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Dealing with Spent Nuclear Waste

Dry Cask Storage: A Viable Option

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FACT SHEET

It is widely recognized by the scientific, national and international communities that nuclear waste poses an extremely hazardous threat to public health and the environment. The question of how to deal with our nuclear waste is a pressing and controversial issue that dominates the ongoing debate over national energy policies.

Background

Nuclear power plants' fuel is stored in rods. Periodically, about one-third of the nuclear fuel in an operating reactor needs to be unloaded and replaced with fresh fuel. The rods containing the already used-fuel are known as "spent fuel." The spent fuel is stored in water pools at the reactor site. (1)

Most of today's growing inventory, about 40,000 metric tons of spent fuel, is stored onsite at the reactor where it was produced in spent fuel storage pools. (2) Since the 1970s, the need for alternative storage grew as pools at many nuclear reactors began to approach their capacity with stored spent fuel. It is estimated that by the end of 2006, approximately 60 facilities will have no more storage space in spent fuel pools. (3)

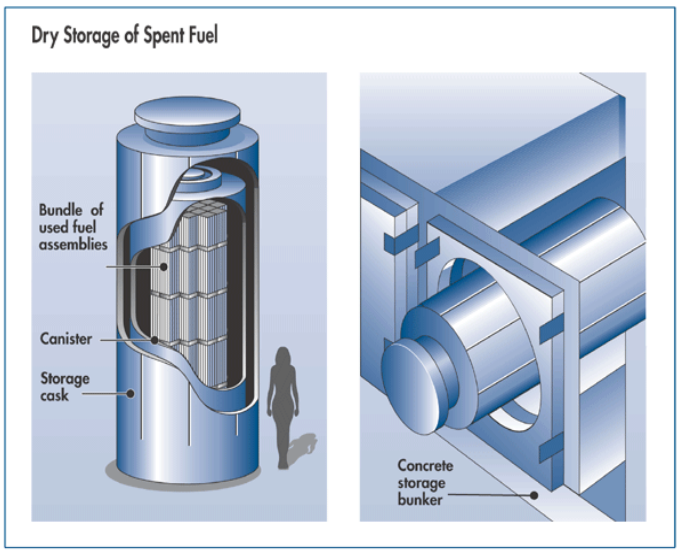
The passage of the Nuclear Waste Policy Act of 1982 established the federal policy for disposal of high-level radioactive wastes generated as byproducts of U.S. nuclear weapons production and from nuclear power plants in a deep "geological" repository. Because a suitable repository has not yet been approved, utilities began looking at options for increasing spent fuel storage capacity. Current regulations permit re-racking (placing fuel rod assemblies closer together in spent fuel pools) and fuel rod consolidation, subject to the U.S. Nuclear Regulatory Commision's (NRC) review and approval, to increase the amount of spent fuel that can be stored in a pool. (1)

Dry Cask Storage

Even with re-racking the spent fuel pools will not be capable of accommodating all spent fuel expected to be produced by currently operating power plants. It is inevitable that additional on-site or other interim storage will be needed for most nuclear reactors until a permanent site can be chosen and constructed. The primary technology being considered today is the use of dry storage casks. (3)

Dry cask storage allows spent fuel that has already been cooled in the spent fuel pool to be surrounded by inert gas inside a container called a cask. NRC requires the spent fuel to be cooled in the pool for several years before being transferred to dry casks. (1)

Casks typically consist of a sealed metal cylinder that provides a leak-tight containment of the spent fuel. Each cylinder is surrounded by additional steel, concrete, or other material to provide radiation shielding to workers and everyone else. (4) Casks can be placed horizontally or set vertically on a concrete pad. The casks used in the dry storage systems are designed to resist floods, tornadoes, projectiles, temperature extremes, and other unusual scenarios. The safest available design for dry cask storage is what is called hardened dry-cask storage, where the cask is enclosed in a concrete bunker underground.



Picture 1 shows the general model and size of a dry-cask container, the second shows the general idea of its storage in a concrete bunker.

As ruled by Congress in the Nuclear Policy Act, all dry-cask designs and use must be approved by NRC. (4) Dry casks must also be continually monitored for radiation leakage and re-licensed by NRC every 20 years. The NRC also 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.

Recent Dry Cask Policy

As approved by the Nuclear Regulatory Commission, dry cask containers can safely store waste for at least one-hundred years and are already used at thirty-three nuclear power sites throughout the country. On December 16, 2005, Senators Harry Reid and John Ensign introduced legislation, co-sponsored in the House, mandating that nuclear waste be stored on site where it is produced and requiring that the federal government take responsibility for the possession, stewardship, maintenance and monitoring of the nuclear waste. (7)

Conclusion

Dry cask storage is a viable solution for dealing, at least temporarily, with our national nuclear waste problems. While complete safety may be unattainable when dealing with the extreme hazard represented by the intense radioactivity of irradiated fuel no matter what the storage technology, using a passive dry storage system is better than having to rely on active mechanical systems of spent fuel pools that can wear out, malfunction or break down. It is also better than rushing the country into false solutions like the faulty Yucca Mountain Repository. The NRC's testing and quality control have shown that dry cask technology is completely safe for up to 100 years. The DOE should utilize this time and opportunity to devise truly safe methods of disposal as well as to contemplate the potential health and safety consequences of our further use of nuclear energy.

Dry cask storage is a good idea because:

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. (1)

- Since dry casks do not contain water, which is necessary to enable a nuclear reaction in light water reactors, there is no chance of an accidental chain reaction, as there would be in water storage pools. (5)

- Because there is no water circulation and filtering, no "low-level" radioactive waste is produced by fuel storage, as is continually the case in the fuel pools.

- Dry-cask storage systems are, for the most part, self-contained, with no mechanical pumps or other active systems, the maintenance of safety relies passively on the cask integrity. (5)

As the 2005 National Academy of Sciences concluded, terrorist attack on spent fuel pools could lead to the release of large quantities of radioactive materials into the environment; dry cask storage offers inherent security advantages over pool storage. (6)

Using dry cask storage would ease the drive to push forward the approval of a permanent high level nuclear repository at a site that does not meet public health and safety standards. It would allow the time to find the safest possible site and, "develop a sensible national policy on nuclear energy." (7)

Resources

[1] U.S. Nuclear Regulatory Commission, Document Collections, *Backgrounder on Dry Cask Storage of Spent Nuclear Fuel*. December 2004. http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dry-cask-storage.html

[2] Makhijani, Arjun. Institute for Energy and Environmental Research. Press Release June 2002. *Independent Institute Recommend Alternative Nuclear Waste Plan.* http://www.ieer.org/comments/waste/yuccaalt.html

[3] Information Brief for the Minnesota House of Representatives from the Research Department, *Nuclear Waste Dry Cask Storage*. December 2001. http://www.house.leg.state.mn.us/hrd/pubs/nucwaste.pdf

[4] U.S. Nuclear Regulatory Commission, Radioactive Waste, *Dry Cask Storage*. June 2003. http://www.nrc.gov/waste/spent-fuel-storage/dry-cask-storage.html

[5] Makhijani, Arjun. *High-Level Dollars, Low-Level Sense: Chapter 3, Overview and Critique of the Current Approach to Radioactive Waste Management, Interim Management for Spent Fuel: MRS and Onsite Storage*. Institute for Energy and Environmental Research. 1996. http://www.ieer.org/pubs/highlv3d.html

[6] Lyman, Dr. Ed. Union of Concerned Scientists. *Global Security, Nuclear Terrorism and Nuclear Reactors. Nuclear Waste Disposal.* November 2005. http://ucsusa.org/global_security/nuclear_terrorism/nuclear-waste-disposal-factsheet.html

[7] *Reid, Ensign Introduce Nuclear Waste On-Site Storage Legislation*. December 2005. http://reid.senate.gov/record.cfm?id=249893