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The Environmental & Health Effects of the US' Nuclear-Arsenal-Network

Introduction

In 1939, before the US formally entered World War II in 1941, President Franklin D. Roosevelt formed a network of agencies that were the precursor to the Manhattan Project in hopes of researching atomic weapons and newly discovered nuclear fission technology. The desire to research and to possibly create an atomic weapon was in response to US intelligence indicating to Roosevelt that Adolf Hitler began the process of developing a nuclear weapon, which would be a device of unprecedented destruction. In 1941, after the Pearl Harbor attack prompted the US to join WWII, efforts to create a nuclear weapon intensified, and the network created in 1939 was reorganized. In 1942 the Manhattan Engineering District was established to oversee the process of making an atomic weapon and to formalize the operation. On July 16th, 1945, in remote Alamogordo, New Mexico, Manhattan project scientists were able to carry out a successful nuclear weapons test with an atomic bomb referred to as Trinity. After Trinity, the world was ushered into the atomic age. Later that year, on August 6th and 9th, the bombings of Hiroshima and Nagasaki with two newly developed atomic bombs, Fat Man, and Little Boy, took place to secure US victory over Japan at the end of WWII.

Discovering nuclear weapons opened a Pandora's box that the US could not close after nuclear weapons served their purpose in WWII. Using such unprecedented power to obtain a surefire surrender from Japan made the Soviet Union, which had an unspoken rivalry with the US since its conception, at unease. The Soviet Union had been receiving intelligence information about the US's nuclear weapons program since 1941 but had limited knowledge of the US's intentions with these weapons. The US's nuclear attack on Japan set a precedent to the Soviet Union that the US would be capable, and willing, to possibly attack them with nuclear weapons as well. The Cold War period, which started with the US's first successful nuclear test Trinity, spanned from 1945 to 1991 when the Soviet Union collapsed.

Nuclear testing and nuclear arsenal operations that took place from the 1940s-1990s caused devastating damage to the environment and health; nuclear weapons also posed a threat of worldwide destruction. From these weighted factors, nuclear weapon testing became banned in serval countries, including the US in 1996, under a comprehensive nuclear test ban treaty. Multiple other treaties concerning the issues followed, making the US and other nations to promise to halt nuclear weapon proliferation. Since the late 1990s, the US has maintained and modernized its established nuclear-arsenal-network to oversee the nuclear weapon stockpile as a means of upholding nuclear deterrence. Although many believe that the negative effects of the US's Cold War legacy and general administrative practices are left in the past, prevailing themes of systematic racism, insufficient oversight, elevated safety risks, and concerning performance reports afflict the United States' modern nuclear-arsenal-network. Two complexes that embody these themes are the Y-12 nuclear weapons plant in Oak Ridge, TN, and Los Alamos National Laboratory (LANL) in NM.

The Nuclear Present: A Case Study of Y-12 & LANL

Y-12

The Y-12 nuclear weapons plant was erected in 1943 to act as a supplier of highly enriched uranium for the Manhattan Project. During the Cold War, the plant continued to supply fissile materials and components for the construction and maintenance of nuclear weapons. Presently, Y-12 focuses primarily on maintaining its highly enriched uranium stockpile, expanding the lifespan of Cold War-era warheads, and supplying the Navy with highly enriched uranium from dismantled weapons. Y-12 has an extensive pattern of not addressing the environmental and safety concerns of their plant's operations. Robert Alvarez, a senior Institute for Policy Studies scholar, in a 2014 article written for the Bulletin of Atomic Scientists, brought up a myriad of problems stemming from poor reckonings with Y-12's past actions and current activity. According to Alvarez, to purify lithium, which is an element used to manufacture fissile materials, Y-12 acquired approximately 24 million pounds of mercury between the 1950s -60s. From this accumulated 24 million pounds of mercury, Alvarez states, “10 percent (2.4 million pounds) were released into the environment or could not be accounted for inside buildings." Alvarez further claims that 73 thousand pounds of that mercury stockpile were released into the air. To put that into perspective, the US Environmental Protection Agency (EPA), on a webpage titled "Basic Information about Mercury," reported that the entirety of the United States emitted around 39 thousand pounds of mercury into the air in the year 2018, which is about half of Y-12's emissions from that purchase and current activity. Mercury, the EPA continues, is a neurotoxin that affects both humans and animals; some of the effects of mercury are death, reduced reproduction capabilities, delayed growth and development, and behavioral abnormalities.

In a 2014 Department of Energy (DOE) report prepared by national security and engineering company, Professional Project Services Incorporated (Pro2Serve) in conjunction with Y-12, there were claims made that Y-12's current operations and past waste is posing little to no threat to human health. The report supports this conclusion with a 2012 study titled *Evaluation of Y-12 Mercury Releases*, which was conducted by the Agency for Toxic Substances and Disease Registry (ATSDR). The report states that this study "conclusively determined that no adverse human health effects have been suffered due to 'most past and current exposure pathways' of mercury release from the Y-12 sites" (Pro2Serve 13). When examining the study cited, this claim does not show the whole picture of ATSDR's findings. In the 2012 ATSDR study, ATSDR states that their research did indicate improvement with Y-12's handling of mercury pollution. However, ATSDR also found that "family members (especially young children) may have inhaled elemental mercury carried from the Y-12 plant by workers into their homes" (16). For a sense of the scale of possible mercury exposure and other hazardous exposure at Y-12 for workers and their families, the Department of Labor (DOL), on a webpage created to highlight Y-12's worker's compensation statistics, titled, “EEICP Program Statistics,” states that between 2000-2020, there have been 33,510 claims filled. For accepted claims and cases, over 2.3 billion dollars of health insurance bills and total compensation were paid (“Office Worker’s Compensation” DOL).

Examining possible environmental effects from these mercury releases, a 2016 University of Tennessee, Knoxville study conducted by Chelsea Standish, finds that the mercury concentrations in the water by the Y-12 plant, particularly near Lower East Fork Poplar Creek (LEFPC), is well above the state and EPA limits (Standish 11). These elevated levels of mercury settled in the sediments by the waterways near Y-12 can be absorbed by microorganisms. These

microorganisms can convert said mercury into a more toxic and bioavailable substance called methylmercury (Standish 4). Due to its bioavailability, methylmercury can enter the aquatic food chain and bioaccumulate (Standish 7). This process of bioaccumulation threatens higher-level predators on the food chain, such as humans, birds, and other organisms that eat the fish or insects by the creek. For birds in particular, methylmercury exposure can negatively affect egg hatchability and bird mating behavior, which can thereby lower the bird population and potentially threaten the balance of nearby ecosystems (Standish 6). Additionally, this study indicates a wider breadth of waterway exposure to Y-12 plant contamination than from what was anticipated from previous studies, meaning more people could be harmed by Y-12 waste emissions (Standish 8).

LANL

Los Alamos National Laboratory, similar to Y-12, was created in 1943 to play a role in the Manhattan Project; LANL's role specifically was to design and construct the atomic bomb. Throughout the Cold War, LANL continued to focus on initiatives of nuclear weapon proliferation and design. To provide uranium for nuclear weapon proliferation and land for nuclear weapon tests and waste disposal, LANL pushed into and further colonized Navajo, Pueblo, and other tribal lands. Native Americans in New Mexico during the US's atomic age worked the uranium mines that dominated their tribal landscape. These culminating factors led to negative health effects for these Native tribes by LANL. Many Natives experienced respiratory illness, cancer, kidney failure, and other ailments associated with exposure to ionized radiation and uranium, according to a 2019 US senate hearing titled, *America's Nuclear Past: Examining the Effects of Radiation in Indian Country* (2-3). Currently, LANL focuses on research, waste management, land remediation, and stockpile security, like the Y-12 plant. Akin to Y-12 and its

mercury problem and site-wide safety hazards, LANL's past actions, paired with a poor reckoning of said past actions along with current laboratory operations, are causing concerning environmental and health issues. Pueblo and Navajo people residing near LANL in the modern-day allege that LANL is failing to remediate tribal territory contaminated by atomic-age mining, LANL's waste, and ionized radiation left from past nuclear testing.

The aforementioned senate hearing was called by the Committee on Indian Affairs to hold LANL and the federal government accountable for the lack of progress on their remediation goals and to showcase how these shortcomings are adversely affecting the current Native American populations near LANL. For example, in the Pueblo village of Paguate, because of the 23.7 million tons of mined radioactive ore left as waste at the nearby Jackpile pit mine between the 1950s-90s and a lack of an effort from LANL to clean it up, Paguate Pueblos are facing elevated health risks (US Cong. Sen. Indian Affairs Com. 56). As shown in a regional survey brought up in the senate hearing "72 percent of Paguate homes tested over a three-month period in 2011 had excessive radon levels with a cancer risk equivalent to smoking between one to two packs of cigarettes per day" (51-52). In the case of the neighboring Navajo nation, between 2015-2018 it was found that "36 percent of males and 26 percent of females in Navajo Nation have concentrations of uranium in the urine that exceed those found in the highest 5 percent of the US population" (US Cong. Sen. Indian Affairs Com. 22). These high levels of uranium, as mentioned before in the senate hearing, can increase risks of cancer, respiratory illness, and kidney failure (2-3). For kids in the Navajo nation, this uranium exposure and exposure to other radioactive contaminants may have impacted their neurodevelopment and their ability to thrive after birth (US Cong. Sen. Indian Affairs Com. 22).

In 2002, LANL had a study prepared by the US Fish and Wildlife Service and multiple New Mexican Environmental Service Programs, titled, *A Water Quality Assessment of Four Intermittent Streams in Los Alamos County, New Mexico.* The study gave an outsider perspective on LANL's environmental impact. The US Fish and Wildlife Services found that there was extensive aluminum, mercury, and other elemental contamination in many nearby water sources, most notably, Pajarito Canyon (75-77). This contamination, the study continues, can cause issues with the bioaccumulation of toxic substances such as mercury, and in the case of aluminum, it can accumulate on fishes' gills and cause hypoxia (75-79). The study stated that more research needs to be done to evaluate total environmental impact, but it was clear that several nearby water sources were not within the limits of the Clean Water Act or the standards of ethically maintaining a cold-water fishery (109-112). Additionally, the US Fish and Wildlife Services noted that it is worrying that many water sources by LANL are used for recreational and farming use, despite a lack of testing of the water's safety (106-112).

Why all These Problems & What are Possible Solutions?

The Root of the Problems

The environmental, security and safety issues present at Y-12 and LANL are not unique to those specific nuclear weapon complexes. These issues are systematic within the US nuclear-arsenal-network and are attracting concerns from activists, the Government Office of Accountability (GOA), and watchdog organizations alike. The GOA, in a 2012 report made for the Subcommittee on Oversight and Investigations, and the Committee on Energy and Commerce, found that throughout the US's nuclear-arsenal-network, 60 near misses or serious accidents were recorded between 2000-2007 (8). The GOA reported that the DOE and the NNSA, the organizations in charge of the nuclear-arsenal-network, are implementing lax

oversight. The GOA finds it worrying that, for the most part, evaluations of security, safety, and environmental effects from facility operations are assessments done by the facility themselves (7). Another nuclear weapon facility, Sandia National Laboratory, in their independent self-assessment, failed to identify a multitude of security weaknesses after a DOE investigation was prompted in May of 2012 (GOA 10). Matthew Bunn, Nickolas Roth, and William Tobey, in an article written for Harvard University's Belfer Center, mirrors similar concerns in their 2019 article, "Revitalizing Nuclear Security in an Era of Uncertainty.” The Belfer article even goes as far as to say that the poorly dealt culmination of issues throughout the US's nuclear weapon complex could increase the chance of a Chernobyl-like accident to occur via a nuclear terrorist incident or failing infrastructure.

Another element to consider is the role of racism in the government's and the nuclear-arsenal-complexes' ability to keep these environmental and health concerns under the radar. In a research dissertation written by Angela Halfacre for the University of Florida, titled, “Risk, Trust, and Group Identity: Ethnic and Racial Perceptions of Environmental Hazards,” Halfacre finds that a majority of nuclear arsenal facilities such as the Savanna River Site in SC, the Y-12 plant in TN, the past Hanford Site in WA, and many more, were built right next to pre-existing tribal lands or African American and Hispanic communities (9, 42). Additionally, Halfacre states that these communities face the most risk with living by these facilities yet are underrepresented in most research about the impacts of the operations of the US's nuclear-arsenal-network (7-8, 22-28).

In Ted Steinberg's book, *Down to Earth*, he discusses that a 1987 study found that "three out of five blacks lived in places with abandoned toxic waste dumps" (257). While that study was from decades ago, that study indicates a pattern still present today with the placement of

nuclear weapons facilities and their dumping sites, which are typically near African American, Hispanic, and Native American communities. These actions suggest a belief of those populations being expendable. In Y-12's case, the facility acknowledged that some waterways near the plant were contaminated with mercury before remediation efforts intensified in the early 2000s. The nearby African American community was not adequately informed of these risks, and this led them to be disproportionately affected by possible health risks associated with eating mercury-contaminated fish ("Y-12 Poster Child" Alvarez). Later on, when Y-12 indicated that they had their mercury problem under control in 2014, Chelsea Standish, in her study, stated that the levels of pollution in nearby waterways, especially the LEFP, which is used by the predominantly African American community nearby, was still significantly contaminated (Standish 11). There appears to be an attempt, a successful one at that, that was, and still is, being made by the government to co-opt the US's racist tendencies as a means of evading accountability. These facilities are not noticeably affecting the US's majority white population at the moment, so accountability and further investigations are not demanded. Grievances expressed by people of color are willfully ignored at little to no expense to the government or the nuclear arsenal facility.

Solutions

As indicated by the GOA's assessment, most of these problems stem from a lack of oversight, lack of accountability, and miscommunications along the chain of command (8). The evidence presented in the LANL and Y-12 case study section likely does not even cover most of the damages done by these facilities or others within the network. Knowing that the US's nuclear-arsenal-network is lacking severely in the sectors of security, remediation, accountability, and general infrastructure is alarming, especially considering that the US

government may increase these facilities' workloads as Cold War-era scale tensions are reignited with Russia. In fact, in a 2020 article for the Federation of American Scientists by, William Arkin and Hans Kristensen, titled, "US Deploys New Low-Yield Nuclear Submarine Warhead," they report that the Trump Administration, back in 2018, ordered the construction of a low-yield nuclear warhead called W76-2 at the Pantex Texas Plant. In 2019, the warhead was completed; the purpose of creating the nuclear warhead, the article continues, is to fill "an exploitable ‘gap’ in US regional deterrence capabilities." This 'gap' is in reference to the difference in size between the US and Russia's respective stockpiles.

Conclusion

Most of the problems appear to be caused by the DOE and the NNSA not conducting adequate oversight over the nuclear-arsenal-network. Additionally, as indicated by the GOA's report and the LANL senate hearing, it seems that infrastructure and remediation efforts are not being improved upon at the pace needed to keep these facilities secure and the surrounding area clean. This possibly indicates budget misuse or misappropriation of funds on either the facilities', or the NNSA’s, part. Increasing oversight, allowing third-party organizations to conduct environmental and safety research, and demanding transparency from the network and the NNSA should set the US's nuclear-arsenal-network on a path towards improvement. The US needs to additionally recognize that with the nuclear-arsenal-network's current infrastructure, pursuing interests to fill the US's defense gap may exacerbate pre-existing structural stresses and ought to favor a route of reinstating and renegotiating previous nuclear arms treaties with Russia. Reparations and better protections ought to be put into place for Native American and African American Communities, in particular, living near these facilities.

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