Our Silent Zombie: Commercial Nuclear Waste Storage in the United States

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Advocates' Forum

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Most people are aware that nuclear power produces nuclear waste, but many would be surprised to learn that one in three people in the United States lives within 50 miles of a nuclear waste storage site (Hulac, 2020). The high-level waste stored around the country is extremely dangerous to humans and takes thousands of years to decay. As of 2017, 80,000 tons of nuclear waste were being stored in this country in pools or dry steel-and-concrete casks just outside the power plants where they had been generated (Fountain, 2017). How is it that what environmental editor of the *Guardian,* John Vidal (2019), calls “the most dangerous materials on earth” have been left scattered in temporary configurations, including near major cities (Surfrider, 2017)?

This paper approaches the fate of nuclear power in the United States with an eye toward the unlikely intersection between the need for electricity, the impact of fossil fuels on climate change, and the imperative of social work practitioners to address the needs of vulnerable populations. It argues that nuclear power in its current state is not politically viable because of our country’s lack of a centralized nuclear waste repository. At the same time, it seeks to remind the reader that nuclear power offers many benefits in an era of ever-increasing climate breakdown; a condition intensified by the increased carbon emissions likely to follow the decline of nuclear power. That breakdown will disproportionately harm the vulnerable populations that social workers serve and thus sustaining nuclear power viability becomes a social-work goal.

But first, it's worth asking, how did we get here?

Creating a Zombie, Calculating the Risks

All commercial nuclear power plants seeking an operating license from the Nuclear Regulatory Commission (NRC), the federal body established to regulate "the peaceful atom," were required to sign onto the government's waste disposal plan. The Nuclear Waste Policy Act of 1982 (NWPA) codified the Department of Energy's (DOE) responsibility to develop a repository for nuclear waste (Surfrider, 2017; EPA, 2019). In 1987, amendments to the act required that the Department of Energy (DOE) would take possession of, and responsibility for storing, the waste, and it named Yucca Mountain, located about 80 miles outside Las Vegas, as the site of the nation's first repository once it proved feasible. Operations were expected to start there in 1998. More than $11 billion was then spent on the Yucca Mountain site for the construction of an experimental tunnel and to perform the scientific and engineering work required for the DOE's more-than 8,700-page license 2008 application[1] to the NRC (R. Kacich, who lead the contract submission team, in discussion with the author, February 28, 2021; NEI, 2021a).

Moreover, every commercial nuclear power plant was required to help finance the construction of the federal waste repository. The plants raised funds for this by charging their customers a fee of one one-tenth of a cent per kilowatt hour. Every quarter, money has been transferred from the plant operators into the federal government's Nuclear Waste Fund (Kacich, 2021). Including interest, electricity consumers have contributed more than $56 billion into that fund, which now generates over $1.5 billion in interest every year (NEI, 2021a; DOE-OIG, 2021). If the government has a plan for the nation's waste and energy companies have transferred consumer payments for their portion of the funding, what's the hold up?

The missing element is the federal government's contribution. With the Nuclear Waste Policy Act established as law, the government is

obligated to collect and dispose of the country's commercial nuclear waste at the appointed site. But Harry Reid, who became a Nevada senator the year the Yucca Mountain plan was enacted, made it his mission to prevent the plan from ever coming to fruition. Rather than formally "kill" development of the facility, which would have been illegal, the Obama administration simply ceased funding it in 2010. The project for storing the vast amount of nuclear waste in this way effectively lapsed into a coma—not technically dead, but in no meaningful way living.

Perhaps given public perception of nuclear power and its sinister by-products, the more apt metaphor for the entire issue is less a comatose policy than that of a flesh-eating zombie. Nuclear energy's technical origins lay in the splitting of the atom for the development of the mind-bogglingly destructive atomic bomb. But while the devastation of Japanese cities Hiroshima and Nagasaki provided stark terror and a broader, more anodyne set of cultural references that helped give shape to the "atomic age" (Boyer, 185), issues and crises surrounding civilian power generation has spawned unease. These crises included the partial meltdown of Pennsylvania's Three Mile Island in 1979; the Ukrainian Chernobyl meltdown in 1986; and most recently, the tsunami inundation of the Fukushima plant in Japan in 2011. Indeed, "since the 1980s, nearly every survey by a major polling organization has shown a majority or plurality of Americans oppose nuclear energy" (Baron & Herzog, 2020).

This context is important because people tend to underestimate familiar risks, such as the likelihood of dying in a car accident, and overestimate risks that are unfamiliar, or that might cause a delayed or prolonged reaction, or that are otherwise associated with dread. As an unfamiliar and involuntary event that could include long-term, dreadful consequences, exposure to nuclear radiation checks all of those risk-perception-amplifying boxes. Related is the discrepancy between expert assessment of nuclear-power-related risk and that of the lay public, a discrepancy that has long been established in psychological literature (Harrison, 2001). While the aforementioned

high-profile disasters have made headlines since commercial nuclear power became available, most people will never encounter a headline touting the benefits of nuclear power compared to alternatives.[2] Moreover, even accounting for the thousands of deaths caused by history's worst global disasters of commercial nuclear power, Chernobyl and Fukushima, the industry's mortality rate per kilowatt hour of energy produced (its "deathprint") is dwarfed by those of the coal, hydro, natural gas, oil and biofuel industries, and is smaller even than the "deathprints" of solar or wind (Conca, 2012). Such statistics illustrate how lay perception of risk is not the result of a careful weighing of the costs and benefits so much as a subjective, feeling-based judgment.

That deep-rooted fear of nuclear power generally is intrinsically related to worries about the waste it generates: how, where, and with what safe mechanisms will a substance with the capacity to damage human cells for 24,000 years be stored? We find an illustrative example of this way of thinking in the March 6, 2021 *Wall Street Journal* "The 10-Point" (2021), a daily news bulletin that includes reader-responses to a prompt published the day prior. To a question about the future of nuclear power, subscriber Sienna Lee, wrote in:

Until we have a way to safely process nuclear waste into nonradioactive[3] products, there should be no growth in the nuclear-power industry. Currently in the U.S., our only method is to hide it away inside a mountain. Increased use of nuclear power leads to increased waste, which leads to a need for more waste storage spaces, and who wants to live near a nuclear-dump site?

Ironically, Ms. Lee may already be living near a nuclear waste storage site, as nuclear power plants and the waste they generate tend to be located in the same desirable zip codes that subscribe to the *Wall Street Journal*.[4] More importantly, when that question, "Who wants to live near a nuclear-dump site?" is framed in the absence of any comparison (e.g., "Would you rather live near a coal plant?") or any assessment of the associated benefits (e.g., "Would you rather live

with a grid powered by solar panels that stopped working when the sun went down?") the answer seems always to be the same. The public fears "hiding [nuclear waste] away inside a mountain," which is not happening, while in fact already living near very real nuclear waste storage sites.

The Time Horizon of Waste

One way in which nuclear power differs significantly from competing forms of electricity-generation is the difficulty in measuring its risk. This difficulty stems from the scale of nuclear temporality. High-level nuclear waste doesn't move in a manner that fits within human conceptions of time. Some isotopes do decay in hours or even seconds. Others, however, devolve very, very *slowly*, if such a description even makes sense for something like Plutonium-239 and its half-life of 24,000 years (NRC, 2021). That sum translates to about 858 generations, which moving backwards from today would stretch back to a time before even the cave paintings of Lascaux. These are not numbers or timelines with which most people can think through with confidence or comfort (Best, 2003).

CBS News correspondent Jonathan Vigliotti picked up on the problems of such a time scale when he traveled to Yucca Mountain to report on the impasse there. He asked William Boyle from the Department of Energy, "At what point does time just run out in the debate and it becomes just such an issue that, [with] all of this waste collecting, we just say we have to put this somewhere?" "It's my impression that if we were to ask the people that live near San Onofre [where waste is temporarily stored] that they reached that point a while ago," Boyle replied. His answer indicates that there is no clear event on the horizon that will catalyze a departure from the status quo.

This gridlock means the waste is indeed just sitting there, at San Onofre and at other sites throughout the country, where it will eventually outlast the integrity of its storage vessels (Mishkin, 2021;

Federal, 2014). The glacial rate of change invokes a particular set of challenges, akin to those associated with slow violence. “Neither spectacular nor instantaneous, and often proceeding at a speed that decouples suffering from its original causes, slow violence can be difficult to represent, even to perceive” (Ahmann, 2018). Likewise, with the temporary storage of nuclear waste, it’s all too easy to forget it’s even there, and this “praxis of not noticing” surely helps to preserve the peace of mind of those living near the gathering waste (p. 150).

Who is Hurt?

Social workers should be concerned that we don't have a centralized waste repository not just because its absence means that existing waste is stored in this shockingly slipshod manner, but also because it is one of the oft-cited reasons for not constructing new nuclear power plants. As existing nuclear plants are retired, carbon emissions go up as coal or natural gas take up the slack in production. There is no denying that the effects of climate change hurt the vulnerable, and to increase the burning of fossil fuels will only exacerbate those. People with more resources might be able to protect themselves from some of the worst effects of pollution and extreme weather, but such *escapism* is not an option for those without the means.

Nuclear power need not remain a zombie forever. It may well be given new life through an appreciation of its reliability, small “deathprint” and relatively cleanliness, and through the establishment of a centralized waste repository. If this were to happen, the populations social workers serve would be better protected from the growing precarity of the electricity grid.

Author Note

As the daughter of a nuclear engineer, I have long been fascinated by how those around me perceive nuclear power. I wrote this article as a challenge to myself and others to think more expansively about how

social work relates to the world beyond categories like race, gender or class typically invoked in the classroom.

[1] This application reflected the contribution and expertise of eight National Laboratories and was the subject of a favorable Safety Evaluation Report by the NRC in 2015.

[2] Nuclear power generates nearly 55% of our nation's carbon-free electricity; nuclear power plants operate continually, making them the ideal zero-carbon complement to wind and solar; one uranium fuel pellet (about the size of a pencil eraser) provides as much energy as a ton of coal, 149 gallons of oil or 17,000 cubic feet of natural gas (NEI, 2022).

[3] "Nonradioactive" is a misnomer. As NRC Commissioner McGaffigan wrote in his comments on the commission's voting record on radiological criteria for controlling the disposition of solid materials in 2005: "We live in a radioactive universe. We are radioactive ourselves. People who work in the Capitol and the Library of Congress receive doses ranging from 50 to 100 mrem/yr from the granite in the buildings. Anyone worried about receiving 1 mrem/yr should avoid all airline travel (one US round trip flight = 5 mrem), should avoid brick houses (living in a stone, brick or masonry house = 7 mrem/yr), should avoid double beds (sleeping for 8 hours next to another person = 2 mrem/yr) and should never smoke (average dose from smoking = 1300 mrem/yr), and I could go on and on. They should mitigate radon in their homes (potentially hundreds of mrem/yr), avoid granite counter tops, glazed ceramic tiles, living at high altitude, Fiestaware, Brazil nuts, etc. I advocate none of these actions, except mitigating radon and not smoking" (NRC, 2005, p. 6).

[4] Nuclear power plants tend to be located near large bodies of water so that there is a "heat sink" accessible for cooling. (If you don't have a large body of water accessible, you need to build a cooling tower, which adds hundreds of millions of dollars of building expenses.) In addition, they tend to be located near urban centers, as additional distance adds cost as the power is transported from where it's

generated to where it's consumed. And they offer well-paying employment opportunities to the local population. The net result of these factors is that plants tend to be located in desirable zip codes.

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