Globethics Repository



Resolving the spent fuel issue for new nuclear power plants

This page was generated automatically upon download from the Globethics Repository. More information on Globethics see https://www.globethics.net. Data and content policy of Globethics Repository see https://repository.globethics.net/pages/policy.

Item Type	Article
Authors	Bosselman, Fred
Publisher	UC Berkeley School of Law
Rights	With permission of the license/copyright holder
Download date	2026-10-30 22:43:37
Link to Item	http://hdl.handle.net/20.500.12424/175859

Resolving the Spent Fuel Issue for New Nuclear Power Plants

*Fred Bosselman**

In the United States, opponents of new nuclear power plants argue that no new plants should be built until we are prepared to bury the spent fuel from power plants in a permanent storage facility.[1] In my opinion, it is unnecessary to resolve this issue before building new nuclear power plants. New plants can use dry cask storage as a safe and secure method of handling spent fuel for the next fifty years or more.[2]

When the fuel used in nuclear power plants loses enough of its potency, it must be removed from the reactor and replaced. At this stage it is referred to as "spent fuel," but it still remains highly radioactive.[3] Some components of the fuel lose almost all of their radioactivity within a matter of days, while others will remain dangerously radioactive for thousands of years.[4]

All existing commercial plants store spent fuel for at least five years in water-filled pools on the power plant site. After five years, plant operators are allowed to switch to dry cask storage in a Nuclear Regulatory Commission-approved cask located on the power plant site.[5] Dry cask storage uses concrete or steel containers to shield the surroundings from radiation. The fuel is cooled by inert gas or air.

The casks are created to resist temperature extremes, floods, tornadoes, and projectiles.[6] Because dry cask storage does not require

Copyright © 2008 by the Regents of the University of California.

* Professor of Law Emeritus, Chicago-Kent College of Law.

1. DAVID BODANSKY, NUCLEAR ENERGY: PRINCIPLES, PRACTICES AND PROSPECTS 291-332 (2d ed., 2004); *see, e.g.*, Nuclear Energy Inst., Inc. v. EPA, 373 F.3d 1251 (D.C. Cir. 2004).

2. NAT'L RESEARCH COUNCIL, SAFETY AND SECURITY OF COMMERCIAL SPENT NUCLEAR FUEL STORAGE: PUBLIC REPORT 68 (2006).

3. *See generally* DAVID BODANSKY, NUCLEAR ENERGY, PRINCIPLES, PRACTICES AND PROSPECTS 193-251 (2d ed. 2004).

4. RAYMOND L. MURRAY, NUCLEAR ENERGY: AN INTRODUCTION TO THE CONCEPTS, SYSTEMS AND APPLICATIONS OF NUCLEAR PROCESSES 28 (2000).

5. Kelley v. Nuclear Regulatory Comm'n, 42 F.3d 1501 (6th Cir. 1995).

6. *See* US Nuclear Regulatory Commission Fact Sheet, Dry Cask Storage of Spent Nuclear Fuel (2007), http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dry-cask-storage.html.

any electricity, water, or maintenance, its operating costs are much lower than for water pool storage. The dry casks do require monitoring and surveillance, but not the constant supervision and operation that water pools require.

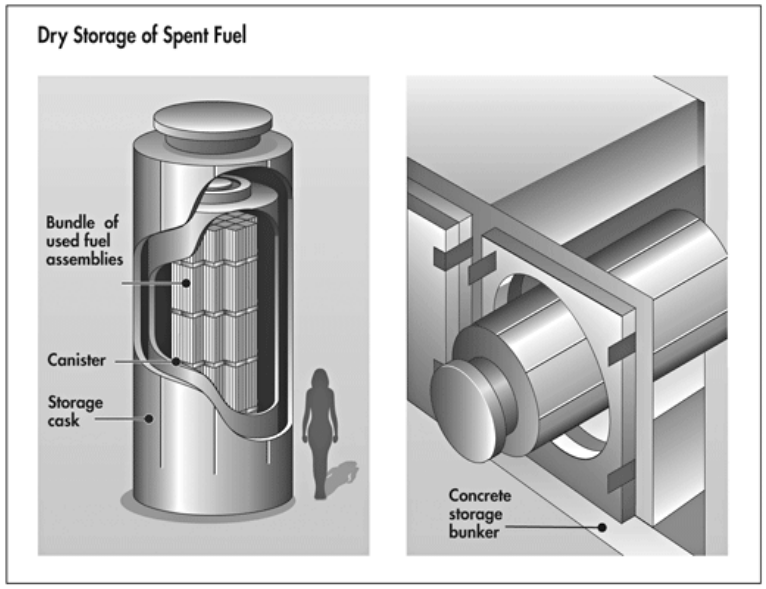


Diagram courtesy of the Nuclear Regulatory Commission

After the terrorist attacks of 2001, Congress asked the National Research Council (an arm of the National Academy of Sciences and the National Academy of Engineering) to study the safety risks associated with the continued storage of spent fuel at power plant sites. The classified report of the study was delivered to the Nuclear Regulatory Commission in 2004, and a censored version was subsequently released to the public.[7] Among the report's findings was:

> Dry cask storage for older, cooler spent fuel has two inherent advantages over pool storage: (1) It is a passive system that relies on natural air circulation for cooling; and (2) it divides the inventory of that spent fuel among a large number of discrete, robust containers. These factors make it more difficult to attack a large amount of spent fuel at one time and also reduce the consequences of such attacks.... The robust construction of these casks prevents large-scale releases of radionuclides in all of the attack scenarios examined by the committee in its classified report.[8]

7. NAT'L RESEARCH COUNCIL, SAFETY AND SECURITY OF COMMERCIAL SPENT NUCLEAR FUEL STORAGE: PUBLIC REPORT (2006).

8. *Id.* at 70. The report was critical of some existing spent fuel pool designs, but pointed out how these problems could be corrected in new plants. *See id.* at 38-59.

In a separate report, the National Research Council noted that the temporary storage of spent fuel in retrievable form would provide opportunities for re-use of the material.[9] If the longest-lived radionuclides in spent fuel were to be transmuted into short-lived nuclides, the waste "would contain only relatively short-lived fission products that would go into a repository and decay to the background level of high-grade uranium ore in about 250 years."[10]

Other scientific studies have also endorsed the safety of dry cask storage. The bipartisan National Commission on Energy Policy said that dry cask storage "is a proven, safe, inexpensive waste-sequestering technology that would be good for 100 years or more, providing an interim, back-up solution against the possibility that Yucca Mountain is further delayed or derailed—or cannot be adequately expanded before a further geologic repository can be ready."[11]

And a few months ago the InterAcademy Council, which includes our National Academy of Sciences and similar groups from other nations, also found that a consensus is beginning to emerge among experts that the objective of waste storage should shift from irretrievable storage to retrievable storage. In other words, wastes would be stored in dry casks with the expectation that they will require further handling in a few decades.[12]

The Union of Concerned Scientists also agrees that properly designed dry cask storage would be a safe option at new nuclear power plants.

> Fortunately, there is no immediate need to open a permanent repository, as interim storage of spent fuel in dry casks at reactor sites is an economically viable and secure option for at least 50 years—if such sites are hardened against attack. New reactors could build in more robust interim storage from the beginning.[13]

The "interim storage of spent fuel in hardened dry casks can be made an acceptably safe and economically viable option for at least 50 years with a

---

9. *See* NAT'L RESEARCH COUNCIL, NUCLEAR WASTES: TECHNOLOGIES FOR SEPARATIONS AND TRANSMUTATION (1995).

10. The process of transmutation differs for each of the various long-lived radionuclides. The general idea is to bombard them with high-energy neutron fluxes created either by an accelerator or a special reactor. *See* Patricia A. Baisden, *A Renaissance for Nuclear Power?*, in NAT'L RESEARCH COUNCIL, ENERGY AND TRANSPORTATION: CHALLENGES FOR THE CHEMICAL SCIENCES IN THE 21ST CENTURY 52 (National Academy Press, 2003); *see also* Daniel Westlen, *Reducing Radiotoxicity in the Long Run*, 49 PROGRESS IN NUCLEAR ENERGY 597 (2007).

11. NAT'L COMM'N ON ENERGY POLICY, ENDING THE ENERGY STALEMATE: A BIPARTISAN STRATEGY TO MEET AMERICA'S ENERGY CHALLENGES 58 (2004).

12. INTERACADEMY COUNCIL, LIGHTING THE WAY: TOWARD A SUSTAINABLE ENERGY FUTURE 88 (2007), *available at* http://www.interacademycouncil.net/?id=12161.

13. UNION OF CONCERNED SCIENTISTS, NUCLEAR POWER IN A WARMING WORLD: ASSESSING THE RISKS, ADDRESSING THE CHALLENGES 45-47 (2007).

few relatively simple modifications, such as surrounding them with an earthen berm."[14]

So why hasn't the government adopted dry cask storage as national policy? For 25 years, the State of Nevada has been fighting Congress' selection of Yucca Mountain, Nevada, as the site for permanent disposal of high-level nuclear waste.[15] Despite Nevada's objections, work has proceeded on preparation of the site, using funds paid for by the utilities that use nuclear power,[16] and the DOE currently estimates that another 23 billion dollars will be needed to open the site by the year 2017.[17] Attempts by the utilities to recover some of their costs incurred by the delay in completing Yucca Mountain have become mired in litigation.[18] Neither Nevada nor the DOE is inclined to compromise.

Congress could sidestep the impasse by designating properly designed spent fuel pools plus dry cask storage as an adequate provision for dealing with the waste disposal needs of new nuclear power plants. There is some indication that attempts might be made in 2008 to attach such provisions to pending climate change legislation in the Senate.[19] But the history of this long-running battle doesn't offer much hope that a sensible solution will be reached any time soon.

Perhaps the public would demand a rational approach if it got over the silly idea that nuclear energy was invented by mad scientists bent on world destruction. In fact, radioactive elements in the rocks of the earth have always created nuclear energy. "This naturally occurring nuclear fission is what maintains the warmth of the earth's interior, keeping the tectonic plates in motion, causing mountains to rise up, and driving a variety of other natural processes."[20] The fact that nuclear energy can cause harm should not cause us to shun it any more than lightning should cause us to shun electricity.

---

14. *Id. See also* GREENPEACE, DRY STORAGE OF SPENT NUCLEAR FUEL: THE SAFER ALTERNATIVE TO REPROCESSING (2000), *available at* http://archive.greenpeace.org/nuclear/ospar2000/html/content/ospar00/docs/reports/OSPARfairlie.pdf.

15. *See* Nuclear Waste Policy Act, Pub. L. No. 97-425, § 302, 96 Stat. 2257 (1983) (codified at 42 U.S.C. § 10222).

16. *See* Indiana Michigan Power Co. v. United States, 88 F.3d 1272 (D.C. Cir. 1996).

17. Letter from Jim Wells, Director of Natural Resources and Environment, U.S. General Accountability Office, to Rep. Jon C. Porter (Jan. 19,2007), GAO-07-297R, *available at* http://www.gao.gov/new.items/d07297r.pdf.

18. *See* Matthew L. Wald, *As Nuclear Waste Languishes, Expense to U.S. Rises*, N.Y. TIMES, Feb. 17, 2008, *available at* http://www.nytimes.com/2008/02/17/us/17nuke.html?hp; *see also* Indiana Michigan Power Co. v. United States, 422 F.3d 1369 (Fed. Cir. 2005).

19. Jenny Weil and Cathy Cash, *Nuclear Provisions in Climate Bill Rejected, But Could Return Next Year*, 29 INSIDE N.R.C (Dec. 10, 2007).

20. E.C. PIELOU, THE ENERGY OF NATURE 146 (2001).