

Nuclear Waste Dry Cask Storage

During the 2001 legislative session, there were three bills on nuclear waste storage introduced in the Minnesota House.¹ These bills were all related in part to the 1994 law allowing the Prairie Island nuclear generating plant along the Mississippi River to store nuclear waste in dry casks.² This information brief is an update of dry cask storage, the licensing process, and how much dry cask storage has been approved. A map of dry cask storage facilities around the country is on page 5.

Background Information

Dry cask storage is the outside storage of spent fuel rods from nuclear plants. In order to continue operating, the plants need to supplement their indoor storage room (typically in pools of heavy water) with aboveground dry storage facilities. Outside, nuclear fuel assemblies are stored in tall steel casks that are at least 18 inches thick. The steel and lead used to make the casks are intended to keep radiation from escaping. The casks are tested to remain intact through any natural disasters.

Dry casks must be continually monitored for radiation leakage and relicensed by the U.S. Nuclear Regulatory Commission (NRC) every 20 years. In the nation, about 35 nuclear plants have on-site dry cask storage, or plan to by 2004. In Minnesota, Xcel Energy's facility at Prairie Island is the only site authorized for dry cask storage.

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¹ See [page 4](#) for bill summaries.

² [Laws 1994, ch. 641](#).

Both types of on-site storage, outdoor dry cask and indoor spent fuel pools, are meant to be temporary until a centralized national storage facility becomes operational. The NRC regulates the storage of spent fuel waste and has determined that it can be safely stored for at least 30 years beyond the licensed operating life of a nuclear plant.

There has been a 20-year history of trying to find a federal permanent repository for storing high-level nuclear waste.³ A site in Nevada at Yucca Mountain was found safe this year by the U.S. Department of Energy (DOE); however, several technical, regulatory, and political hurdles remain before nuclear waste is ever transported there. There is a general consensus that the availability of a federal permanent repository is at least ten years away.

The costs for storing and disposing of high-level nuclear waste are paid for by a federal nuclear waste fund. The fund was established in 1983 by the national Nuclear Waste Policy Act, and is financed by a 1/100 of a cent per kilowatt-hour charge on utilities for the electricity generated at their nuclear power plants. Since the fund was established, \$17 billion has been collected for future nuclear waste storage.

Since no permanent storage repository is yet authorized, nuclear plants have been running out of spent fuel capacity. It is estimated that by the end of 2006, approximately 60 facilities will have no more storage space in their spent fuel pools.

The limits on how much dry cask storage each nuclear plant can have is determined by the type of NRC operating license. The NRC places an upper limit of fuel assemblies that can be stored on-site for plants with a site-specific license. Plants operating under a general license for dry storage do not have an upper limit for the number of fuel assemblies that can be stored.

The NRC must approve every dry cask container design, and it regulates the testing, manufacture, and maintenance of the casks. Several dry cask storage systems have been approved by the NRC and each system is licensed for 20 years. As of February 2001, 16 nuclear sites in the nation have 230 dry storage casks on the ground.⁴ In neighboring Wisconsin, Wisconsin's Public Service Commission had limited the Wisconsin Electric Power Company station at Point Beach to 12 dry casks, but recently approved 24 more.

³ The U.S. Secretary of Energy will apparently make a decision by the end of February as to whether to recommend Yucca Mountain to the president as the federal permanent repository for high-level radioactive waste. If the president agrees with this recommendation, the recommendation would be submitted to the Congress.

Upon submission of the recommendation to Congress, the Nuclear Waste Policy Act gives states 60 days to object to the site. If no state objects, Yucca Mountain would then be approved for the permanent federal repository. If a state objects (and Nevada has been very clear as to its intention to object), the site would be disapproved. Under the NWPA, Congress would have 90 days from the receipt of Nevada's objection to pass a joint resolution overturning the objection and approving the site. If the Congress does not pass the joint resolution and therefore "fails to act to certify the Yucca Mountain site for a permanent repository, there will be no national plan for the management of the disposal of high level nuclear waste." *See Draft Annual Report: Federal Programs for the Management of High-Level Radioactive Waste*, Minnesota Environmental Quality Board. December 2001, pp 25-26.

⁴ See [page 5](#) for a U.S. map of storage areas.

Dry Cask Storage in Minnesota

In 1994, the legislature approved a total of 17 casks to be filled and placed at the Independent Spent Fuel Storage Installation (ISFSI) at Prairie Island.⁵ Of these 17 casks authorized, 14 have been filled. The Prairie Island storage facility was constructed to hold, and has a federal permit for, a total of 48 casks. At the time of the 1994 legislation, it was thought that these 17 casks would provide sufficient storage for Xcel to keep the Prairie Island plant operating at full-scale until the year 2001, absent storage options outside the state. Subsequent to that legislation, the Minnesota Public Utilities Commission approved an addition to the temporary pool storage at the Prairie Island plant. In addition, Xcel received permission to use a higher burn-up rate for the fuel at Prairie Island, allowing the Prairie Island reactors to refuel less often, generating fewer spent fuel assemblies. Due to these developments, the new shutdown date has been extended from 2001 to 2007, given full-scale operations at the plant.

Given that a federal permanent repository will not be available until well after the potential shutdown date, Xcel is exploring a small number of alternatives. Three of those alternatives would allow the Prairie Island facility to continue to operate through its current federal license period—2013 and 2014 for twin reactors at Prairie Island, and potentially through the useful life of the reactors, if the reactors were relicensed by the federal NRC.⁶ Two such options would require legislative attention and approval: (1) re-racking the indoor storage pool at the Prairie Island facility for a third time, to allow for adequate storage space; and (2) filling and placing additional dry casks at the Prairie Island ISFSI facility.⁷ At this time, Xcel does not plan to request approval for either of these options from the 2002 Legislature.⁸

⁵ Currently, Minnesota is the only state that limits the amount of dry cask storage by statute.

⁶ The current operating license for the Monticello nuclear facility runs out in 2010, but storage space is much less of a consideration for the Monticello plant than it is for the Prairie Island facility. In 1979, the on-site storage pool at Monticello was expanded to provide additional storage, and in 1987, over 1,000 spent nuclear fuel assemblies were shipped to a storage facility in Illinois.

⁷ Re-racking is the process of replacing existing spent nuclear fuel storage racks in the pool, with racks that provide for increased storage density.

⁸ There are a few other alternatives available to Xcel to extend the forecast shutdown date of 2007, including:

- utilizing reserved indoor pool space reserved for maintenance of a full core discharge: Xcel reserves sufficient space in the indoor pool to accommodate the storage of the entire core for both Prairie Island units. This reserved storage capacity could be utilized temporarily to allow for continued operation of the reactors (may extend the shutdown date by one to two years, assuming full operation);
- consolidating spent nuclear fuel rods racked in the indoor pool: Rod consolidation is the process of removing the spent fuel rods from assemblies stored on the indoor pool rack and placing them in a canister that allows for storage of the rods with minimal spacing. Rod consolidation was studied extensively by Xcel in the late 1980s, but not implemented due to unresolved technical issues (the potential for extending the forecasted shutdown date is not known at this time); and
- reducing spent fuel discharges; in other words, manage operation of the reactors (and therefore the amount of spent nuclear fuel that is produced) so that the total storage capacity is not utilized by 2007, allowing the plant to be continue to operate.

(At a minimum, the first two alternatives would require federal NRC approval.)

A third potential option available to Xcel is a private storage facility in Utah. Xcel is a member of Private Fuel Storage (PFS), L.L.C., a consortium of eight commercial nuclear utilities proposing to establish an interim storage facility for high-level nuclear waste on 98 acres of the Skull Valley Goshute Reservation in Utah. In July 1997, PFS filed a license application for this project with the NRC. A license decision from the NRC is expected in 2002 and, if approved, PFS plans to complete construction of the facility and begin shipping nuclear waste in 2003. However, even if the NRC approves the PFS license, PFS is certain to face other legal and regulatory hurdles before spent fuel can be transported to and stored at the Utah facility. No legislative action would be necessary to implement this third option.

The Minnesota Public Utilities Commission has ordered Xcel to solicit contingent bids to replace the capacity and energy provided by the twin Prairie Island units, in the event that none of these three alternatives are realized.

Pending State Legislation

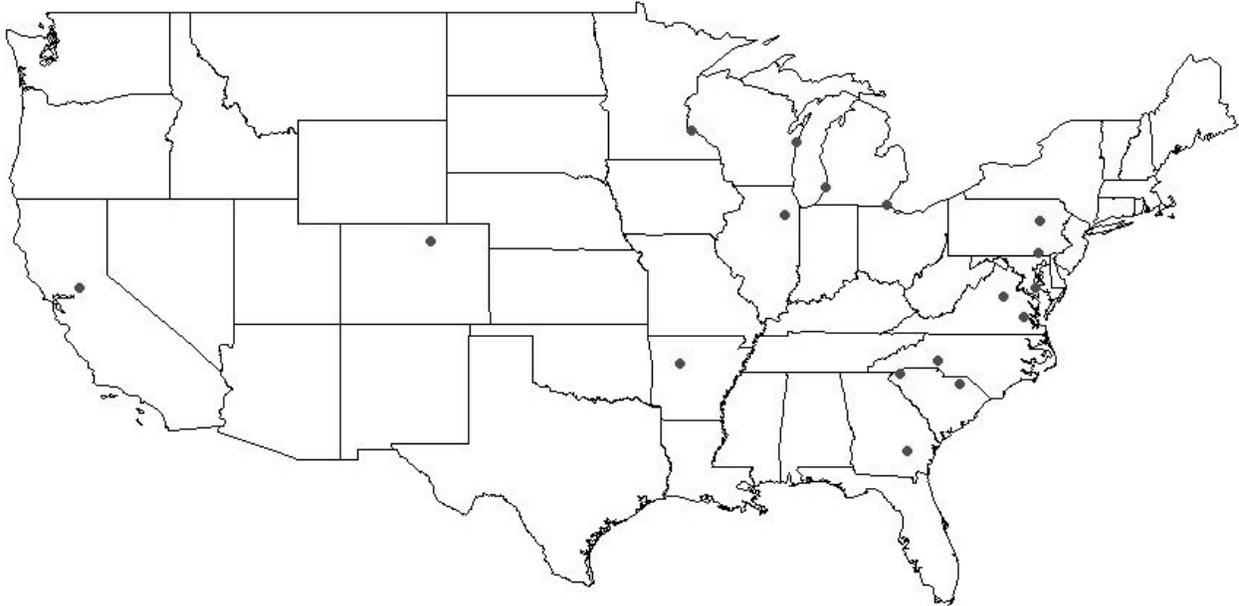
Three bills were introduced in the first year of the 2001-2002 legislative biennium. None of the three have been acted on by the Minnesota Legislature.

H.F. 2533 (Jennings). Waives state environmental and administrative review required for the continued operation and federal relicensing of Prairie Island and Monticello nuclear plants, if the requisite federal approval permits are granted. Additionally, until the end of federal licenses for Prairie Island and Monticello, on-site dry cask storage necessary for this purpose is granted. Stops requirements after the first 17 dry casks are stored for funding of alternative and renewable energy sources.

H.F. 2548 (Hausman). Repeals the currently dormant state nuclear waste council, which was created in 1985, when the state was being considered as one of the potential sites for the permanent federal repository for spent nuclear fuel. Establishes a new 12-member nuclear waste issues council to review nuclear waste issues and to develop state policy on disposal, storage, and transportation.

H.F. 2549 (Hausman). Reconfigures the currently dormant state nuclear waste council to consist of 23 members who would advise the governor and the legislature on all policy issues relating to the storage and disposal of nuclear waste. Provides for greater responsibility and more specific duties—all pertaining to nuclear waste storage disposal and transportation—than specified in [H.F. 2548](#). An additional requirement mandates that the 17 casks at Prairie Island can be safely unloaded and their contents safely transported.

Location of Nuclear Waste Sites Where Dry Cask Storage Takes Place



House Research Department

Reactor Name	City	State
Arkansas Nuclear 1 & 2	Russellville	Arkansas
Rancho Seco	Clay Station	California
Fort St. Vrain	Platteville	Colorado
Hatch 1 & 2	Baxley	Georgia
Dresden 2 & 3	Morris	Illinois
Calvert Cliffs 1 & 2	Lusby	Maryland
Palisades	South Haven	Michigan
Prairie Island	Red Wing	Minnesota
McGuire 1 & 2	Cowans Ford Dam	North Carolina
Davis-Besse	Oak Harbor	Ohio
Susquehanna	Berwick	Pennsylvania
Peach Bottom 2 & 3	Peach Bottom	Pennsylvania
Oconee 1, 2, & 3	Seneca	South Carolina
H.B. Robinson	Hartsville	South Carolina
North Anna 1 & 2	Mineral	Virginia
Surry 1 & 2	Gravel Neck	Virginia
Point Beach 1 & 2	Manitowoc	Wisconsin