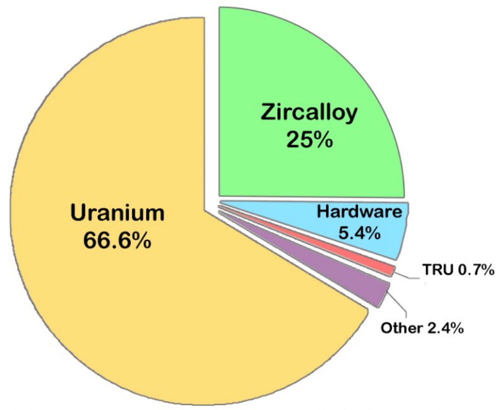
Nuclear Waste: The greatest danger is now!

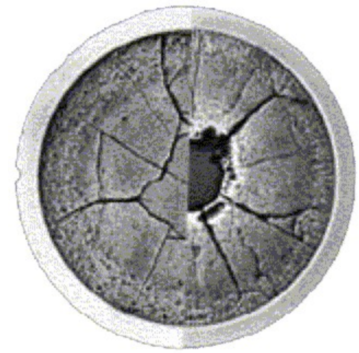
Spent fuel is hot stuff. It's thermally hot - about 400 degrees Fahrenheit. That's not residual heat from when the fuel was in the reactor, it's decay heat from fission products with short half-lives (from days or weeks to about 30 years for most isotopes of iodine, cesium, strontium, etc.).

REACTOR FUEL ASSEMBLY

There are 4,000 spent fuel assemblies at San Onofre.



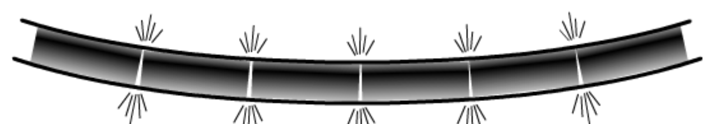
The average composition of U.S. spent fuel



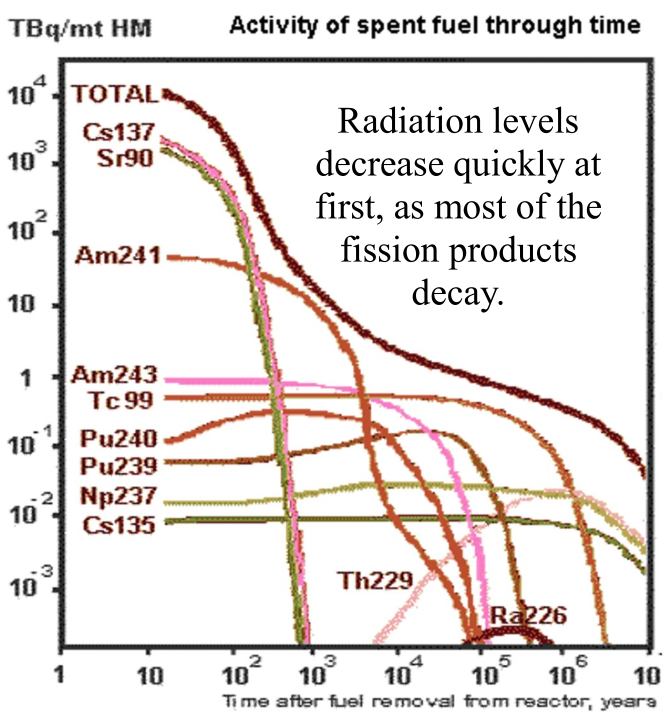
Expanded and cracked fuel pellet after being irradiated in the reactor for 3 to 5 years.

Model of one fuel pellet

Sagging tubes with fused pellets cause all the force of the pellets to be carried by the narrow areas between the pellets.

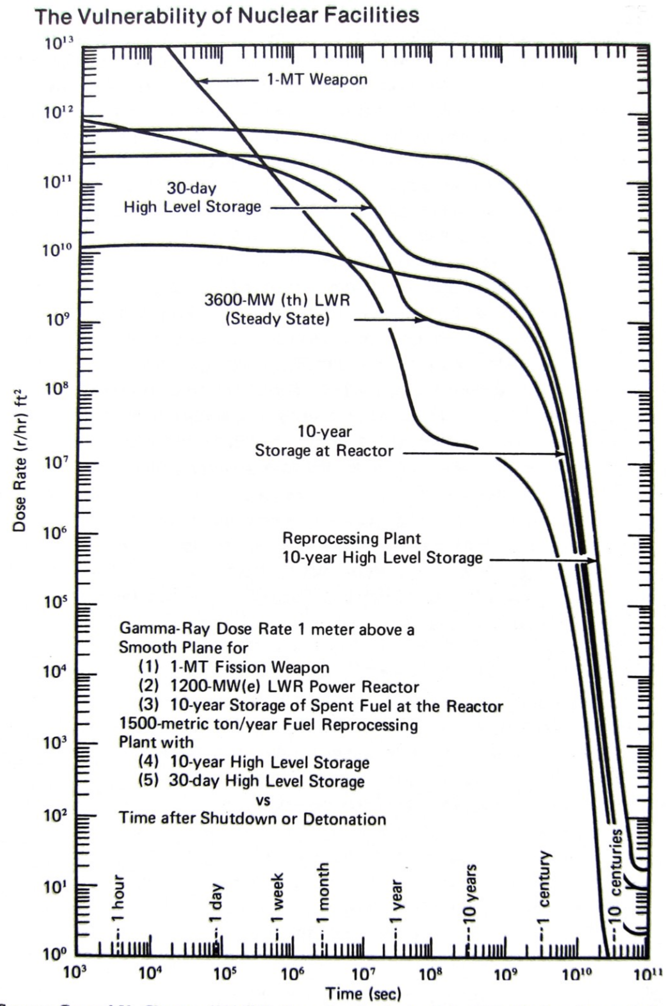


High burnup fuel is known to fuse tightly to the zirconium cladding.



San Onofre dry cask storage system

Ace Hoffman
www.acehoffman.org
(760) 720-7261



Source: Conrad V. Chester, "Civil Defense Implications of the U.S. Nuclear Power Industry During a Large Nuclear War in the Year 2000," *Nuclear Technology* 31 (December 1976):333.

Figure 2-15. Nuclear Weapon and Nuclear Facility Gamma-Ray Dose Rate versus Time after Detonation and Shutdown

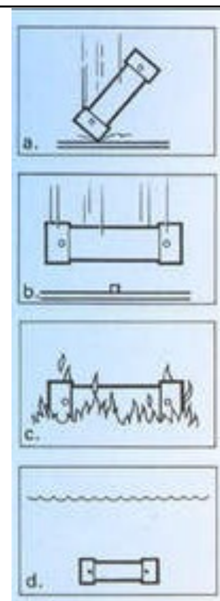
Source: Ramberg

After ~10 years, about 1% of the original amount of radioactivity that was occurring the day the fuel was removed from the reactor is still occurring.

After ~100 years, about 1/10 of the 10-year amount of radioactivity will still be occurring. The rate of decline in radioactivity has slowed considerably.

After ~1000 years, radioactivity will have dropped to about 1/10th of the 100-year amount. Most of the original fission products have decayed to stable elements, but the decline of radioactivity is no longer very rapid and the spent fuel is still very hazardous, mainly from plutonium and its daughter products.

Transport cask test event scenarios



The impact (free drop and puncture), fire, and water-immersion test are considered in sequence to determine their cumulative effects on a given package. These tests are insufficient for real world potential events during transport.

If spent fuel is transported, the transport containers are inadequate beyond design parameters. The primary issue the world should be grasping is that spent fuel is vastly more dangerous when it's first made than later -- and it's still dangerous later. So making it at all is the biggest mistake in spent fuel handling!

Half-Lives of Radionuclides in Body Organs

Radionuclide	*Radiation*	*Critical Organ*	*Half-Life* *Physical*	*Biological*	*Effective*
Iodine-131	Beta	Thyroid	8 days	138 days	7.6 days
Strontium-90	Beta	Bone	28 years	50 years	18 years
Cesium-137	Gamma	Whole body	30 years	70 days	70 days
Plutonium-239	Alpha	Bone	24,400 years	200 years	198 years
		Lung	24,400 years.	500 days	500 days

Source: U.S. Atomic Energy Commission, *The Safety of Nuclear Power Reactors and Related Facilities* WASH 1250 (Washington, D.C.: U.S. Atomic Energy Commission, July 1973), p. 4-23. Source: Ramberg