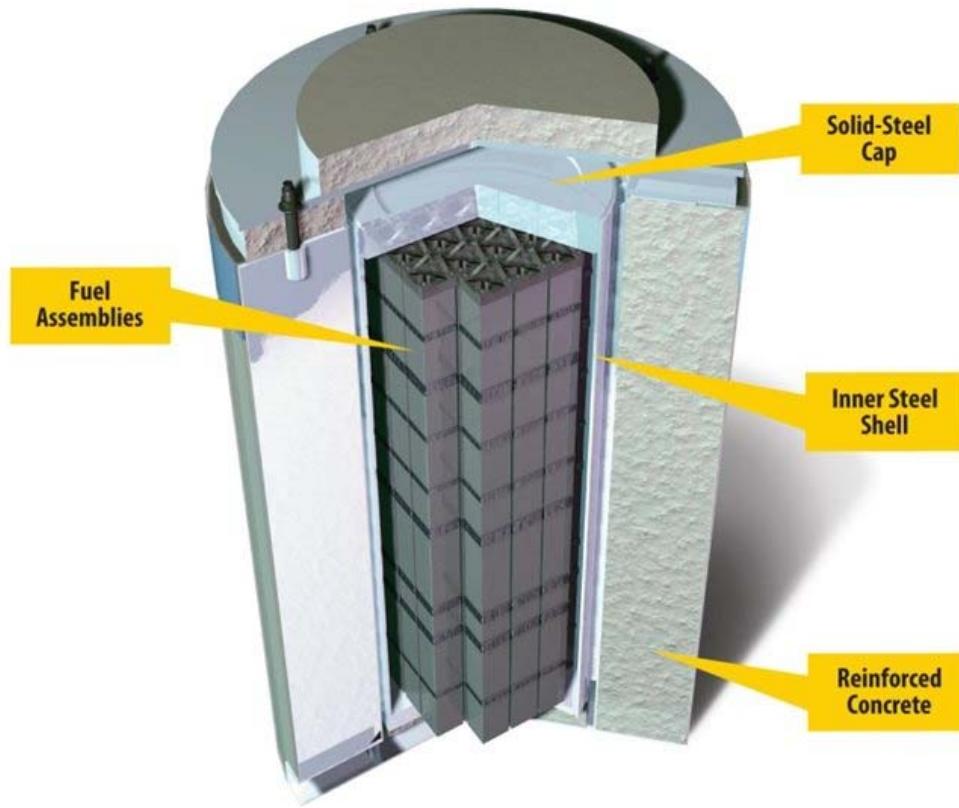
It is standard practice to store used fuel in a pool for at least five years, and typically longer, after it has been removed from the reactor core. Once the radioactivity and heat have decreased sufficiently, the older fuel may be moved from the pool and placed in dry storage containers.



Used nuclear fuel is stored at least 20 feet below the water's surface.

Dry Storage Is Final Step Before Permanent Repository

Nearly all U.S. nuclear plants are storing used fuel in large, rugged containers made of steel-reinforced concrete. Depending on the design, a container can hold up to 37 pressurized water reactor fuel assemblies or 87 boiling water reactor fuel assemblies. The containers have either a 20-year or a 40-year license with an option to extend the license term for up to 40 years. Given that the geologic repository Congress mandated to be built by 1998 still does not exist, containers are safely stored at plant sites until such time as a repository is ready.



Cutaway view of a typical storage container for used nuclear fuel.

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