U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Backgrounder

Office of Public Affairs
Telephone: 301/415-8200 E-mail: opa@nrc.gov

Dry Cask Storage of Spent Nuclear Fuel

Background

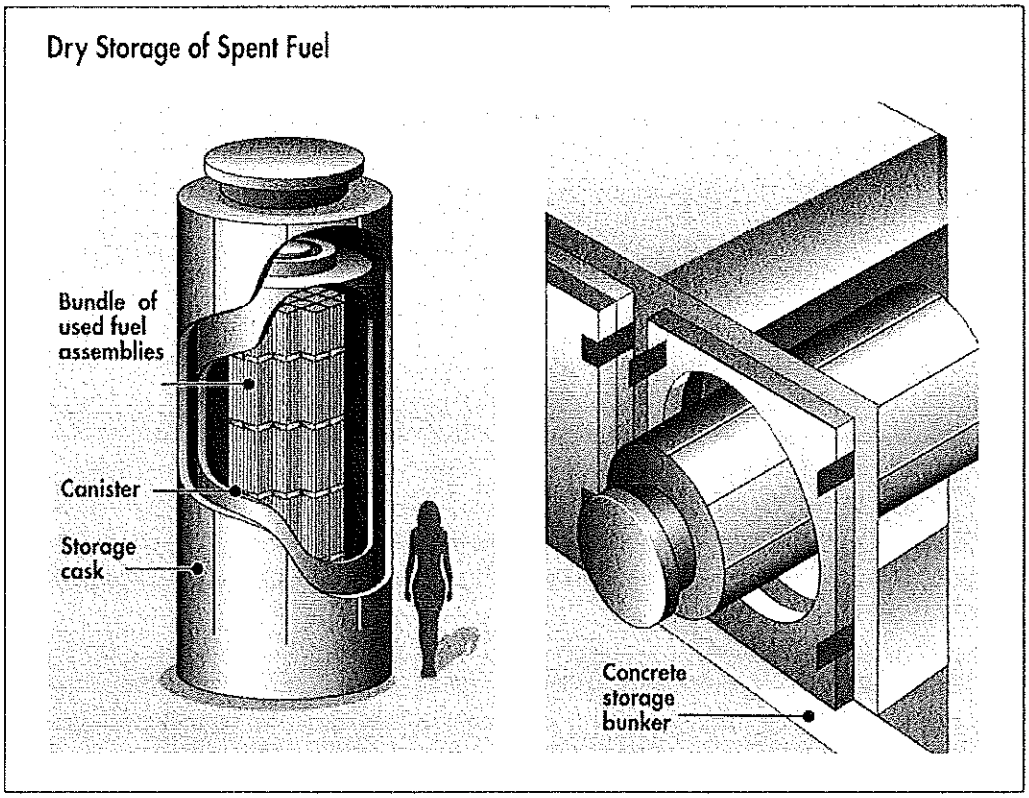
For years, nuclear power plants have temporarily stored used fuel, known as "spent fuel," in water pools at the reactor site. Periodically, about one-third of the nuclear fuel in an operating reactor needs to be unloaded and replaced with fresh fuel. Designers of nuclear power plants anticipated that the spent fuel would be reprocessed, with usable portions of the fuel to be recycled and the rest to be disposed as waste. However, commercial reprocessing was never successfully developed in the United States, and a permanent waste repository has not yet been developed. As a result, many of the spent fuel pools at commercial nuclear power plants are nearing capacity.

In the early 1980s, utilities began looking at options for increasing spent fuel storage capacity. Current regulations permit reracking (placing fuel rod assemblies closer together in spent fuel pools) and fuel rod consolidation, subject to NRC review and approval, to increase the amount of spent fuel that can be stored in the pool. Both of these methods are constrained by the size of the pool.

Another option for increasing capacity is storage in an independent spent fuel storage installation (ISFSI). Such storage may be either at the reactor site or elsewhere. The spent fuel may be stored in wet or dry ISFSIs. Over the last decade, there has been increased interest in dry cask storage on-site by licensees to provide additional capacity for storing spent fuel. Fuel that has been stored for at least five years in water has cooled sufficiently, and its radioactivity decreased enough, for it to be removed from the spent fuel pool and loaded into casks. This frees up additional space in the pool for storing spent fuel newly removed from the reactor.

Congress is considering options to create additional storage capacity on federal lands to store commercial spent fuel until a repository or new reprocessing technologies can be developed.

There are two ways an ISFSI may be licensed. A "site-specific license" authorizes operation of a storage facility at a nuclear power plant or elsewhere, subject to the NRC's standard licensing requirements. The license specifies the type of storage system to be used. Alternatively, nuclear power plant operators may operate an ISFSI under a "general license" using NRC-approved dry storage casks. The general license option allows plants to avoid repeating certain evaluations (such as environmental impact or seismic reviews) that were already conducted for the plant's operating license.)



Discussion

Dry casks typically consist of a sealed metal cylinder containing the spent fuel enclosed within a metal or concrete outer shell. In some designs, casks are placed horizontally; in others, they are set vertically on a concrete pad.

The NRC reviews and approves the designs for spent fuel dry storage systems. The NRC's regulations for review are developed through a public process and provide a sound basis for determining whether use of a proposed storage system will protect public health and safety and the environment.

The NRC periodically inspects the design, fabrication, and the use of dry casks, to ensure licensees and vendors are performing activities in accordance with radiation safety and security requirements, and licensing and quality assurance program commitments.

Dry spent fuel storage in casks is considered to be safe and environmentally sound. Over the last 20 years, there have been no radiation releases which have affected the public, no radioactive contamination, and no known or suspected attempts to sabotage spent fuel casks or ISFSIs. For approval of cask designs, the NRC conducts a technical review to ensure the design would be safe and secure for use at a broad range of nuclear power plant site characteristics, consistent

with the requirements for a general license. [Additional information is available at http://www.nrc.gov/waste/spent-fuel-storage.html .]

Dry cask storage systems are designed to resist floods, tornadoes, projectiles, temperature extremes, and other unusual scenarios. NRC requires the spent fuel to be cooled in the spent fuel pool for at least five years before being transferred to dry casks. Typically, the maximum heat generated from 24 fuel assemblies stored in a cask is less than that given off by a typical home heating system in an hour. As the fuel cools further, the heat generated will decrease over time.

Spent fuel is currently in dry storage at ISFSIs located at 31 sites with general licenses and 15 sites with site-specific licenses. The map shows the current ISFSIs.

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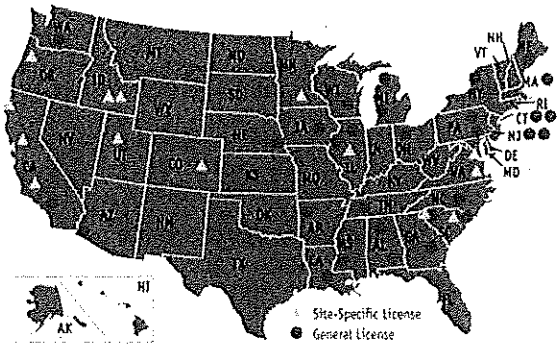
Licensed/Operating Independent Spent Fuel Storage Installations



ALABAMA
- Brown's Ferry
- Farley

ARIZONA
- Palo Verde

ARKANSAS
- Arkansas Nuclear

CALIFORNIA
- Diablo Canyon
- Rancho Seco
- San Onofre
- Humboldt Bay

COLORADO
- Fort St. Vrain

CONNECTICUT
- Haddam Neck
- Millstone

GEORGIA
- Hatch

IDAHO
- DOE: TMI-2 Fuel Debris
- Idaho Spent Fuel Facility

ILLINOIS
- GE Morris
- Dresden
- Quad Cities

IOWA
- Duane Arnold

LOUISIANA
- River Bend

MAINE
- Maine Yankee

MARYLAND
- Calvert Cliffs

MASSACHUSETTS
- Yankee Rowe

MICHIGAN
- Big Rock Point
- Palisades

MINNESOTA
- Prairie Island

MISSISSIPPI
- Grand Gulf

NEBRASKA
- Ft. Calhoun

NEW JERSEY
- Hope Creek
- Oyster Creek

NEW YORK
- James A. FitzPatrick

NORTH CAROLINA
- McGuire

OHIO
- Davis-Besse

OREGON
- Trojan

PENNSYLVANIA
- Susquehanna
- Peach Bottom

SOUTH CAROLINA
- Oconee
- H.B. Robinson

TENNESSEE
- Sequoyah

UTAH
- Private Fuel Storage

VIRGINIA
- Surry
- North Anna

WASHINGTON
- Columbia Generating Station

WISCONSIN
- Point Beach

Data as of March 2007
Source: U.S. Nuclear Regulatory Commission