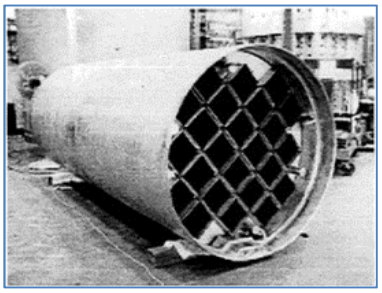
Other nations use safer thick-wall metal casks

Safety Features	Thin-wall canisters	Thick-wall casks
1. Thick walls	1/2” to 5/8”	**10” to 19.75”**
2. Won’t crack, maintainable		✓
3. Ability to inspect (inside & outside)		✓
4. Ability to repair, replace seals		✓
5. Early warning monitor to prevent leaks		✓
6. Continuous radiation monitoring		✓
7. ASME container certification		✓
8. Defense in depth (redundancy)		✓
9. Stored in concrete building		✓
10. Gamma & neutron protection	need cask/overpack with air vents	✓
11. Transportable	need cask; NRC regs. req. no cracks	✓
12. Proven technology	cannot inspect for cracks.	✓
13. Market leader	U.S.	**World**



Thick casks in buildings for security & environmental protection

Japan – thick-wall casks in building at Fukushima

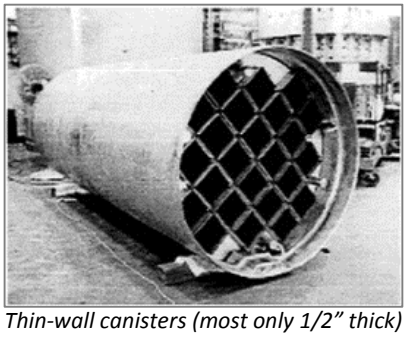
Survived 2011 Great Earthquake and tsunami

Germany – thick-wall casks in building at Gorleben

Stored for over 40 years without major problems

COMMERCIAL NUCLEAR WASTE STORAGE AND TRANSPORT PROBLEMS AND SOLUTIONS

EXECUTIVE SUMMARY



Thin-wall canisters (most only 1/2" thick) cannot be inspected inside or outside.

STORAGE PROBLEMS: Nuclear fuel waste is unsafely stored, maintained and monitored at most U.S. nuclear power facilities, with no adequate plan for cracking, leaking dry storage canisters and no adequate funding. Thin-wall canisters cannot be inspected, repaired, maintained or monitored to prevent leaks – *Basic requirements we expect in a car*. Instead, proposed Department of Energy (DOE) and private company interim storage plans ignore these problems and assume nothing will go wrong. Nuclear Regulatory Commission (NRC) management approves these inferior dry storage systems by ignoring their own safety regulations. The NRC states the Koeberg nuclear plant in South Africa had a comparable container (a tank) crack and leak in only 17 years. The cracks were deeper than the thickness of most thin-wall canisters.

TRANSPORT PROBLEMS: Transport of uninspected thin-wall nuclear waste canisters and high burnup nuclear fuel waste is unsafe, yet the NRC approves this by ignoring their own regulations. Proposed DOE and private company interim storage plans assume nothing will go wrong when transporting and storing these aging canisters. They have no adequate plan for radioactive leaks in transport or storage.

SHIMKUS BILL 3053 PROBLEMS: The Shimkus bill H.R. 3053 will make these problems worse. This inadequately funded bill ignores the thin-wall nuclear fuel waste canister storage and transport problems, eliminates storage and transport safety requirements, eliminates oversight and transparency, and overrules (preempts) existing federal, state and local water and air rights and other rights. It allows on-site transfer of utility liability to the DOE. This bill is a major threat to our safety, economy, security and democracy.

CONSEQUENCES: Each canister contains as much lethal highly radioactive Cesium-137 and other radionuclides as was released in the Chernobyl nuclear disaster. A failure of only one "Chernobyl canister" could result in permanent evacuation of our communities, permanent contamination of major food and water supplies, destabilization of the U.S. economy, increased security risks, major health and economic consequences to families, farmers, ranchers and other businesses, and permanent genetic damage affecting future generations of people and other living creatures on land and sea.

SOLUTIONS: Oppose Shimkus bill H.R. 3053. Instead, expedite storage of spent nuclear fuel from inferior thin-wall canisters to thick-wall transportable cask systems, similar to those used in Germany, Japan and most other countries. Existing sites should be assessed for environmental and other risks to determine if fuel needs to be relocated to a different location on-site or to a nearby location without those risks, such as another operating nuclear reactor facility. Transport is a major risk factor, so transport risks should be minimized. States should be given authority to raise minimum safety nuclear waste safety standards and to regulate nuclear waste stored and transported in their states. Adequate funding is needed for these efforts.

REFERENCES

H.R.3053 - Nuclear Waste Policy Amendments Act of 2017 *https://www.congress.gov/bill/115th-congress/house-bill/3053*
U.S. Nuclear Waste Policy Act of 1982 (NWPA) *https://www.epw.senate.gov/nwpa82.pdf*
Dry Storage Inventory by State *https://sanonofresafety.files.wordpress.com/2015/10/d32-caskinventorybystate2017-05-18.pdf*

Technical references available at *SanOnofreSafety.org*

Donna Gilmore *SanOnofreSafety.org* August 24, 2017

COMMERCIAL NUCLEAR WASTE STORAGE AND TRANSPORT PROBLEMS AND SOLUTIONS

STORAGE PROBLEMS

1. Most U.S. nuclear plants store spent nuclear fuel waste in thin walled (1/2" to 5/8" thick) welded shut stainless steel canisters (304/304L or 316/316L SS).
2. Thin-wall canisters may prematurely crack and have radioactive leaks due to atmospheric and other corrosion factors and U.S. utilities have no adequate plan to deal with this.
3. Thin wall canisters cannot be inspected for interior or exterior cracks, and cannot be repaired, maintained or monitored to **prevent** leaks, yet the NRC continues to approve them.
4. High burnup fuel used by reactors can cause fuel cladding to become damaged after dry storage.
5. The fuel and other contents (e.g., fuel baskets) in thin-wall canisters cannot be inspected.
6. If any of the over 2000 U.S. thin wall canisters have cracks, detection occurs after they leak. The NRC only requires quarterly radiation level testing and assumes nothing will go wrong.
7. Holtec President states a microscopic through-wall crack will release millions of curies of radionuclides into the air and it's not feasible to repair cracks even if you could find them.
8. Thin-wall canisters have no early warning monitoring system to prevent leaks, no continuous radiation monitoring system and no defense in depth.
9. Most utilities plan to destroy spent fuel pools after decommissioning. However, the only method utilities currently have to replace containers is to unload fuel into a spent fuel pool. A dry fuel handling facility (hot cell) may be needed due to the explosive nature of high burnup fuel rods or to avoid damaging fuel. However, none exist at utilities and none in the U.S. are large enough.
10. There are no adequate emergency plans; entire cities and surrounding areas may be uninhabitable.

TRANSPORT PROBLEMS

1. Canisters with even partial cracks are not safe for transport. NRC Regulation 10 CFR § 71.85.
2. High burnup fuel can become damaged after dry storage and in transport, with no way to inspect for damage in thin-wall welded canisters.
3. A transport accident can result in a criticality, making communities permanent exclusion zones.
4. Transporting high burnup fuel in thin-wall canisters via trains has not been determined safe. NRC is uncertain if train vibrations will cause the fuel cladding to fail in transit.
5. Our nation's crumbling infrastructure and system of highways, roads, and bridges is rated a D+, according to the American Society of Civil Engineers. And less than 1% of rails are inspected (FRA).
6. There is no adequate emergency plan. A truck or railway accident or terrorist attack involving transported nuclear waste would render entire cities and surrounding areas uninhabitable.

SHIMKUS BILL H.R. 3053 PROBLEMS

1. Eliminates nuclear safety storage and transport requirements needed to prevent leaks.
2. Eliminates requirements to evaluate transport issues before building a site.
3. Eliminates state, local and public oversite, input, and transparency of waste storage facilities.
4. Eliminates (preempts) federal, state and local clean water and air rights, and other rights.
5. Eliminates site specific environment review.
6. Eliminates the ability of States and local governments to use money received for hosting sites to challenge issues with the interim storage facilities.
7. Eliminates congressional and other oversight of DOE nuclear waste storage and transport.
8. Distributes already inadequate Nuclear Waste Funds without first analyzing and resolving transport, storage, and site specific environmental risks.
9. Remove utilities' liability by transferring licenses to the federal government without addressing critical dry storage and transport safety issues and costs. License can be transferred at existing site.

COMMERCIAL NUCLEAR WASTE STORAGE AND TRANSPORT PROBLEMS AND SOLUTIONS

SOLUTIONS

- **Require all nuclear waste storage systems be transportable and designed to be inspected, maintained and monitored to PREVENT radioactive leaks (*they currently are not*).**

1. Require transportable storage casks with proven ability to inspect (inside and outside the cask), repair, maintain and monitor to PREVENT leaks. Use materials that do not crack, designed for longer life, and have multiple redundancies to prevent radioactive releases.
2. Most of the rest of the world uses thick-wall metal casks that meet these requirements. Thick-wall casks survived the Great Earthquake and tsunami in Japan. Germany, France, Australia, Belgium, Italy, Switzerland, Russia, South Africa and most other countries use thick-wall metal casks.
    a. Thick-wall metal transportable storage casks are 10" to almost 20" thick, with two bolted lids and double metal seals in each lid for redundancies. Thick wall transportable storage casks are directly transportable and can be inspected inside and have continuous pressure monitoring to prevent radioactive leaks. *Thin-wall canisters are welded shut and cannot be inspected inside or out, and must be loaded into a reusable transport cask for transport.*
    b. Thick-wall transportable storage casks are proven technology for over 40 years. Most U.S. thin-wall canisters have been in use about 10 years or less and cannot be inspected, so are unproven technology. Utilities purchased them based on cost, not lifespan and safety.
3. Thick wall storage casks are designed for a longer life span. Thin-wall stainless steel canisters are vulnerable to short term cracks. Once a crack starts in a thin-wall canister, cracks continue to grow through the wall of the canister. The NRC states it can take 16 years for cracks to grow through the wall. Holtec canister vendor states even a microscopic through-wall crack will release millions of curies of radionuclides and cracks are not feasible to repair even if you could find them.
4. Require continuous remote early warning monitoring systems to **prevent** radioactive leaks.
5. Require ability to inspect and retrieve spent fuel assemblies without destroying the container. *Each thin-wall canister system cost about $4 million (includes materials and labor).*
6. Require an on-site replacement and repair plan.
7. Keep the spent fuel pools until all nuclear waste is removed from the site.
8. Evaluate need to build a dry fuel handling facility (hot cell), if returning fuel from dry to wet storage might cause an explosive reaction or damage the fuel.

- **Increase protection from environmental and security risks BEFORE the canisters leak**

1. Store casks in hardened reinforced buildings for additional environmental and security protection.
2. Require utilities fund state and local emergency planning, and on-line continuous radiation monitoring until all waste is removed from site. Provide on-line public access to this information.

- **Improve safety of existing dry storage nuclear fuel waste BEFORE the canisters leak**

1. Expedite removal of fuel from thin-wall canisters to safer thick-wall casks, before these "Chernobyl canisters" leak and potentially explode.
2. For high risk sites, relocate waste to a safer site, while minimizing transport and environment risks (e. g., relocate from areas with high risk of flooding, coastal corrosion, or coastal erosion). Do not relocate waste for the purpose of consolidating waste. This is an unnecessary transport risk.
3. Permit states to regulate and oversee nuclear waste storage and transport, and allow them to set higher nuclear waste standards. It's time to end federal preemption of states' rights for nuclear waste stored in their states.
4. Allocate funding to address these urgent nuclear waste storage and transport issues.