November 19, 2018

TO: Nuclear Regulatory Commission
WCS_CISF_EIS@nrc.gov

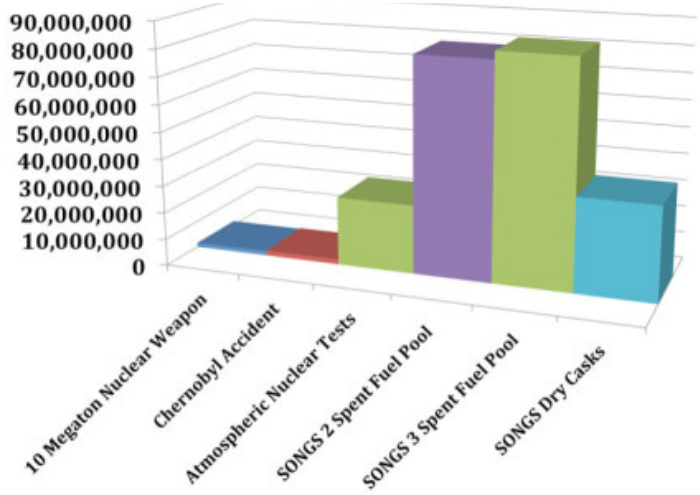
NRC Commissioners

FR: Donna Gilmore, SanOnofeSafety.org
donnagilmore@gmail.com

RE: **Docket NRC-2016-0231, Interim Storage Partners LLC's Consolidated Interim Storage Facility (WCS) Comments from Donna Gilmore**

The proposed Texas Interim Storage Partners LLC's Consolidated Interim Storage Facility (ISP-CIS) is not a safe or feasible design. This facility must be rejected. The environmental consequences are significant nationwide. The facility does not meet 1982 Nuclear Waste Policy Act (NWPA) safety and environmental requirements. It does not meet Nuclear Waste Technical Review Board (NWTRB) critical safety recommendations to Congress that **spent nuclear fuel and its containment must be monitored, maintained and retrievable in a manner to prevent hydrogen gas explosions in both short and long-term storage and transport.** Instead, it relies on weakened enforcement and exemptions of NRC regulations, including exemptions from ASME standards. This facility can jeopardize our national security and represents a major health, environmental, financial, energy and safety risk to Texas as well as the rest of the country. It does not protect the people nor the environment.

Curies of Cesium-137. R.Alvarez, June 25, 2013



It does not solve our short-term nuclear waste storage problems. It makes the problems worse.

Another solution exists that can meet safety requirements. See **Alternative Recommendation** Section.

It's not acceptable to kick these canisters down the road. We are at the end of the road. Please do the right thing before it is too late. If enough NRC engineers speak out and tell the truth to the public and tell the truth to those in power, there may be a chance to save our country from multiple nuclear disasters that will likely occur before any canisters can be moved.

The ISP-CIS plan reads like a Catch-22. Its plan is to return cracking or leaking thin-wall canisters (most only 1/2" to 5/8" thick) back to sender. Neither the proposed ISP-CIS facility nor the sender has a plan in place to deal with leaking or cracking canisters. Leaking and cracking canisters are not approved for transport. There is no plan in place to prevent or stop cracks and leaks, repair cracks, or maintain and monitor the fuel and its containment in order to prevent leaks, explosions or criticalities. The assumption nothing will go wrong during dry storage is false and unprofessional. It is a plan to fail.

Each spent nuclear fuel canister contains roughly a 1986 Chernobyl nuclear disaster. There are more than 2400 "Chernobyl cans" stored in the U.S. and more being added every year. Transporting these "Chernobyl cans" across the country to Texas or elsewhere will no more solve our nuclear waste storage problem than rearranging the chairs on the Titanic would have stopped it from sinking. This plan will only make the current nuclear waste storage problems worse. There is a better solution.

See Spent Nuclear Fuel Fact Sheet
https://sanonofresafety.files.wordpress.com/2018/07/spentnuclearfuelfactsheet-short2018-07-11.pdf

Details

The President of Holtec, Kris Singh, admits thin-wall stainless steel canisters cannot be inspected for cracks or depth of cracks. He admits even a microscopic through-wall crack will release millions of curies of radionuclides into the environment. He also states it is not practical even if you could find the cracks or a way to repair them, to repair them, which they cannot. It will only introduce another area for cracking.

> Kris Singh statement at Southern California Edison Community Engagement Panel meeting, October 14, 2014 https://youtu.be/euaFZt0YPi4
>
> Kris Singh statement transcript
> https://sanonofresafety.files.wordpress.com/2015/09/attachment-14-declaration-of-donna-gilmore.pdf

The NRC has approved license amendments for Calvert Cliffs (in Maryland) and other Areva NUHOMS canister systems to no longer require reporting peak radiation levels at the outlet air vents – this is where radiation levels will be highest from through wall cracks. It appears the NRC and nuclear industry plan is hide radioactive leaks. What other reason is there for weakening radiation monitoring and reporting requirements? Current requirements are only for once every three months. Wasn't that bad enough?

NRC NUREG-1927 (Rev. 1) aging management requires canisters with 75% through-wall cracks to be taken out of service. ISP has no plan in place to do that. It plans no hot cell or spent fuel pool to replace canisters. There are no other options to replace failing canisters. Partially cracked canisters have no seismic rating, yet this issue is not resolved.

NUREG-1927 only requires one canister at a facility be "inspected", starting after 20 years. Even that has been watered down by allow a partial inspection with a camera. A camera is not adequate to find microscopic cracks nor measure them. Eddy current is a tool for measuring crack length, not find cracks, and has other limitations. The NRC and ISP need to reveal this information to the public and others. It's time to stop the false promises of future technology solutions.

The NRC and nuclear industry have had over 27 years to develop and implement inspection and repair technologies for these thin-wall canisters filled with spent nuclear fuel, yet still do not have either one.

At the October 11, 2018 NRC Commissioner briefing, an NRC employee admitted to the Commissioners they currently are still trying to figure out how to identify surface defects and how to characterize them in the canisters. Commissioner David A. Wright asked NRC engineer, Christian Araguas, the status of industry efforts to find a way to repair, mitigate and inspect [the outside] of these canisters. Araguas said "**I think** we have confidence in the industry and the direction they're going to be able to **inspect these in the future**." After over 27 years of trying and pouring millions of dollars and precious scientific resources down this dead end, it's unclear why anyone would have confidence in the ability to inspect, let alone repair these thin-wall canisters. There was no response on the repair portion of Commissioner Wright's question.

> NRC Meeting Transcript: Strategic Programmatic Overview of the Decommissioning and low-level waste and spent fuel storage and transport Business Lines, October 11, 2018
> https://www.nrc.gov/docs/ML1829/ML18295A698.pdf

The NRC approves elimination of pools once all fuel is in dry storage — eliminating the only method to replace cracking canisters. How does the NRC expect canisters can be inspected, repaired or replaced in order to meet transport and NRC CIS storage requirements?

Instead of approving this flawed facility, the NRC must require nuclear waste containers that are not vulnerable to these cracking risks and that can be inspected (inside and out), maintained, repaired and monitored to prevent leaks and explosions.

If fresh water enters the canisters through cracks, canisters can go critical, says the NRC. Boron is not credited in dry storage or transport to protect against a criticality. It's only credited when loading from pool to dry storage. The NRC admits to this in this RAI exchange between Holtec and the NRC. This applies to all thin-wall canisters, not just Holtec canisters.

> Holtec Response to NRC First Request for Additional Information (RAI) for HI-STORM UMAX Canister Storage System (TAC No. L24664), https://www.nrc.gov/docs/ML1303/ML13032A008.pdf

The following summarizes limitations of inspection methods for vessels and pipes. These methods cannot be used with thin-wall canisters filled with spent nuclear fuel.

> "…Leak detection is not a reliable indicator of CLSCC [chloride stress corrosion cracking] because cracks are highly branched and may be filled with corrosion products. Nevertheless, it is recommended that where pipework or vessels develop leaks in service, they should always be investigated for possible CLSCC by NDE [non-destructive examinations] or by in-situ metallography.
>
> CLSCC can generate very large cracks in structures where, as in the case of reactors, the residual stress from welding dominates and operational stresses are low by comparison. If undetected by NDE, the large cracks might introduce failure modes with consequences that were not anticipated by the original design, e.g. complete separation of attachments, toppling of tall columns under wind loading or collapse of long pipe runs due to self-weight.
>
> The simplest and most effective NDE technique for detecting CLSCC is dye penetrant testing.
>
> Eddy Current Testing (ECT) is effective with purpose-designed probes that have been calibrated on known defects. ECT was found to be ineffective on the samples from the reactor due to limited penetration of the current and sensitivity to surface imperfections that could not be distinguished from cracking. Crack sizing by eddy current testing may be limited and is not possible by penetrant testing.
>
> Ultrasonic flaw detection can be applied as a manual or an automated NDE technique for detecting CLSCC. For structures with complex design features and welds as on the reactors, the trials indicated that ultrasonic testing would require a range of probes, several complimentary scans and be very time consuming. Ultrasonic flaw detection did not cover all design details and possible crack position orientations found on the reactor, and crack sizing was difficult."
>
> Chloride stress corrosion cracking in austenitic stainless steel, Assessing susceptibility and structural integrity, UK, prepared by the Health and Safety Laboratory for the Health and Safety Executive, 2011, R Parrott, et. al., SK17 9JN. http://www.hse.gov.uk/research/rrpdf/rr902.pdf

Calvert Cliffs has some of the oldest thin-wall canisters (up to 25 years old). They received an NRC license renewal for 40 years in spite of the inability to effectively perform aging management. The ISFSI site license renewal allows them to continue using inferior thin-wall storage systems with vague statements like the one below from the Calvert Cliffs NRC License Renewal Certificate (ML14274A030). They do not

mention that adequate inspection and repair technology for thin-wall canisters loaded with fuel does not exist. They do not require that technology be available that can thoroughly inspect for cracks, depth of cracks, and repair and maintain these canisters. They do not require the interior of the canisters to be inspected. They only need to inspect external surfaces using "proven technology reasonably available," which is vague and clearly inadequate, as indicated below:

> *The licensee shall perform inspections of DSC [dry storage canister] external surfaces using proven technology **reasonably available** at the time the inspection is conducted which is **capable of meeting the physical access and environmental constraints** of the HSM (concrete overpack) interior.* Calvert Cliffs License Renewal Certificate, October 23, 2014 https://www.nrc.gov/docs/ML1427/ML14274A030.pdf

Why is the NRC Calvert Cliffs license renewal webpage still empty of documents after all these years? Were you trying to hide the above and other information? See following webpage for Calvert Cliffs renewal documents. https://sanonofresafety.org/calvert-cliffs-nuclear-power-plant/

Note in particular the Requests for Additional Information (RAI) documents. These reveal safety concerns from NRC engineers. Their efforts to identify the serious safety problems is admirable. Unfortunately, it appears their concerns were ignored, since the license approval of these inferior thin-wall canister systems did not address their concerns.

The NRC does not require inspection of the contents of the canister, even though both fuel assemblies and fuel assembly baskets can degrade during dry storage, based on operating experience and experiments. At Fukushima, the thick-wall casks survived the tsunami and great earthquake of 2011. These thick-wall casks were inspected inside. They found the aluminum baskets will likely last only 60 years, so they discontinued future use of them. The NRC has yet to address this issue and continues to approve new thin-wall canisters with aluminum alloy baskets, which is the current standard for thin-wall canister baskets. The NRC has been aware of this issue for years. What is the status? This is very relevant to this ISP-CIS facility, since these will be aging baskets with no method to inspect them. Baskets are needed to prevent criticalities.

Storing cracking or leaking hot canisters in a sealed thick-wall cask overpack is not an NRC approved option for leaking or cracking canisters. A thermal analysis would likely show, as it has in the past, these hot canisters, that currently require convection air cooling, cannot be stored in sealed thick-wall cask overpacks without overheating. Please provide evidence where a thermal analysis has been done and approved by the NRC to store hot thin-wall canisters in thick wall cask overpacks. It needs to also address high burnup fuel.

Canisters are vulnerable to short-term cracks and leaks from various environmental causes, such as highly corrosive chlorides found in marine environments, and in Potash (Potassium Chloride) found in the Southwest. The air vents in the thin-wall canister overpacks allow corrosive particles, rain and flood waters to access and corrode the exterior of the thin-wall canisters. The canisters are never cleaned.

None of the thin-wall canisters, once loaded with lethal spent nuclear fuel can be inspected for cracks nor depth of cracks. To claim thin-wall canisters are "proven" technology that will not crack and leak for 40 years (after the initial 20-year license) is not based on credible scientific evidence. There is evidence to support these thin-wall canister issues will not be solved and much evidence to support we need proven thick-wall cask systems to manage this lethal spent nuclear fuel.

The May 2018 Nuclear Waste Technical Review Board (NWTRB) report on Geological Repositories admits required technology needed to monitor and maintain the spent nuclear fuel does not exist – even for short-term geological repository storage. They need long-term research to try to solve these issues. However, after all the decades of research around the world, the inability to solve this does not give substantiated hope this problem will be solved. Therefore, the NRC needs to evaluate this plan for an indefinite period of time, not just 40 years, and not turn the Texas site into another leaking nuclear waste dump. This plan must be based on more than unsubstantiated hope and not risk probabilities based on overly optimistic and uninformed SWAG's, which is now the case.

> Geologic Repositories: Performance Monitoring and Retrievability of Emplaced High-Level Radioactive Waste and Spent Nuclear Fuel (May 2018) http://www.nwtrb.gov/our-work/reports/geologic-repositories-performance-monitoring-and-retrievability-of-emplaced-high-level-radioactive-waste-and-spent-nuclear-fuel

Risking transport across the entire country on rail systems that were not designed for these loads and that have not been evaluated is a plan for failure. The 1982 NWPA requires analyzing transport risks before selecting a location. Why is the NRC ignoring this critical common-sense safety requirement?

Thin-wall canisters do not meet common-sense safety requirements we expect in a car: ability to inspect, maintain, monitor, repair and replace parts to prevent major failure. There is no effective early warning system to **prevent** radioactive leaks, explosions or criticalities. The thin-wall canisters are a bad design.

Thin-wall canister systems are pressure vessels, yet do not meet ASME pressure vessel codes, such as pressure monitors and pressure relief valves. The NWTRB December 2017 report recommends pressure monitoring and pressure relief valves, so containers do not over pressurize and explode. Thick-wall casks can meet ASME and international manufacturing standards. Instead, the NRC gives numerous exemptions from ASME to the thin-wall canister designs. Three Mile Island has some thin-wall canisters with pressure monitor and relief valves. However, the NRC does not require these for thin-wall canister designs. This an example of weak NRC safety enforcement standards.

> Management and Disposal of US Department of Energy Spent Nuclear Fuel, Report to the United States Congress and the Secretary of Energy, Nuclear Waste Technical Review Board (NWTRB), December 2017. http://www.nwtrb.gov/docs/default-source/reports/nwtrb-mngmntanddisposal-dec2017-508a.pdf?sfvrsn=12

The NRC staff has limited resources and so does the public. Instead of wasting resources trying to put lipstick on this pig, resources should be redirected to solve the current "interim" nuclear waste storage problem at existing sites around the country. We are running out of time before these canisters start leaking, exploding or going critical.

Exposure to air can causes the zirconium, uranium and aluminum hydrides in the canisters to trigger explosions at any temperature. This is of particular concern with moderate and high burnup fuels.

Unborated water entering through cracks will cause criticalities. The boron metal in the thin-wall canisters is only credited while the fuel is being loaded into the canister from the borated pool. Many of the approved technical specifications and safety evaluations do not make this point clear. The NRC approves these canisters with the assumption there will never be through-wall cracks. See additional details below.

Alternative Recommendations

Until the NRC embraces and enforce higher standards, such as those recommended by the Nuclear Waste Technical Review Board (NWTRB) in their December 2017 report to Congress and the safety requirements in the 1982 Nuclear Waste Policy Act (NWPA), and ASME (American Society of Mechanical Engineers), they are putting us all at high risk. Superior proven solutions are available for "interim" storage that do not require consolidation of nuclear waste nor major transport risks. This requires proven thick-wall metal transportable storage cask systems, currently available worldwide and used at a few locations in the U.S. The NRC should stop approving exemptions to safety regulations and stop weakening enforcement of safety regulations. The NRC has kicked these cans down the road. They are reaching the end of the road. The last thing we need to do is transport and store cracking canisters.

Thick-wall casks are 10" to 19.75" thick (mainly carbon steel or ductile cast iron).

Thick-wall casks survived the 2011 Fukushima tsunami and earthquake and have been used throughout the world for over 40 years.

Reasons to buy thick nuclear waste dry storage casks

Safety Features	Thin Canisters	Thick Casks
1. Thick walls	1/2" to 5/8"	up to 20"
2. Won't crack		√
3. Ability to repair		√
4. Ability to inspect exterior		√
5. Early warning monitor		√
6. ASME canister or cask quality certification		√
7. Defense in depth (redundant systems)		√
8. Stored in concrete building		√
9. Licensed in U.S.	*	*
10. Market leader	U.S.	World

Thick-wall casks can meet requirements for ability to inspect, monitor, maintain and retrieve both the fuel and its containment in a manner to prevent hydrogen gas explosions as recommended by the Nuclear Waste Technical Review Board December 2017 report to Congress, and as required for the DOE in the NWPA.

Once fuel assemblies are inspected and loaded into thick-wall casks, the casks should be located out of flood zones and out of high-risk coastal zones. Casks should be transported minimal distances to minimize significant risks, as stated in the NWPA.

Casks should be stored in reinforced buildings for additional environmental and security protection. On-site support systems must be in place to maintain, repair, monitor and retrieve the fuel and its containment. This may require a large hot cell (dry fuel handling facility). A spent fuel pool may be acceptable for lower burnup and cooler fuel, but repeated drying can damage the fuel. The German model of storing and maintaining spent nuclear fuel should be evaluated and used as a benchmark for any other thick-wall cask systems considered. It has many safety features, including defense in depth features, that are non-existed in current U.S. thin-wall dry storage systems and in some thick-wall casks systems.

There are no other proven options available in the world marketplace. We need to dig ourselves out of the hole we are in before it's too late. Transporting thin-wall canisters to will not solve our nuclear waste storage problems. It will only make the problems worse. There is no viable permanent solution. Resources should be redirected requiring and implementing the best available waste storage technology. Instead, valuable technical resources are being wasting trying to make a bad design work. You cannot put lipstick on these pigs.

Additional Details

- **Storing cracking or leaking canisters in overpacks (such a thick-wall transport casks) will not work and is not approve by the NRC.** Thin-wall canisters require convection air cooling so they do not overheat. The NRC has not approved a transport or other thick-wall cask overpack for storage of these thin-wall canisters (leaking or not). The only thin-wall canisters approved for storage in a thick-wall cask are at Humboldt Bay. Those canisters are low burnup fuel that had cooled for decades in the pool. This is not the heat or radioactive profile of the canisters planned for transport and storage.

- **NRC's assumptions that nothing can go wrong in dry storage has been disproven by the NRC's own evidence.** Please include Comments in ML16082A004 as comments for this Docket. ML16082A004 *Sierra Club comments to NRC proposed rule for regulatory improvements for decommissioning power reactors*, Docket NRC-2015-0070, March 2016 http://www.nrc.gov/docs/ML1608/ML16082A004.pdf.

Below are a few examples that disprove NRC assumptions nothing can go wrong once fuel is in dry storage. Additional details and references for this and other relevant issues at https://sanonofresafety.org/holtec-hi-storm-umax-nuclear-waste-dry-storage-system/

- **Holtec loaded over half the Diablo Canyon canisters incorrectly over three loading periods**. The NRC said this could never happen. The NRC approved an exemption, so PG&E was not required to unload the canisters. However, that doesn't change the fact that this is a false assumption on the NRC's part. And PG&E cannot unload those canisters back into the pool, due to "reflooding problems", even though this is a requirement of their license.

Loading the fuel incorrectly allowed PG&E to load hotter fuel in each canister. However, their license required them to load the cooler fuel in the outer cells in order to prevent damage the fuel assemblies. No one has any idea if the fuel has become damaged. Canisters cannot be opened at the site. Even if they could unweld them it would destroy the over $1 million-dollar canisters. Thin-wall canisters are not designed for retrieval or maintenance of spent nuclear fuel assemblies and their containment.

- **Holtec delivered defectively designed canisters (with defective basket shims) to San Onofre and elsewhere.** Four canisters were loaded and stored in San Onofre Holtec UMAX storage holes before a loose bolt (pin) was found at the bottom of the fifth canister. Holtec had not inspected near the bottom inside of the canisters (as required by the license after delivery before loading). **Southern California Edison said they have no method to unload the defective canisters, even though that is a requirement of their license (condition 8).**

- **Holtec has been using this defective basket shim design since 2016. Dresden, Grand Gulf, Hatch, Vermont Yankee, Columbia, Watts Bar and Callaway are using these canisters.** Vermont Yankee had

already loaded 30 canisters when they were notified of the problem, with 15 more remaining to load.

- **These examples provide evidence of significant problems with design and quality control in the oversight, design, manufacture, transport, installation and management of the spent fuel dry storage systems.** It also shows poor project management of the licensees.

- **See Loose Holtec Bolts NRC email correspondence with Donna Gilmore, March 27, 2018**
https://sanonofresafety.files.wordpress.com/2018/06/looseholtecboltsnrc-davidmcintyre-donnagilmoreemails2018-003-27.pdf

- **Existing spent nuclear fuel dry storage facilities cannot unload thin-wall canisters, even when this is a requirement of their NRC license**. The thin-wall canisters are being loaded with hotter fuel and no thin-wall welded canister has ever been unloaded once stored on-site, due to "reflooding" issues.

- **The only other option to transfer fuel to another dry storage container is a large hot cell (dry fuel handling facility filled with an inert gas so there are no explosions), but none are available in the country large enough to do this.** Southern California Edison nor any other facility has a hot cell on-site, and the last hot cell large enough in the country, the Idaho Test Area North hot cell, was destroyed in 2007. Viability of Existing INL Facilities for Dry Storage Cask Handling, USDOE Report, INL/EXT-13-29035, April 2013 https://inldigitallibrary.inl.gov/sites/sti/sti/5680934.pdf

  Tom Palmisano, San Onofre Chief Nuclear Officer, admitted they have no ability to unload canisters back into the spent fuel pool (in spite of this being a requirement of their license and of all other facilities that have pools and dry storage). He stated it's a "reflooding" problem the nuclear industry has not solved and they've known this for decades. Promises they can figure this out in a few years ring hollow, given they've had decades to address this.

  > Edison video of March 22, 2018 Community Engagement Panel meeting.
  > https://youtu.be/mjgna2atn7Y

  Tom Palmisano stated he is aware of only one dry storage container that has been returned to spent fuel pools. This was in 2010 with a Peach Bottom TN-68 thick-wall cask design. Unlike hot thin-wall welded canister systems, this thick-wall cask has a bolted lid, designed to be opened without destroying the container. It had much cooler fuel than what is typical in the U.S. for thin-wall canister storage. It did not contain high burnup fuel and had cooled for decades. The cask contained low burnup fuel (under 30 GWd/MTU). It had then cooled for a decade in dry storage. Where is the operating or other evidence from the NRC or others that this is even possible with thin-wall canisters filled with hot nuclear fuel.

  > Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3 Renewed Facility Operating License Nos. DPR-44 and DPR-56, NRC Docket Nos. 50-277, 50-278 and 72-29 (ISFSI), Submittal of Independent Spent Fuel Storage Installation (ISFSI) Cask Event Report, December 01, 2010, Exelon
  > https://www.nrc.gov/docs/ML1100/ML110060275.pdf and
  >
  > Fuel Summary for Peach Bottom Unit 1 High Temperature Gas-Cooled Reactor Cores 1 and 2, INEEL/EXT-03-00103, K. I. Kingrey, April 2003
  > https://inldigitallibrary.inl.gov/sites/sti/sti/2699826.pdf

The Peach Bottom cask, rather than being stored in a building for additional environmental and security protect, as is done in other countries, had a bolted on carbon steel protective cover. Moisture collected under the cover creating galvanic corrosion, prematurely degrading a seal. Peach Bottom should store their thick casks in buildings. The Peach Bottom cask continuous pressure monitoring system worked, so the system worked as designed for maintenance. With thin-wall canisters, there is no pressure monitoring system. We will only know after canisters leak, explode or go critical.

Peach Bottom Atomic Power Station - NRC ISFSI Inspection Report 05000277 1201 00 1 0, July 8,2011 https://www.nrc.gov/docs/ML1118/ML111890441.pdf and

NRC Information Notice 2013-07: Premature Degradation of Spent Fuel Storage Cask Structures and Components from Environmental Moisture, April 16, 2013
https://www.nrc.gov/docs/ML1232/ML12320A697.pdf

- **Please include the following documents as comments and references to this Docket.**

Evidence for high burnup embrittlement (failure risks) in both storage and transport:

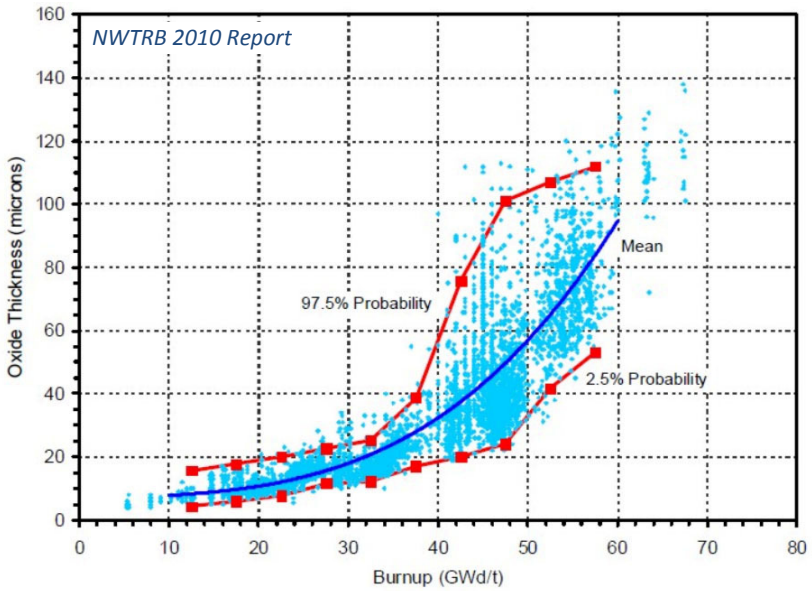
Comment (1) of Donna Gilmore on NUREG/CR 2214 Managing Aging Processes in Storage (MAPS Report), 12/26/2017
https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML17363A207

Evidence for criticality and short-term cracking and leaking risks with no system in place to prevent or stop this:

Comment (2) of Donna Gilmore of San Onofre Safety Regarding NUREG/CR-2214, "Managing Aging Processes in Storage (MAPS Report), 12/26/2017
https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML17363A209

NRC NUREG-2224 High Burnup Storage and Transport Comments, September 24, 2018
https://sanonofresafety.files.wordpress.com/2018/09/nureg-2224donnagilmorecomments2018-09-24.pdf

High and moderate burnup fuel increases risks in storage and transport. Data from over 4400 commercial fuel rods around the world were plotted to determine at what burnup level the fuel becomes damaged. This operating experience data shows indicators for damage for both moderate and high burnup fuel. It shows Zirconium fuel cladding oxide thickness, an indicator for damage and hydride build up at about 35 GWd/MTU. Higher damage means it's more likely to be unstable in storage and transport. This operating data is being ignored by the NRC and the nuclear industry. Why?



Aging canisters are at high risk. Some of the "Chernobyl cans" at Calvert Cliffs in Maryland are already 25 years old, yet none have been inspected for cracks or depth of cracks. Some of the Areva NUHOMS San Onofre canisters in Southern California are already 15 years old. The majority of the spent nuclear fuel in the U.S. is stored in unproven aging thin-wall canisters. Consequences can impact military bases, food supplies, aquifers, fertilizer, major energy supplies, financial systems, and our health and wellbeing.

> U.S Dry Cask Inventory, Sorted by State (2 pages)
> https://sanonofresafety.files.wordpress.com/2018/07/d32-caskinventorybystate2018-07-14a.pdf

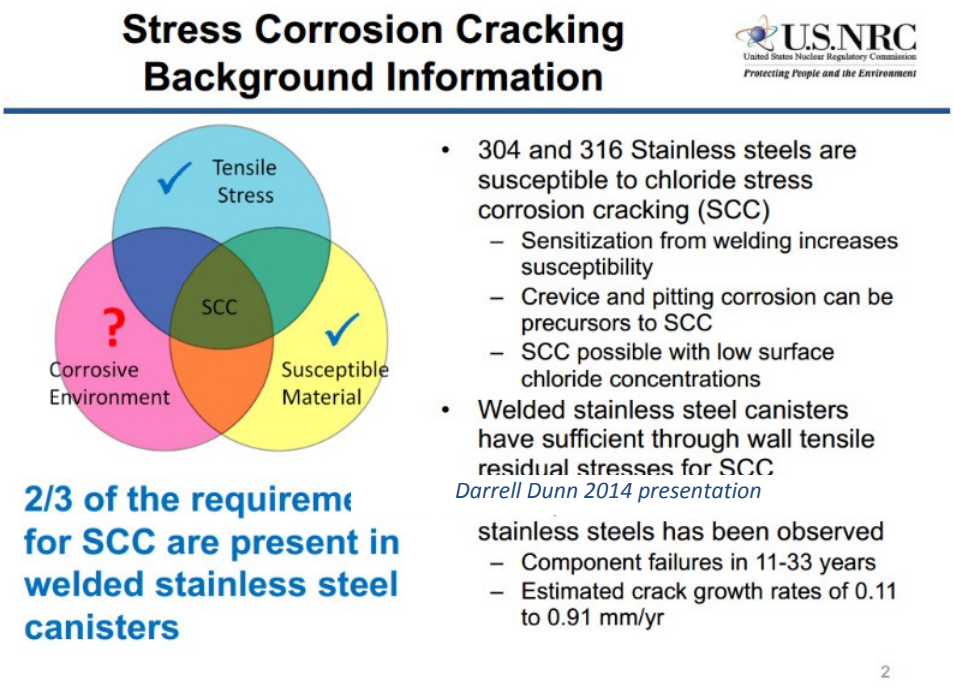
The NRC admits once a crack starts in a thin-wall canister, it can grow through the wall in 16 years.

> Summary of August 5, 2014, Public Meeting with the Nuclear Energy Institute on Chloride Induced Stress Corrosion Cracking Regulatory Issue Resolution Protocol, September 9, 2014
> https://www.nrc.gov/docs/ML1425/ML14258A081.pdf

In 2014, the NRC assumed it would be 30 years before a canister surface would be cool enough for moist salt air to dissolve on a canister – one of the major triggers for stress corrosion cracking. Subsequently, the temperature was verified on a few canisters around the country. A two-year old Holtec Diablo Canyon canister containing 32 spent nuclear fuel assemblies, with high burnup fuel, was found to have a low enough temperature for salts (also found on the canister) to deliquesce (dissolve) on the canister.

> Diablo Canyon: Conditions for stress corrosion cracking in 2 years, October 23, 2014
> https://sanonofresafety.files.wordpress.com/2011/11/diablocanyonscc-2014-10-23.pdf

NRC material engineer, Darrell Dunn, admitted the corrosive environment was the only remaining condition needed for these canisters to start cracking. The conditions exist. We only have promises of future solutions. The nuclear industry has had over 27 years to solve this problem. It's time to based decisions on facts, not nuclear industry promises of future solutions. It's time to replace these canisters with thick-wall casks before one or more of the aging Chernobyl disaster canisters explodes or goes critical from through-wall cracks.



> Chloride-Induced Stress Corrosion Cracking Tests and Example Aging Management Program presentation, Darrell S. Dunn, August 5, 2014 https://www.nrc.gov/docs/ML1425/ML14258A082.pdf

The NRC states not enough humidity at San Onofre for corrosion. The NRC needs to stop being an enabler of inferior technology. NRC claims, such as Darrell Dunn's claim that there is not enough humidity at San Onofre for corrosion is ludicrous. He does this by ignoring conditions of frequent fog, on-shore winds and surf.

NRC says not enough humidity at San Onofre for corrosion. Ignores frequent fog, on-shore winds and surf

The Electric Power Research Institute (EPRI) wrote reports ignoring these same conditions, and cherry-picked other data to reach their conclusions, ignoring Diablo Canyon and Koeberg tank data showing short-term crack and leak risks.

Critique of EPRI Flaw Growth and Flaw Tolerance Assessment for Dry Cask Storage Canisters, D. Gilmore, May 17, 2015
https://sanonofresafety.files.wordpress.com/2013/06/epri-critiqueandkoebergplant2015-05-17.pdf

Recommendations

- Reject this ISP-CIS Facility. It's a failed design that doesn't meet basic critical safety requirements.

- Require the environmental scope be nationwide because there is a significant risk aging thin-wall "Chernobyl disaster canisters" will leak and explode in the short-term. They have considerable unresolved vulnerabilities and do not meet basic safety requirements as defined in the 1982 Nuclear Waste Policy Act and as recommended by the Nuclear Waste Technical Review Board.

- Require spent nuclear fuel and its containment must be monitored, maintained and retrievable in manner to prevent hydrogen gas explosions in both short and long-term storage and transport. That is not being done today and cannot be done with the proposed ISP-CIS Facility. Stop approving exemptions and weakening enforcement of NRC regulations and NWPA safety and environmental requirements.

- Require transfer of fuel to thick-wall transportable storage casks that meet NWPA and NWTRB requirements. Then move casks out of high risk flood and coastal zones to the nearest safest location on higher ground. Store in reinforced buildings for additional security and environmental protection. There are no other options. Time is of the essence. The problem is now. The entire country is at risk.

- Read Short Spent Nuclear Fuel Fact Sheet, July 11, 2018
https://sanonofresafety.files.wordpress.com/2018/07/spentnuclearfuelfactsheet-short2018-07-11.pdf

- Admit these thin-wall canister storage systems are lemons and should be recalled, not transported and consolidated. How many canisters are cracking? How deep are the cracks? You don't know.

- Require continuous radiation monitoring with public access. The NRC won't provide radiation levels for existing canisters at the outlet or inlet air vents, so we have no idea if any are leaking. Some older

Areva NUHOMS canisters at San Onofre have readings over 2000 Counts Per Minute (CPM). Why won't the NRC tell us why? The public doesn't know. Why?

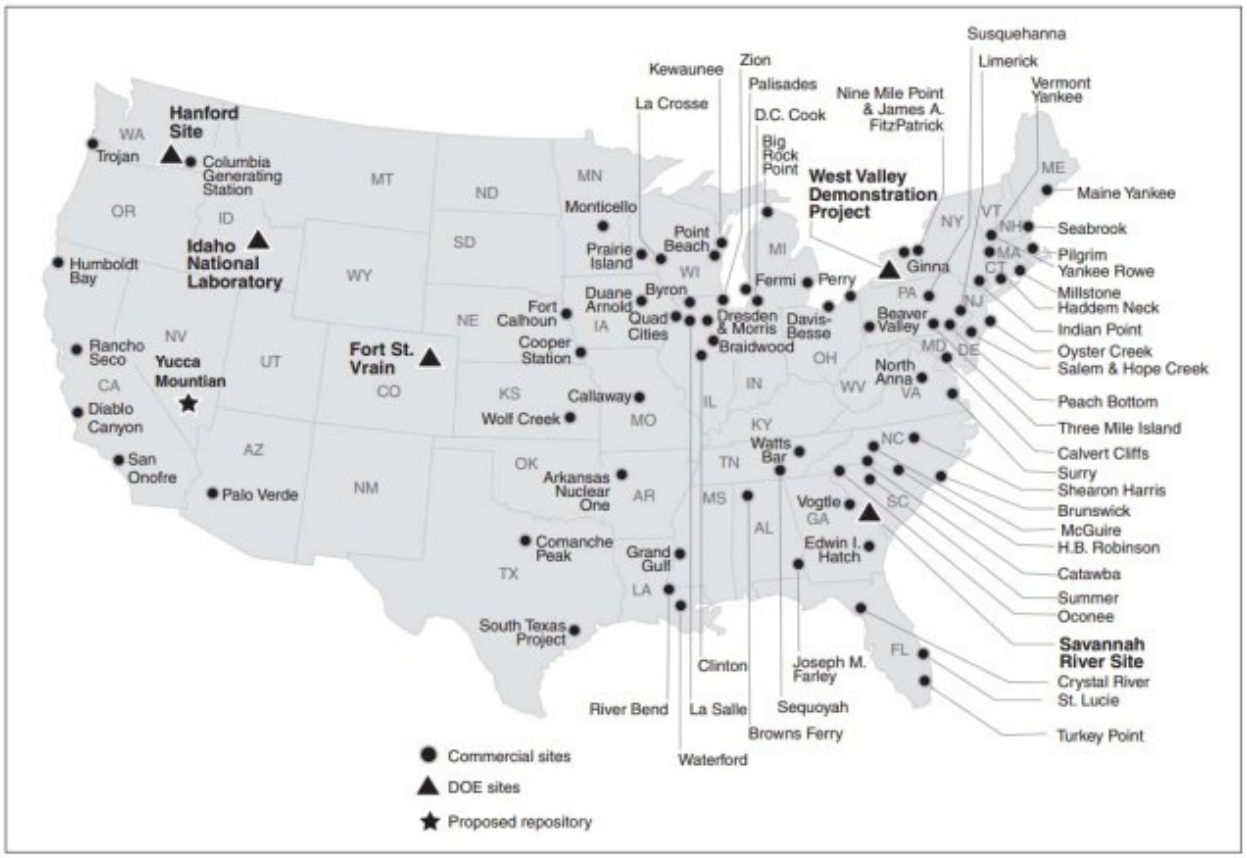
- Instead of wasting NRC resources on this unsafe ISP-CIS facility, a higher priority should be revoking the permit for the Holtec HI-STORM UMAX system at San Onofre and thin-wall canister systems elsewhere.

  The NRC admitted the San Onofre Holtec loading system causes every canister to be damaged with walls bumping and scraping against a steel guide ring as they are lowered below the guide ring in each hole (vault). The NRC admits with the small (1/2") clearance it is not possible to avoid this. As of today, 29 canisters are loaded in the San Onofre UMAX holes. Hotter canisters have faster crack growth rate, so we're on borrowed time. This should be a national emergency, yet the NRC claims this is not an "urgent problem", based on no evidence. See details of this issue at:

  San Onofre defective Holtec nuclear waste storage system is a lemon and must be recalled, November 8, 2018
  https://sanonofresafety.org/2018/11/08/san-onofre-defective-holtec-nuclear-waste-storage-system-must-be-recalled/

For more information contact Donna Gilmore at 949-204-7794 or donnagilmore@gmail.com or visit SanOnofreSafety.org. Thank you for the opportunity to provide comments and recommendations.

Figure 1: Current Storage Sites and Proposed Repository for High-Level Nuclear Waste



Source: DOE.

Note: Locations are approximate. DOE has reported that it is responsible for managing nuclear waste at 121 sites in 39 states, but DOE officials told us that several sites have only research reactors that generate small amounts of waste that will be consolidated at the Idaho National Laboratory for packaging prior to disposal.