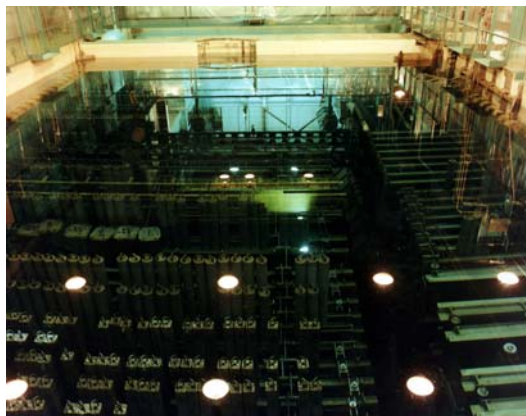


## TERRORISM AND NUCLEAR REACTORS: NUCLEAR FUEL

- Before it is used in the reactor, nuclear fuel consists of low-enriched uranium and is made up of 4-5% of the radioactive isotope uranium-235 and 95-96% of the stable isotope uranium-238.
- Fresh nuclear fuel is relatively harmless. Although concentrated exposure can lead to lung and kidney problems, fresh fuel is much less dangerous than other substances such as asbestos.
- After about three years in a reactor, nuclear fuel loses its capability to efficiently self-sustain a reaction. At this point, the “spent” nuclear fuel consists of about 94% uranium-238, 0.5% uranium-235, and 1% plutonium, a highly radioactive isotope.
- Used nuclear fuel is highly radioactive and must be very well shielded. Spent fuel removed from the reactor will administer a lethal dose of radiation to a person in fifteen to twenty seconds at a distance of a few feet.
- Some fission products take many years to decay. Cesium-137, for example, has a half-life of 30 years, meaning that half of the radioactivity will decay every thirty years.
- Spent fuel is stored near nuclear reactors in spent fuel pools, where at least 20 feet of coolant water separates spent fuel and the surface. The coolant contains neutron-absorbing boron and acts as a radiation shield.
- There are about 1.6 million pounds of spent fuel in the Salem spent fuel storage facility.
- The “cladding” around fuel rods contains zirconium. New fuel assemblies can start a zirconium fire if they are not constantly surrounded by coolant. In the event of an enormous explosion in the spent fuel facility followed by a complete loss of coolant, this zirconium fire can eject harmful radiation into the air and may create a radiological emergency of a greater magnitude than nuclear meltdown.
- During the first three days after a worst-case zirconium fire, 38,600 thousand square miles would experience an increase in cancer fatalities above one percent. Residents living within the closest 9,650 thousand square miles will experience an increase in cancer risk above 10 percent, and this risk will increase according to proximity to the radiation source.



Prepared by the Princeton University Woodrow Wilson School undergraduate task force on Nuclear Reactor Terrorism, May 2002. Prepared for the Coalition for Peace Action as part of the Princeton University Community Based Learning Initiative.



Sponsored by the Coalition for Peace Action  
40 Witherspoon Street, Princeton, New Jersey 08542-3208  
(609) 924-5022  
[www.peacecoalition.org](http://www.peacecoalition.org) [cfpa@peaccoalition.org](mailto:cfpa@peaccoalition.org)