



NUCLEAR INFORMATION AND RESOURCE SERVICE

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Dry-Store High-Level Radioactive Waste Where It Is: Moving It Now Would be a Mobile Chernobyl x 2

The Waste

High-Level is a category of radioactive waste that includes irradiated fuel rods from nuclear reactors and the liquid and solidified waste from reprocessing these rods. Uranium fuel has been used for both military (bomb making) and civilian (electric power) purposes. More than 95% of the high-level radioactive waste in the U.S. is from electric power generation.

Nuclear power reactors produce this waste at a rate of about 30,000 lbs per year. This is a relatively small mass but being deadly and laced with plutonium, the potential liability is so great that no commercial insurance is available. Now reactor owners are suing the federal government for failure to fulfill contracts that commit the federal government to taking ownership and providing for "disposal" of this waste.

Irradiated fuel rods are millions of times more radioactive than natural uranium; a single rod if not shielded will deliver a lethal radiation dose in less than a minute; dangerous levels will persist for more than a million years. The waste is also thermally hot. After removal from the reactor, heat is generated inside the rods by decay of radioactive elements called fission products. This heat cannot be turned off and initially is so hot the rods will melt unless cooled in moving liquid. This heat will dictate how this material must be handled and stored for centuries, but the radioactivity requires this waste to be isolated from our air, water, food, environment virtually forever.

The only real **solution** to the problem of lethally radioactive waste that remains a hazard for more than a million years is to stop generating more.

Safety First: HOSS it!

A big step towards containing this deadly waste is to move rods after about five years of storage in pools into dry containers. About two-thirds of the nuclear power reactor sites in the USA have initiated dry storage in large steel and concrete containers called "casks." Unfortunately reactor owners use dry storage only as an "overflow," leaving the deep pools overcrowded, filled well beyond the original design. Wet storage has many risks that dry casks do not have. Pools could drain-down if punctured or boil if coolant pumps stop; in either case, exposed fuel rods will burn and newer waste will melt. Fuel pools are not inside reactor containment structures and so are vulnerable to any disruption, while dry casks at Fukushima made it through a 9.0 quake, tsunami and loss of power without exploding, burning or cracking.

After 9-11-2001 reactor communities called for "Hardening" of On-Site Storage (HOSS) to reduce risks from bad actors and natural disasters. HOSS mandates spreading containers out (current installations resemble bowling pins), creating earthen barriers from public roads or water frontage and providing real-time monitoring of heat and radiation levels. Hundreds of grassroots organizations, many national environmental organizations, and thousands of individuals have endorsed HOSS.¹

Stop Mobile Chernobyl

The vast majority of high-level radioactive waste has never been moved and the shipment of other radioactive materials, while not safe, is also not comparable to putting tens of thousands of radioactive waste containers on to trucks, trains and barges. This will happen if Congress decides to change the law governing

this material and mandate "consolidated storage." The attractiveness of this plan is solely for the waste generators, since a federal program to move it to off-site storage would:

- 1) transfer the ownership of the waste to the taxpayer
- 2) make room on the reactor site for more waste
- 3) make reprocessing more likely
- 4) remove the reactor owners from future liability

The name "Mobile Chernobyl" is a reference to a major reactor explosion, fire, and melt-down in 1986 in Ukraine which spread radioactive fuel particles over much of the Northern Hemisphere. One of the worst-case radioactive accidents in an extended, national shipping program combines crushing forces with a flammable material, like diesel fuel. If the container were breached and then engulfed in fire, even a small portion of highly radioactive particles being carried off the accident site in a plume of smoke could result in impacts to health, environment and property like the Chernobyl reactor fire in 1986, contaminating a large area beyond the accident site with dangerous elements like plutonium and cesium.

While workers work hard to ensure safety, accidents do happen. The U.S. Department of Energy (DOE) estimated in 1994 that there would be five or six accidents involving off-accident-site contamination during the 20 years, or more, needed to move all of the nation's back-logged radioactive waste to the Southwest. DOE also said not to worry--these radiation exposures were "not significant" since it is a national program: they average any impact over the entire U.S. population and if you do that, contamination of half of Chicago just does not "show up" in the DOE assessment of risk. A consolidated storage site commits the program to shipping the waste twice if a permanent isolation program is also pursued, as it should be.

The good news is that 21st Century electric power generation from wind, sun, waves, and geothermal does not use fuel, and so does not make waste.

Fukushima Freeways are Not the Answer

Significant radiological impact from a full-scale waste shipping campaign does not even require an accident. A perfect, undamaged transport cask does not have enough shielding to prevent penetrating radiation (gamma and X-ray) from escaping the walls of the container. The "allowable" limit is equivalent to two (old, non-digital) chest X-rays or about 20 milli



Radioactive waste rail shipping container (small). Reactor in background

rads/hour at six feet away. An unrelated traffic tie-up could place a waste container in traffic for hours. Cars could stay in the adjacent lanes within that six-foot area for hours. We may receive a benefit from a medical X-ray that our doctor recommends and that we agree to; being "zapped" by radiation penetrating a waste cask confers no benefit and carries possible health consequences including cancer.

The State of Nevada was targeted for the nation's waste in the 1980's. It refused and created a very helpful **archive** of information on this waste and on its transport in particular:

<http://www.state.nv.us/nucwaste/>

Keep Waste Where It Is For Now: Stop Mobile Chernobyl

Reactor sites are not qualified for permanent storage of high-level waste, but the "temporary" options are the same technology--dry cask storage. One of the biggest reasons to keep waste at the reactor site for now is to keep waste generators "in the conversation" until we have a scientifically sound plan and site for permanent disposition of this most deadly of wastes.

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ⁱ link to Principles for Safeguarding Nuclear Waste at Reactor Sites:
<http://www.nirs.org/radwaste/policy/hossprinciples3232010.pdf>