BACKGROUNDER
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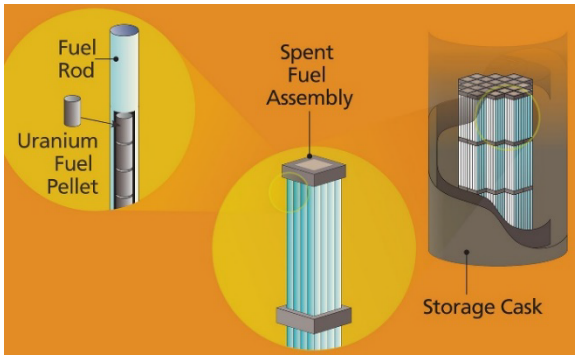
Dry Cask Storage of Spent Nuclear Fuel

Nuclear plants were originally designed to provide temporary onsite storage of used nuclear fuel. Known as "spent fuel," these bundles of fuel rods must be replaced from time-to-time because they lose efficiency. About one-third of the nuclear fuel in a reactor is removed and replaced with fresh fuel at each refueling. The spent fuel, which generates considerable heat and radiation, is placed into deep pools of water at the reactor site, where it can be stored safely.

Reactor designers expected spent fuel to be stored in pools for a few years before it was shipped offsite to be "reprocessed." A reprocessing plant would separate portions that could be recycled into new fuel; unusable portions would be disposed as waste. But commercial reprocessing never succeeded in the United States, so pools began to fill up.



Pools Reach Capacity

As spent fuel accumulated in the pools in the early 1980s, utilities began to look at options for increasing the amount they could store. The pools are robust structures that cannot be enlarged. So utilities needed to fit more fuel into their pools. Current regulations permit two options for expanding pool capacity: re-racking (replacing storage racks to decrease the distance between assemblies) and fuel rod consolidation (removing fuel rods from the assemblies to pack them more densely for storage). The NRC must review and approve any such changes. But pool capacity can only be expanded so far.

Enter Dry Storage

Utilities began turning to dry storage to manage their spent fuel onsite. After a few years in the pool, the fuel has cooled and its radioactivity decreased enough to allow it to be removed. Moving spent fuel into dry casks frees up space in the pool to store spent fuel newly removed from the reactor.

Dry casks typically have a sealed metal cylinder to contain the spent fuel enclosed within a metal or concrete outer shell to provide radiation shielding. In some designs, casks are set vertically on a concrete pad or below grade within a concrete pad; in others, they are placed horizontally.

Dry cask storage is safe for people and the environment. Cask systems are designed to contain radiation, manage heat and prevent nuclear fission. They must resist earthquakes, projectiles, tornadoes, floods, temperature extremes and other scenarios. The heat generated by a loaded spent

fuel cask is typically less than is given off by a home-heating system. The heat and radioactivity decrease over time without the need for fans or pumps. The casks are under constant monitoring and surveillance.

Licensing Dry Storage

The NRC developed cask licensing requirements through a public process to provide a sound basis for ensuring protection of public health and safety and the environment. NRC staff conducts thorough reviews and only approves designs that meet those requirements. Utilities can choose from two licensing options, both of which allow for public input:

Horizontal storage system

- A *site-specific license* allows a specific cask design to be used at a specific location and offers the opportunity for a hearing before the NRC grants the license.
- A *general license* allows a reactor site to use any cask certified by the NRC, as long as the site meets the conditions specified in the certificate. The public can comment on cask designs before the NRC certifies them.

The NRC periodically inspects the design, manufacturing and use of dry casks. These inspections ensure licensees and vendors are following safety and security requirements and meeting the terms of their licenses and quality assurance programs. NRC inspectors also observe practice runs before utilities begin moving their spent fuel into dry casks.

Since the first casks were loaded in 1986, dry storage has released no radiation that affected the public or contaminated the environment. There have been no known or suspected attempts to sabotage cask storage facilities. Tests on spent fuel and cask components after years in dry storage confirm that the systems are providing safe and secure storage. The NRC also analyzed the risks from loading and storing spent fuel in dry casks. That study found the potential health risks are very small.

Vertical casks

Additional information on the storage of spent nuclear fuel is available on the NRC's website.

January 2023