

# PUBLIC SUBMISSION

<b>As of:</b> 6/6/18 8:52 AM
<b>Received:</b> June 05, 2018
<b>Status:</b> Pending_Post
<b>Tracking No.</b> 1k2-93jz-zskt
<b>Comments Due:</b> June 05, 2018
<b>Submission Type:</b> Web

**Docket:** NRC-2018-0017  
Storing Spent Nuclear Fuel Waste

**Comment On:** NRC-2018-0017-0003  
Requirements for the Indefinite Storage of Spent Nuclear Fuel

**Document:** NRC-2018-0017-DRAFT-0068  
Comment on FR Doc # 2018-05776

---

## Submitter Information

**Name:** Tami Thatcher  
**Address:**  
10217 S. 5th W.  
Idaho Falls, ID, 83404  
**Email:** tzt@srv.net

---

## General Comment

The petition to the Nuclear Regulatory Commission points out important flaws in current NRC regulations, part 72 of title 10 of the Code of Federal Regulations (10 CFR), regarding spent nuclear fuel (SNF) stored in independent spent fuel storage installations (ISFSIs) at nuclear power stations. The NRC's 10 CFR part 72 regulations that define requirements for ISFSIs was based on the best case hoped for scenario that a permanent repository would open in 1998 as promised by the Department of Energy. The NRC regulations did not anticipate that a permanent repository would not be available at all or in the best case, perhaps a hundred years later than expected. And even when the NRC suggested that its dry storage might last for 300 years, they had no technical basis to validate that assertion.

The NRC underguesstimated how rapidly the spent nuclear fuel canisters could fail due to stress corrosion cracking, particularly in a salt air environment. The NRC's inadequate technical basis resulted in inadequate regulations that put the public and the environment at

risk. The NRC allowed dry storage of spent nuclear fuel near to salt air and high likelihood of coastal flooding.

The NRC not only must revise its current 10 CFR part 72 regulations, it needs to stop placing the health of the nuclear industry and utility profits ahead of the health of humans and the planet. If the NRC cared about human health, it would have conducted meaningful epidemiology near nuclear facilities; it would pay attention to the serious shortcomings of current radiation protection standards, and it would require adequate monitoring of radionuclide emissions.

The NRC regulations, coupled with inadequate state radionuclide monitoring programs, are already affecting our health. The continued inadequate NRC regulations are unacceptable. At the very least, the NRC should revise 10 CRF 72 to provide for assurance that canisters used for spent nuclear fuel dry storage will not be leaking radionuclides to the air long before the fuel is shipped to another location.

---

## **Attachments**

CommentNRC-2018-0017

## **Public Comment Regarding US Nuclear Regulatory Commission “Requirements for the Indefinite Storage of Spent Nuclear Fuel, Docket NRC-2018-0017-0003**

Comment submitted by Tami Thatcher, Idaho Falls, ID

The petition to the Nuclear Regulatory Commission points out important flaws in current NRC regulations, part 72 of title 10 of the *Code of Federal Regulations* (10 CFR), regarding spent nuclear fuel (SNF) stored in independent spent fuel storage installations (ISFSIs) at nuclear power stations. The NRC's 10 CFR part 72 regulations that define requirements for ISFSIs was based on the best case hoped for scenario that a permanent repository would open in 1998 as promised by the Department of Energy. The NRC regulations did not anticipate that a permanent repository would not be available at all or in the best case, perhaps a hundred years later than expected. And even when the NRC suggested that its dry storage might last for 300 years, they had no technical basis to validate that assertion.

The NRC underguesstimated how rapidly the spent nuclear fuel canisters could fail due to stress corrosion cracking, particularly in a salt air environment. The NRC's inadequate technical basis resulted in inadequate regulations that put the public and the environment at risk. The NRC allowed dry storage of spent nuclear fuel near to salt air and high likelihood of coastal flooding.

The NRC not only must revise its current 10 CFR part 72 regulations, it needs to stop placing the health of the nuclear industry and utility profits ahead of the health of humans and the planet. If the NRC cared about human health, it would have conducted meaningful epidemiology near nuclear facilities; it would pay attention to the serious shortcomings of current radiation protection standards, and it would require adequate monitoring of radionuclide emissions.

The NRC approved thin walled canister designs without studying their susceptibility to stress corrosion cracking. Studies for chloride-induced stress corrosion cracking in the thin-walled canisters are now being studied, years after spent fuel has been put into the NRC licensed canisters for dry storage. For spent nuclear fuel storage near the ocean coast, all three criteria are met for localized corrosion to create a through-wall crack, and over time frames shorter than the time that the spent nuclear fuel will be in dry storage. I worked at a Department of Energy nuclear facility that unexpectedly discovered stress corrosion cracking in safety class stainless steel piping that occurred simply because of check valves allowing in some groundwater that had not been demineralized.

The NRC ensures that safety is continually shortchanged in order to save utilities money. I knew that the NRC's regulation of operating reactor safety, high burnup fuel and of spent nuclear fuel safety were inadequate. **Why did I expect that the NRC's regulation of dry storage of spent nuclear fuel would be any different?**

In order for stress corrosion cracking to occur, three conditions must be met: (1) a sufficiently aggressive chemical environment, (2) the metal is susceptible to SCC, and (3) sufficient tensile stress must be present. A published in 2016 found that all three conditions are present for at least some of the spent nuclear fuel dry storage sites.<sup>1</sup>

The NRC had hoped that the fuel would only be in dry storage for 20 years. If the NRC is not to blame for being overly optimistic that the Department of Energy would provide a permanent disposal facility for the spent nuclear fuel by 1998, the NRC is to blame for not evaluating the susceptibility of the canisters to cracking, the vulnerability of citing the dry storage near the ocean coastline, or the effect of high burnup spent nuclear fuel on required cooling times and on transportation.

While the storage of spent nuclear fuel in densely packed fuel pools is very unsafe and a seismic event or other accident can release a catastrophic amount of airborne radioactive emissions causing permanent de-population of vast areas of land, all within NRC's regulations and deemed of little significance, the storage of spent nuclear fuel in thin walled canisters susceptible to through wall cracking so that fission products are released to the air is also licensed by the NRC.

The NRC licensed thin walled dry storage canisters for spent nuclear fuel that are susceptible to through wall cracking. There is no method of inspection to determine partially through wall cracking. It is only by the release of fission products that the canister will be discovered to have a through wall crack. The NRC's solution to this problem is to allow the utilities such as San Onofre to monitor only the incoming air and not the air exiting areas where the canisters are stored.

The NRC licensed thin walled stainless steel dry storage canisters knowing that there was no approved method for repairing the canister or replacing the canister. Even if a fuel pool were required to be available (and there is no requirement for a pool to remain available), it may not be known whether fuel could be safely extracted from the canister.<sup>2 3 4 5</sup>

---

<sup>1</sup> D. G. Enos and C. R. Bryan, Sandia National Laboratories, "Final Report: Characterization of Canister Mockup Weld Residual Stresses," SAND2016-12375R, November 22, 2016. <http://prod.sandia.gov/techlib/access-control.cgi/2016/1612375r.pdf>

<sup>2</sup> See the petition Ray Lutz, Citizens' Oversight, PRM-72-8, Position White Paper by Citizens' Oversight, "A New Strategy: Storing Spent Nuclear Fuel Waste," January 2, 2018.

<sup>3</sup> See this power point presentation by Erica Gray: <https://www.nrc.gov/public-involve/conference-symposia/dsfm/2015/dsfm-2015-erica-gray.pdf>

<sup>4</sup> See Donna Gilmore on thin walled canister versus thick walled canisters used in other countries at <https://sanonofresafety.org/>

<sup>5</sup> More nuclear "qwap" about canisters near the coastline <https://documents.coastal.ca.gov/reports/2017/10/w9a/w9a-10-2017-corresp.pdf>

So, the NRC created regulations for dry storage in the U.S. without adequate technical basis for understanding the susceptibility of the canisters to through wall cracking. Furthermore, it created regulations that made no provision for detecting the growth of cracks, preventing crack growth, repair cracks, or replacing canisters.

And the NRC did this all while other countries (Germany, France, Japan and others) had decided to use thick walled cast iron canisters that can be repaired if cracks develop.

Despite any appearance of progress toward a repository or consolidated interim storage, there are numerous ways that removal of spent nuclear fuel may continue to be delayed: failure to grant a license for permanent storage, delayed licensing, construction delays, lack of funding, delays in licensing or procuring transportation overpacks, or an accident that causes an interruption in shipping. Needed roads and railways don't necessarily connect the utility to the highway or railway or may be inadequate for the heavy loads.

Yet, the NRC wrote regulations based on optimism that a repository would be available in 1998. The NRC wrote regulations with an emphasis on not cutting into utility profits because utilities were having to pay for dry storage. The NRC ignored the lack of technical basis for concluding that the canister integrity would be assured. The NRC continues to put utility profit-making ahead of protection of the public and ahead of the costs that will be paid by rate payers and tax payers for this huge mess of unsafe dry storage canisters.

### **A Bit of Background on Other NRC Debacles:**

#### **Yucca Mountain Repository**

There is considerable lack of understanding by the public about the longevity and toxicity of long-lived radiative waste. It is not like natural uranium and thorium bound up in rock. The longevity and toxicity of radionuclides that dominant repository contamination migration studies include, for example, chlorine-36 (301,000 year), iodine-129 (17,000,000 year), technetium-99 (213,000 year), uranium-234 (245,500 year), neptunium-237 (2,144,000 year), americium-241 (432 year but decays to Np-237), plutonium-238 (87.7 year but decays to U-234), plutonium-239 (24,000 year but decays to U-235). We are not talking about a mere 150,000 years of radiotoxic material. The 10,000 year timeframe once proposed for Yucca Mountain was never adequate. And, even the one million year analysis timeframe for the waste migration may not be sufficient. The stable end product for uranium, thorium and plutonium is lead which is not good to have in your water either.

The Yucca Mountain repository is destined to fail because the geology of the porous mountain located above groundwater does not isolate the spent nuclear fuel which is not protected from corrosion. The low radiation doses from ingestion of contaminants from the proposed Yucca Mountain repository rely on titanium drip shields which have not been designed nor has the method for their installation been developed. It may be impossible to robotically install the relied

upon titanium drip shields in the dusty, collapsing tunnels after a few centuries of cooling the SNF. Any realistic assessment of the likelihood of failure to install the titanium drip shields or failure of their adequate performance has not been included by the NRC's optimistic study of contaminant migration from Yucca Mountain. The NRC was supposed to review the Department of Energy's Yucca Mountain submittal, but ended up preparing the cornerstone estimate of the repository's estimated radionuclide releases. [? Ref here)

The geology of Yucca Mountain does not prevent corrosion of the SNF or its containers and does not prevent the migration of radionuclides into nearby watersheds. Arguments that migration of the contaminants from the repository will be acceptably low hinge on the assumed protection of 1,500 5-ton titanium drip shields to be robotically installed after the waste is in place.<sup>6 7 8 9</sup>

---

<sup>6</sup> State of Nevada, Office of the Governor, Agency for Nuclear Projects, "Report and Recommendations of the Nevada Commission on Nuclear Projects." December 10, 2010.

<https://www.leg.state.nv.us/Division/Research/Library/Documents/ReportsToLeg/2010/61-10.pdf>

Excerpt: "For example, the current license application includes covering all the waste canisters with 11,500 titanium drip shields to protect them from rock fall and highly corrosive groundwater. But the drip shields themselves (estimate to cost \$12 billion or more) are only proposed to be installed 80 to 100 years after the waste is put into the mountain, using yet-to-be developed robotics due to the extreme thermal and radiological environment that would exist within the emplacement tunnels. Despite this, potentially disqualifying conditions were revealed at the site (i.e., fast groundwater pathways, unacceptably high level potential for escaping radioactive gasses, recent volcanism, high levels of seismicity, etc.). To get around this, DOE petitioned Congress to exempt the site from health and safety regulations and then scrapped its own site evaluation guidelines altogether."

Another excerpt: "It posits the existence of titanium alloy 'drip shields', one 5-ton drip shield over each of the 11,500 waste packages, to ward off the corrosion-promoting water. However, these extremely expensive drip shields are not part of the current waste installation plan, but are intended to be installed by a yet-to-be-designed, remote-controlled robotic mechanism about one hundred years after the wastes have been emplaced."

<sup>7</sup> The Department of Energy was planning to use a consent-based approach for siting spent nuclear fuel and high-level waste storage and disposal facilities including: (1) a pilot interim storage facility, (2) consolidated interim storage facilities, and (3) permanent geologic disposal facilities, one for commercial spent nuclear fuel and the other for defense spent nuclear fuel and high-level waste.

A consent-based approach was recommended in the 2012 Blue Ribbon Commission report on the nation's problem of spent nuclear fuel disposal, but no one knows what a consent-based approach entails. What we do know that even with local support, state opposition effectively stymied efforts to obtain authorization to construct the geologic waste disposal at Yucca Mountain at Nevada and prevented a proposed interim storage site at Skull Valley, Utah. The DOE held meetings in 2016 around the country seeking public input on the consent-based process, including one in Boise, Idaho. The Department of Energy successfully disposed of the consent-based approach and the public comments collected following the appointment of Rick Perry as the Secretary of Energy in 2017.

The majority of the spent nuclear fuel is from commercial electricity generation from US nuclear power plants. As of 2013, there was 70,000 metric tons heavy metal, enough for the stymied Yucca Mountain repository. The inventory is expected to roughly double as the existing fleet of US nuclear reactors operates for its expected life. Utilities are winning billions in compensation from the DOE over the continuing costs of storing the spent nuclear fuel because of the DOE's failure to provide a disposal facility.

The rest of the spent nuclear fuel is from DOE research and defense reactors, including nuclear submarines and carriers. The DOE's high-level waste is in various forms ranging from liquid waste at Hanford awaiting vitrification, highly soluble powder-like calcine at Idaho and vitrified waste as other sites.

<sup>8</sup> Before ending the consent-based siting effort, information found about the Department of Energy's consent-based siting at [www.energy.gov/consentbasedsiting](http://www.energy.gov/consentbasedsiting) and its Integrated Waste Management and Consent-based Siting booklet at <http://energy.gov/ne/downloads/integrated-waste-management-and-consent-based-siting-booklet>

<sup>9</sup> State of Nevada's website reflecting its opposition to Yucca Mountain, see <http://www.state.nv.us/nucwaste/>

(Footnotes continued) <sup>10 11 12 13</sup>

If interim parking lot spent nuclear fuel sites are opened, it seems unlikely that this waste will ever be transported again. Thus, any interim sites will become “permanent” or will be begging for a geologic repository to open in their state after the canisters begin leaking.

### **US Drinking Water Already Filling With Radionuclides**

In many communities, our air and drinking water already has unexplained elevated levels of radionuclide contaminants from nuclear reactors, nuclear fuel cycle facilities, Department of Energy facilities, mining and milling of uranium, and so forth. In my community, these are long-lived radionuclide contaminants that have already been added to the environment. The continuing loading of air and water with contaminants is also not being factored in to the technically invalid estimates of radioactive waste migration from disposal at a permanent repository and other radioactive disposal sites.

Drinking water already exceeding federal drinking water standards in many U.S. communities, at least intermittently. <sup>14 15 16</sup>

### **NRC Refuses to Acknowledge Flaws in the Current Radiation Protection Standards**

- 
- <sup>10</sup> Utah Department of Environmental Quality reflects state leaders views and offers this information on its opposition to storage of spent nuclear fuel at the facility proposed on the Skull Valley Goshute Indian Reservation at <http://www.deq.utah.gov/Pollutants/H/highlevelnw/opposition/concerns/concerns.htm>
- <sup>11</sup> See Yucca Mountain Environmental Impact Statement, DOE/EIS-0250F-S1.
- <sup>12</sup> Department of Energy Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste, January 2013. p. <http://energy.gov/em/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste>
- <sup>13</sup> Blue Ribbon Commission on America’s Nuclear Future, Report to the Secretary of Energy, January 2012. [http://energy.gov/sites/prod/files/2013/04/f0/brc\\_finalreport\\_jan2012.pdf](http://energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf).
- <sup>14</sup> Environmental Defense Institute March 2018 newsletter article “Radiation Workers and the Rest of Us Should Avoid Contaminated Water, <http://www.environmental-defense-institute.org/publications/News.18.March.pdf>
- <sup>15</sup> Environmental Defense Institute newsletter for December 2017 “Where to Find Out More About Your Drinking Water.” <http://www.environmental-defense-institute.org/publications/News.17.Dec.pdf>
- <sup>16</sup> Environmental Defense Institute newsletter for February 2018 that contains several articles about drinking water: “What’s Up With the Radionuclides in Drinking Water Around Boise, Idaho?” “Radionuclides in Drinking Water in Ammon, Idaho,” “Understanding the Radionuclide MCLs in Drinking Water in Idaho,” and “Understanding the Man-Made Radionuclides in Drinking Water in Idaho (with helpful decay chain information for uranium-238, thorium-232, uranium-235 and uranium-233 and the man-made actinides that can feed these decay series)” <http://www.environmental-defense-institute.org/publications/News.18.Feb.pdf>

The NRC also continues to use radiation health models that underestimate the actual health harm to humans from radiation exposure.<sup>17</sup>

The NRC marches on as though existing emergency planning is adequate, despite evidence to the contrary. The truth about the lives shortened by the Three Mile Island Unit 2 accident matters.<sup>18</sup>

### **NRC Refuses to Fund Valid Epidemiology**

The US Nuclear Regulatory Commission refuses to fund epidemiology studies near US nuclear power plants. And if you understand the real reasons why, you would not support nuclear energy. And you certainly would not choose to live near a nuclear plant.

The framework for the study was reported in “Analysis of Cancer Risks in Populations Near Nuclear Facilities; Phase I (2012).<sup>19</sup> After 5 years in planning for the study, the NRC has now decided it would take too long and cost too much. I think the NRC knows that a credible study would be the end of licensing new nuclear plants.

The NRC issued a statement<sup>20</sup> explaining their decision which included this excuse: “For example, the German study initially found an association of increased childhood leukemia risk within 5 kilometers of the facilities. However, upon examination of the offsite exposures, the authors concluded the increased risk could not be explained by the releases from the facilities.” In other words, it couldn’t happen, so it didn’t.

Epidemiology conducted in Europe includes the study known by its German acronym KiKK (Kinderkrebs in der Umgebung von Kernkraftwerken). The KiKK study on Childhood Cancer in the Vicinity of Nuclear Power Plants, completed in 2007 is scientifically rigorous and statistically sound and its peer reviewed results show significantly elevated cancer risk for children under five years of age living within 5 km of a nuclear power plant. The study looked at childhood leukemia and cancer near nuclear plants from 1980 to 2003.

In Illinois, near the Braidwood and Dresden nuclear power plants, one family learned that many children in the area had cancer, brain cancer, and leukemia, after their daughter Sarah was

---

<sup>17</sup> “Health Risks from Exposure to Low Levels of Ionizing Radiation BEIR VII – Phase 2, The National Academies Press, 2006, [http://www.nap.edu/catalog.php?record\\_id=11340](http://www.nap.edu/catalog.php?record_id=11340) The BEIR VII report reaffirmed the conclusion of the prior report that every exposure to radiation produces a corresponding increase in cancer risk. The BEIR VII report found increased sensitivity to radiation in children and women. Cancer risk incidence figures for solid tumors for women are about double those for men. And the same radiation in the first year of life for boys produces three to four times the cancer risk as exposure between the ages of 20 and 50. Female infants have almost double the risk as male infants.

<sup>18</sup> Steve Wing, David Richardson, Donna Armstrong, and Douglas Crawford-Brown, A Reevaluation of Cancer Incidence Near the Three Mile Island Nuclear Plant: The Collision of Evidence and Assumptions, Volume 105, Number 1, January 1997, Environmental Health Perspective

<sup>19</sup> See cancer risk study at nap.edu.

<sup>20</sup> NRC Policy Issue Information SECY-15-0104, August 21, 2015 “Analysis of Cancer Risks in populations Near Nuclear Facilities Study,” <http://pbadupws.nrc.gov/docs/ml1514/ML15141A404.pdf>

diagnosed with brain cancer when she was seven.<sup>21</sup> Cindy and Joe Sauer lived in the area of these reactors from 1998-2004. Joe Sauer, a medical doctor, conducted his own epidemiology study which showed clear increases in childhood cancers near the plants. Read his findings of elevated brain and other cancers near these plants and other studies.<sup>22 23</sup>

The NRC regulations, coupled with inadequate state radionuclide monitoring programs, are already affecting our health. The continued inadequate NRC regulations are unacceptable. At the very least, the NRC should revise 10 CFR 72 to provide for assurance that canisters used for spent nuclear fuel dry storage will not be leaking radionuclides to the air long before the fuel is shipped to another location.

Sincerely,

Tami Thatcher

---

<sup>21</sup> Read about Cindy and Joe Sauer and what they learned about childhood cancer near nuclear power plants: <http://ieer.org/resource/commentary/on-life-near-two-nuclear-power-plants-in-illinois/> and read Joe Sauer, MD, presentation on elevated cancer rates near the Dresden and Braidwood nuclear plants at <http://ieer.org/wp/wp-content/uploads/2013/06/Health-Concerns-and-Data-Around-Illinois-Nuclear-Plants-slides-for-SDA-2013.pdf>

<sup>22</sup> Dr. Paul Dorman, "Why UK nuclear power plants may cause childhood cancer and leukaemia," May 16, 2011, <https://www.escosubs.co.uk/theecologist/promotion.asp?code=RF2011ROW>

<sup>23</sup> Steve Wing, David B. Richardson, Wolfgang Hoffman, "Cancer Risks Near Nuclear Facilities," Environ Health Perspect. 2011;119(4):417-421.