FEDERATION OF AMERICAN SCIENTISTS

AUGUST 2025

Poison in our Communities

Impacts of the Nuclear Weapons Industry across America

ALLIE MALONEY

About FAS

The **Federation of American Scientists (FAS)** is an independent, nonpartisan think tank that brings together members of the science and policy communities to collaborate on mitigating global catastrophic threats. Founded in November 1945 as the Federation of Atomic Scientists by scientists who built the first atomic bombs during the Manhattan Project, FAS is devoted to the belief that scientists, engineers, and other technically trained people have the ethical obligation to ensure that the technological fruits of their intellect and labor are applied to the benefit of humankind. In 1946, FAS rebranded as the Federation of American Scientists to broaden its focus to prevent global catastrophes.

Since its founding, FAS has served as an influential source of information and rigorous, evidence-based analysis of issues related to national security. Specifically, FAS works to reduce the spread and number of nuclear weapons, prevent nuclear and radiological terrorism, promote high standards for the safety and security of nuclear energy, illuminate government secrecy practices, and prevent the use of biological and chemical weapons.

FAS can be reached at 1112 16th St. NW. Suite 400, Washington, DC, 20036, **fas@fas.org**, or through **fas.org.**

COPYRIGHT © FEDERATION OF AMERICAN SCIENTISTS, 2025. ALL RIGHTS RESERVED.
COVER IMAGE: NATIONAL NUCLEAR SECURITY ADMINISTRATION / NEVADA SITE OFFICE, PUBLIC DOMAIN

Author

Allie Maloney is a former Herbert Scoville Jr. Peace Fellow for the Nuclear Information Project. Allie graduated with her bachelors in international affairs and political science from the University of Georgia. She was formerly a Richard B. Russell Security Leadership Fellow at UGA's Center for International Trade and Security, where she focused her research on gender perspectives in nuclear nonproliferation

Acknowledgements

The author would like to thank Mary Dickson, Sarah Ray, Karen Nickels, and Dawn Chapman for their insights and for their advocacy efforts to bring justice to affected communities. Thank you to Angela Kellett, Matt Korda, Mackenzie Knight-Boyle, and Eliana Johns for their expertise and help in putting together this report.

Abstract

This report examines the humanitarian consequences of nuclear weapons from cradle-to-grave. Much of the scholarship surrounding effects of nuclear weapons on environmental and human health is framed within a potential detonation scenario. While such research is crucial for understanding the consequences of nuclear weapons use, nuclear weapons are built, maintained, and deployed every day—impacting communities at every stage even before detonation. This research addresses the question of how nuclear weapons presently impact American communities throughout their lifecycle, contributing to ongoing scholarship in exploring how possession and production of nuclear weapons endangers domestic citizens. Examining case studies of American communities involved in nuclear weapons production, it is clear that the mining of uranium, enrichment of uranium and processing of plutonium, the assembly of the weapons, the explosive testing of the weapons, and the waste that is left after contaminates environments and sickens communities. The author argues nuclear weapons currently and directly cause both tangible and intangible harms to American communities, even without their use in war.

Methodology

This report presents a cradle-to-grave analysis of the environmental and human health effects of the nuclear weapons industry in the continental United States. The report utilizes government reports, community surveys, declassified documents, unstructured interviews, archived testimonies, news articles, and historical accounts to present qualitative and quantitative data on community health impacts of nuclear weapons. The report is divided into five sections, each focusing on a singular community at the center of one step in the nuclear weapons lifecycle: uranium mining and milling in Church Rock, New Mexico; uranium enrichment and plutonium processing in Oak Ridge, Tennessee, and Hanford, Washington; nuclear weapons assembly and disassembly in Amarillo, Texas; explosive nuclear testing in Nevada; and nuclear waste in St. Louis, Missouri. There are many steps in the design, manufacturing, testing, and storage of nuclear weapons; the impacts of these processes are not limited to the communities presented in the report. Additionally, the United States is only one of nine nuclear weapons states; the production of nuclear weapons in other countries harms communities across the globe. The five case studies do not present a comprehensive view, but are rather vignettes that illustrate how the nuclear weapons industry can impact the health and environment in the communities where it operates and beyond.

Contents

Introduction

In 1942, the United States formally began the Manhattan Project, which led to the production, testing, and use of nuclear weapons. In August 1945, the United States dropped two nuclear weapons on Japanese cities, killing around 200,000 people by the end of 1945 and leaving survivors with cancer, leukemia and other illnesses caused by radiation exposure.[1] While this was their only use in wartime, states have detonated nuclear weapons many times since for testing purposes, producing radioactive fallout. Many U.S. nuclear weapons production activities, including the mining of uranium and testing of the weapons themselves, have occurred outside of the continental United States. Notably, explosive testing in the Pacific Islands and ocean spread radioactive fallout to Marshallese, Japanese, and Gilbertese people, forcibly displacing entire communities and producing intergenerational illnesses.[2]

Much of the scholarship surrounding the effects of nuclear weapons on environmental and human health is framed within a potential detonation scenario.[3] For example, studies have shown that even a regional nuclear war would cause millions of immediate deaths and trigger a "nuclear winter," a shift in the climate that would disrupt agricultural production, thus killing hundreds of millions more through starvation.[4] Additionally, in 2024, the United Nations General Assembly voted to create an independent scientific panel to study the health, environmental and economic consequences of nuclear war.[5] While such research is crucial for understanding the consequences of nuclear weapons use, nuclear weapons are built, maintained, and deployed everyday, impacting communities at every stage even before detonation. Studying only the predictive futures of the use of a nuclear weapon in war is insufficient in understanding nuclear weapons' holistic humanitarian impact.

According to former Secretary of Defense Lloyd J. Austin III, "The heart of American deterrence is the people who protect us and our allies. Here at STRATCOM, you proudly stand up—day in and day out and around the clock—to defend us from catastrophe and to build a safer and more peaceful future. So let us always ensure that the most dangerous weapons ever produced by human science are managed with the greatest responsibility ever produced by human government."[6] Nuclear deterrence theory contends that a retaliatory nuclear strike is so threatening that an adversary will not attack in the first place. Thus, nuclear advocates often suggest that these weapons protect American citizens and the U.S. homeland. This report demonstrates, however, that the creation and sustainment of the nuclear deterrent harms members of the American public. As the United States continues nuclear modernization on all legs of its nuclear triad through the creation of new variants of warheads, missiles, and delivery platforms, examining the effects of nuclear weapons production on the public is ever more pressing.

1 Wellerstein, A. (2020, August 4) Counting the dead at Hiroshima and Nagasaki. Bulletin of Atomic Scientists. https://thebulletin.org/2020/08/counting-the-dead-at-hiroshima-and-nagasaki/

2 Pace University Disarmament Institute. (n.d.). Nuclear test archive. Retrieved March 18, 2025, from https://disarmament.blogs.pace.edu/nuclear-test-archive/

3 Xu, S., & Dodt, A. (2023). Nuclear bomb and public health. Journal of public health policy, 44(3), 348–359. https://doi.org/10.1057/s41271-023-00420-x ; Ritchie, N., & Kupriyanov, M. (2023, July). Understanding the humanitarian consequences and risks of nuclear weapons. Federal Ministry for European and International Affairs, Department for Disarmament, Arms Control and Non-Proliferation. https://www.bmeia.gv.at/fileadmin/user_upload/Zentrale/Aussenpolitik/Abruestung/Understanding_the_Humanitarian_Consequences_and_Risks_of_Nuclear_Weapons.pdf

4 Masters, J. (2025, May 16) Nuclear winter from a Pakistan-India war could kill 2 billion. Yale Climate Connections. https://yaleclimateconnections.org/2025/05/nuclear-winter-from-a-pakistan-india-war-could-kill-2-billion/

5 United Nations Office for Disarmament Affairs. (n.d.). Panel on the effects of nuclear war. Retrieved March 18, 2025, from https://disarmament.unoda.org/panel-on-the-effects-of-nuclear-war/

6 Austin, L. J. (2022, December 9). Remarks by Secretary of Defense Lloyd J. Austin III at the U.S. Strategic Command Change of Command Ceremony [Speech transcript]. U.S. Department of Defense. https://www.defense.gov/News/Speeches/Speech/Article/3241858/remarks-by-secretary-of-defense-lloyd-j-austin-iii-at-the-us-strategic-command/

Mining: Church Rock, New Mexico

> "I was measuring the water depth every week, of course I found out later it was contaminated. One day I was called out. My supervisor told me to stay on the surface—don't go underground, we need to go over to the mill site... I started looking around on the dyke there. I noticed huge cracks. They were big enough to put my hand in there. When you looked down it was pitch black, so I know that those cracks were way down in several places...after several minutes we just got back in the vehicle and we went back to the office at the mine site. And that was that. I heard from my department that the dam had broken. I said "wow, where?" After I got off shift and I was driving by and I looked in that direction. It was in the spot where I saw those huge cracks and now there was a huge gaping hole."

LARRY KING, RECORDED TESTIMONY OF 1979 URANIUM TAILINGS SPILL[7]

Uranium Mining on Navajo Lands

One of the largely understudied impacts of the nuclear weapons industry is that of the first step in the production process: uranium mining. Uranium, which is responsible for supplying the radioactive component necessary for a nuclear explosion, must be mined from the earth. During the peak of the uranium mining boom in the second half of the 20th century, miners across the globe drilled, blasted, and breathed uranium ore. Miners in foreign countries supplied the majority of the uranium ore for the United States' early weapons program. The Shinkolobwe mine in the Belgian Congo, around and in which an estimated 15,000 miners and their families lived and worked, provided the uranium used in the Hiroshima bomb.[8] These miners were overworked in radioactive conditions with little pay.[9]

In its rush to build bombs, the United States also fueled a uranium mining boom on its own soil. In 1946, the Atomic Energy Act created the Atomic Energy Commission (AEC), which became the sole purchaser of uranium in the United States as all nuclear facilities remained under federal control. The AEC encouraged the domestic mining and milling of uranium to reduce foreign dependence, thus spurring private companies like United Nuclear Corporation to look for quick and cheap ways to mass mine and build profit.[10]

The Colorado Plateau is home to several Native American tribes, including the Havasupai, Hopi, Hualapai, Southern Paiute, Southern Ute, and Navajo—the largest Native American tribe in the U.S. with a population of around 300,000. The Plateau is also a geographic hotspot for uranium deposits. Private companies and civilians developed mines on or near native lands to extract the profit from the earth; 75% of uranium mines in the United States exist within 50 miles of a reservation.[11] Due to both proximity and employment opportunities, Navajo miners became one of the largest population demographics to supply domestic uranium, totaling 3,000-5,000 miners in 1970.[12]

These miners were exposed to dangerous physical, chemical, and radiological elements. Miners used various methods for extracting ore, including open-pit mining, underground mining, and in-situ leaching. In some instances,

7 Multicultural Alliance for a Safe Environment. (2020 August, 5). LKing 15m [Video]. YouTube. https://www.youtube.com/watch?v=zrIvrJRWfIw
8 Swain, F. (2020, August 3). The forgotten mine that built the atomic bomb. BBC Future. https://www.bbc.com/future/article/20200803-the-forgotten-mine-that-built-the-atomic-bomb
9 Owens, J., Drozdenko, T. (2019, February 27) The DRC and America's Nuclear Weapons. Outrider. https://outrider.org/nuclear-weapons/articles/drc-and-americas-nuclear-weapons
10 Alvarez, R. (2013, November 14). Uranium mining and the U.S. nuclear weapons program. Federation of American Scientists. https://fas.org/publication/uranium-mining-u-s-nuclear-weapons-program-3/
11 Keyanna, T., Neal, R., & Roybal, C. (2024, February). The health impacts of uranium mining in Native American communities. Native American Budget & Policy Institute. https://nabpi.unm.edu/assets/documents/research/health-impacts-uranium-mining-policy-brief-final.pdf
12 Alvarez, R. (2013, November 14). Uranium mining and the U.S. nuclear weapons program. Federation of American Scientists. https://fas.org/publication/uranium-mining-u-s-nuclear-weapons-program-3/

miners were lowered underground into circulating radon gas and silica dust after blasting holes in the ground with dynamite.[13]

Miners were at higher risk for radiation exposure through ingestion, inhalation, dust absorption into their eyes or open wounds, or external exposure from gamma rays and beta particles.[14] The scientific community has linked uranium mining to a myriad of health consequences since 1897. Early studies found that up to three quarters of uranium miner deaths were a result of lung disease and cancer.[15] Further studies have since linked the uranium industry to increased mortality, Hodgkin's disease, and bladder, lung, kidney, and prostate cancer.[16] But many Navajo miners were not made aware of the consequences. Due to the myriad studies, by 1932 (predating the first uranium mine on Navajo lands), some countries had already started providing compensation to miners who developed lung cancer.[17] However, private companies owning the mines took on deliberate campaigns to conceal the cancerous effects of uranium exposure, pouring money into research studies and campaigns citing secondhand smoke as the leading cause of lung cancer.[18]

The U.S. Public Health Service studied workers who mined uranium for the Atomic Energy Commission, recording workers who had died from various illnesses without prior consent before their deaths or from their families.[19] After confirming that uranium mining was causing mass amounts of workers to fall ill, they decided not to disclose the study to the workers, citing national security, fearing that miners would stop working once they knew the risks.[20] In 1995, the Advisory Committee on Human Radiation Experiments deemed this study unethical. The report, authored by 13 private citizens specializing in nuclear medicine, bioethics, and law stated very clearly:

> "As a consequence of exposure to radon and its daughter products in underground uranium mines, at least several hundred miners died of lung cancer and surviving miners remain at elevated risk. These men, who were subject of government study as they mined uranium for use in weapons manufacturing, were subject to radon exposures well in excess of levels known to be hazardous. The government failed to act to require the reduction of the hazard by ventilating the mines and it failed to adequately warn the miners of the hazard to which they were being exposed."[21]

Exposure is not limited to miners. The communities surrounding mines and mills are also at risk for exposure. Off-site releases from natural disasters like floods and earthquakes, or even human error, amplify the threat as thorium and radium—the radon decay products present in uranium tailings—can become airborne or seep into the environment

13 Nuclear Care Partners. (2022, Summer). Humor in the face of danger: A uranium miner's unique experience in the mines. Nuclear Care Partners. https://www.nuclearcarepartners.com/experience-in-the-mines/
14 Committee on Uranium Mining in Virginia, Committee on Earth Resources, & National Research Council. (2011, December 19). Potential human health effects of uranium mining, processing, and reclamation. In Uranium mining in Virginia: Scientific, technical, environmental, human health and safety, and regulatory aspects of uranium mining and processing in Virginia. National Academies Press. https://www.ncbi.nlm.nih.gov/books/NBK201047/
15 Keyanna, T., Neal, R., & Roybal, C. (2024, February). The health impacts of uranium mining in Native American communities. Native American Budget & Policy Institute. https://nabpi.unm.edu/assets/documents/research/health-impacts-uranium-mining-policy-brief-final.pdf
16 Royal Society. (2001). The health hazards of depleted uranium munitions, Part 1. Carlton House Terrace, London. Royal Society. http://royalsociety.org/The-health-hazards-of-depleted-uranium-munitions-Part-1-Full-Report/
17 Keyanna, T., Neal, R., & Roybal, C. (2024, February). The health impacts of uranium mining in Native American communities. Native American Budget & Policy Institute. https://nabpi.unm.edu/assets/documents/research/health-impacts-uranium-mining-policy-brief-final.pdf
18 Keyanna, T., Neal, R., & Roybal, C. (2024, February). The health impacts of uranium mining in Native American communities. Native American Budget & Policy Institute. https://nabpi.unm.edu/assets/documents/research/health-impacts-uranium-mining-policy-brief-final.pdf
19 ibid
20 Advisory Committee on Human Radiation Experiments. (1995, October 24). Final report (R. R. Faden, Chair). U.S. Department of Energy, Office of Scientific and Technical Information (OSTI). https://www.osti.gov/servlets/purl/120931
21 ibid

and water supply, thus increasing the chance of cancer in the nearby population.[22] Outside of disastrous releases, families would have also been exposed to radiation daily through contact; for example wives who washed their husbands' contaminated clothing.

Church Rock Mill Spill

The Navajo Nation chapter of Church Rock, New Mexico is home to significant archaeological sites including kiva circles and Anasazi dwellings, as well as 20 abandoned uranium mines (see Figure 1).[23] Most of these mines were developed between the 1950s and 1960s as part of AEC's uranium mining boom for use in the U.S. nuclear weapons program.[24]

FIGURE 1: ABANDONED URANIUM MINING FACILITIES IN THE CHURCH ROCK AREA

SITE NAME	YEARS IN OPERATION	ORE OR TAILINGS PRODUCED IN TONS
BECENTI OPEN PIT MINE	1952-58	846
BECENTI UNDERGROUND MINE	1958-69	8,563
C D & S OPEN PIT MINE	1957	57
CHRISTENSEN UNDERGROUND MINE	1953-58	UNKNOWN
CHURCH ROCK UNDERGROUND MINE	1972-86	400,000
EASTERN SHAFT OF CHURCH ROCK UNDERGROUND MINE	1979-85	UNKNOWN
CHURCH ROCK WASTE DUMP	1978-82	UNKNOWN
CHURCH ROCK URANIUM MILL AND TAILINGS FACILITY	1975-86	3.5 MILLION
DIAMOND UNDERGROUND MINE	1952-70	47,181
FOUTZ CAVED PIT #1	1953-54	324
FOUTZ CAVED PIT #2	1953-54	242
FOUTZ CAVED PIT #3	1953-55	2,412
GRACE NUCLEAR	1975	0
HOGBACK	1952-60	6,354
NORTHEAST CHURCH ROCK MINE	1968-82	400,000
OLD CHURCHROCK MINE	1960-62; 1976-82	77,955
RAT'S NEST MINE	1957-58	324
TETON PILOT IN SITU MINE	1980	0

22 Committee on Uranium Mining in Virginia, Committee on Earth Resources, & National Research Council. (2011, December 19). Potential human health effects of uranium mining, processing, and reclamation. In Uranium mining in Virginia: Scientific, technical, environmental, human health and safety, and regulatory aspects of uranium mining and processing in Virginia. National Academies Press. https://www.ncbi.nlm.nih.gov/books/NBK201047/

23 Navajo Nation Division of Community Development. (n.d.). Church Rock. Navajo Nation Profile. https://navajoprofile.wind.enavajo.org/Chapter/Church%20Rock

24 Shuey, C., Ronca-Battista, M., Southwest Research and Information Center, Navajo Nation Environmental Protection Agency, Navajo Nation Abandoned Mine Lands Department, Tribal Air Monitoring Support Center, & U.S. Environmental Protection Agency. (2007). Church Rock uranium monitoring project 2003-2007. Church Rock Chapter (through Navajo Education & Scholarship Foundation). https://commons.clarku.edu/churchrock/1

FIGURE 1: ABANDONED URANIUM MINING FACILITIES IN THE CHURCH ROCK AREA

SITE NAME	YEARS IN OPERATION	ORE OR TAILINGS PRODUCED IN TONS
WESTWATER UNDERGROUND MINE	1957-60	4,713
WILLIAMS & REYNOLDS OPEN PIT MINE	1953-58	2,560

Adapted From: "Church Rock uranium monitoring project 2003-2007," Shuey, C & Ronca-Battista, M, 2007[25]

After extracting the ore from the mines, workers transported it to a mill where it was mixed in sulfuric acid to separate out the uranium. The leftover acidic waste from the milling process sat in ponds or often unlined pools in the ground.[26] The Church Rock Uranium Mill, owned by United Nuclear Corporation, was a central mill to surrounding mines. In the 1970s, the dam surrounding the tailing ponds at the Church Rock Mill was identified by UNC consultants and federal agencies as at risk for damage from being built on faulty geological integrity. Work continued despite this, and the ponds grew daily with more hazardous waste. Long splinters were seen in the earthen dam by 1977 but went unreported.[27]

On July 16, 1979 the dam broke; 94 million gallons of uranium and heavy metals flowed into the Puerco River in "the largest single release of liquid radioactive waste."[28] The flow continued for at least two hours– dispersing effluent 100 miles downriver before it was stopped.[29] Sheep and goats were irradiated from eating the grass near the river and drinking its contaminates. The local Native population fished, swam in, drank from, and irrigated with water from the Puerco river. In one singular release, radioactive waste contaminated the environment upon which the community rested much of their agriculture, economy, spirituality, and livelihoods.[30]

In contrast to the more famous Three Mile Island accident that occurred earlier that same year, the Church Rock Mill flood released three times more radioactive curies.[31] However, there were no evacuation plans, mass media stories, or long-term plans to care for the victims. When the local emergency coordinating committee asked the New Mexico Governor to declare a state of emergency and assistance to McKinley County, it was denied.[32] The UNC removed 3,500 tons of contaminated soil from just ten miles of the river.[33]

Despite the catastrophic event, the United Nuclear Corporation worried about its loss of profits from halting production, so they appealed to the Nuclear Regulatory Commission. The NRC allowed them to resume operations just three months later. Since the lined lagoon dikes were broken, UNC threw tailings into unlined ponds, allowing the waste to leak into the groundwater.[34]

25 Shuey, C., Ronca-Battista, M., Southwest Research and Information Center, Navajo Nation Environmental Protection Agency, Navajo Nation Abandoned Mine Lands Department, Tribal Air Monitoring Support Center, & U.S. Environmental Protection Agency. (2007). Church Rock uranium monitoring project 2003-2007. Church Rock Chapter (through Navajo Education & Scholarship Foundation). https://commons.clarku.edu/churchrock/1

26 Arnold C. (2014). Once upon a mine: the legacy of uranium on the Navajo Nation. Environmental health perspectives, 122(2), A44–A49. https://doi.org/10.1289/ehp.122-A44

27 Brugge, D., deLemos, J. L., & Bui, C. (2007). The Sequoyah corporation fuels release and the Church Rock spill: unpublicized nuclear releases in American Indian communities. American journal of public health, 97(9), 1595–1600. https://doi.org/10.2105/AJPH.2006.103044

28 Millard, J., Gallaher, B., Baggett, D., & Gary, S. (1983, September). The Church Rock uranium mill tailings spill: A health and environmental assessment summary report. New Mexico Environmental Improvement Division, Health and Environment Department. https://semspub.epa.gov/work/06/1000720.pdf

29 ibid

30 Arnold C. (2014). Once upon a mine: the legacy of uranium on the Navajo Nation. Environmental health perspectives, 122(2), A44–A49. https://doi.org/10.1289/ehp.122-A44

31 Richards, L. M. (2013, April 22). On poisoned ground. Science History Institute. Retrieved March 18, 2025, from https://www.sciencehistory.org/stories/magazine/on-poisoned-ground/

32 Brugge, D., deLemos, J. L., & Bui, C. (2007). The Sequoyah corporation fuels release and the Church Rock spill: unpublicized nuclear releases in American Indian communities. American journal of public health, 97(9), 1595–1600. https://doi.org/10.2105/AJPH.2006.103044

33 ibid

34 ibid

The Center for Disease Control (CDC) conducted one six-person study on the impacts of the spill, but only factored in the possible inhalation of tailings, ignoring the more probable mode of exposure of ingestion of contaminated water or food.[35] They also concluded that the surface water was at a similar quality to how it was before the spill and that no water wells were contaminated. This conclusion is questionable based on community environmental and health surveys conducted 20 years after this study, and explained in the next section.

The Legacy, Today

Contamination persists in the environment today from both the catastrophic spill and everyday operations, as contaminated water was regularly washed into the soil and groundwater. Families around the abandoned mine and mill sites reckon with the contamination that has seeped into their bodies and bloodlines. Children who were not yet alive when the mines were operational face illness, developmental disorders, and are denied access to their ancestral lands.[36]

Due to the lack of government- or UNC-supported studies to assess the impact of the spill on the community, local organizations and researchers embarked on the long, resource-intensive task themselves. One study, conducted 25 years after the Church Rock spill and 20 years after mining operations ceased in the area, found contamination of well water and high levels of gamma radiation in soil in residential areas.[37] The following table shows the 17 wells in the Church Rock area. The columns list the chemicals, heavy metals, and radionuclides which exceeded the normal range for U.S. Environmental Protection Agency (EPA) standards. All wells were used for livestock and some were for mixed domestic use. All wells show contamination outside the ranges of safe EPA standards. While not used for drinking water, it was used to water livestock, which many families relied on for food or livelihood. Families possibly bathed, washed clothes, and watered gardens with the water of domestic-purpose wells. The samples were taken between 2003 and 2006. At that time 13 out of 17 of the wells were operational. The four inoperational or abandoned wells were Solar St, Friendship I, Nose Rock, and King Ranch.[38]

FIGURE 2: CHURCH ROCK-AREA WELLS AND LISTED CONTAMINANTS EXCEEDING USEPA STANDARDS

WELL	CHEMICAL CONCENTRATION	HEAVY METALS	RADIONUCLIDES
ANNIE GREY	CALCIUM, SULFATE, DISSOLVED SOLIDS		
SOLAR ST	CALCIUM, SULFATE, DISSOLVED SOLIDS, CONDUCTIVITY	IRON	
BROWN BULL	SULFATE, PH, DISSOLVED SOLIDS, TOTAL HARDNESS	IRON	
FRIENDSHIP I	CALCIUM, SULFATE, TOTAL HARDNESS, CONDUCTIVITY	ARSENIC, SELENIUM, IRON	
PIPELINE CYN	DISSOLVED SOLIDS, CALCIUM, SULFATE	ARSENIC, SELENIUM, IRON	

35 Millard, J., Gallaher, B., Baggett, D., & Gary, S. (1983, September). The Church Rock uranium mill tailings spill: A health and environmental assessment summary report. New Mexico Environmental Improvement Division, Health and Environment Department. https://semspub.epa.gov/work/06/1000720.pdf

36 Navajo Birth Cohort Study. (2021, October 14). Navajo Birth Cohort Study. ECHO (Environmental influences on Child Health Outcomes) powerpoint presentation. Southwest Research and Information Center. http://sric.org/nbcs/docs/NBCS%20update%20for%20TCRHCC%2010%2014%202021.pdf

37 Shuey, C., Ronca-Battista, M., Southwest Research and Information Center, Navajo Nation Environmental Protection Agency, Navajo Nation Abandoned Mine Lands Department, Tribal Air Monitoring Support Center, & U.S. Environmental Protection Agency. (2007). Church Rock uranium monitoring project 2003-2007. Church Rock Chapter (through Navajo Education & Scholarship Foundation). https://commons.clarku.edu/churchrock/1

38 ibid

FIGURE 2: CHURCH ROCK-AREA WELLS AND LISTED CONTAMINANTS EXCEEDING USEPA STANDARDS

WELL	CHEMICAL CONCENTRATION	HEAVY METALS	RADIONUCLIDES
LIME RIDGE			ALPHA RADIATION, URANIUM MASS (UG/L)
PUERCO NORTH FORK	DISSOLVED SOLIDS, CONDUCTIVITY	IRON	
WINDMILL CLUSTER	DISSOLVED SOLIDS, CALCIUM, TOTAL HARDNESS, SULFATE, CONDUCTIVITY	ARSENIC, IRON	
LOBO VALLEY	DISSOLVED SOLIDS, PH		
NOSE ROCK		ARSENIC	
SUPERMAN	DISSOLVED SOLIDS, SULFATE PH	ARSENIC, SELENIUM, IRON	
COAL MINE	PH	SELENIUM	
KING RANCH	DISSOLVED SOLIDS, TOTAL HARDNESS, SULFATE	IRON	ALPHA RADIATION, RADIUM-226, RADIUM-228
YAZZLE FAMILY	DISSOLVED SOLIDS, CHLORIDE, PH, CONDUCTIVITY	SELENIUM	
UPHILL ROAD	SULFATE, CONDUCTIVITY	IRON	
CHAPTER HOUSE WELL	PH, CONDUCTIVITY	FLUORIDE, IRON	
2ND CANYON	PH	IRON, FLUORIDE	

Adapted From: "Church Rock uranium monitoring project 2003-2007," Shuey, C & Ronca-Battista, M, 2007

Well, surface, and ground water samples showed significant contamination. None of the 17 wells in the study were safe for human water consumption. Mine water effluent, a regular release not resulting from the mill spill, also contributed to pollution of the environment. Even treated water discharged from the mines into the Puerco River was considered unsuitable for human or livestock use from the 1960s-80s, despite the fact that livestock watering from the river was common practice.[39] This water also contaminated groundwater making it unfit for human or livestock consumption.

The study also tested homes around the Church Rock mine area for radon levels, and found that 25 percent of the homes exceeded 4.0 pCi/l-air radon. Exposure to this level for eight hours a day presents the same lifetime risk of lung cancer as smoking two packs of cigarettes a day.[40]

Years of radiation exposure have had significant health consequences to both workers and the general public. Health surveys in the community are limited, but the health impacts from long term mining and milling are clear. The DiNEH Project, a community health assessment funded by the National Institute of Environmental Health Sciences conducted in 2009, showed two to four times higher rates of kidney disease in people living within five miles of uranium mine sites, and "hypertension, kidney disease, diabetes, and autoimmune disease increased as the number of mines in a chapter increased."[41] A 2023 study examining DiNEH project samples of Navajo community members

39 ibid

40 Shuey, C., Ronca-Battista, M., Southwest Research and Information Center, Navajo Nation Environmental Protection Agency, Navajo Nation Abandoned Mine Lands Department, Tribal Air Monitoring Support Center, & U.S. Environmental Protection Agency. (2007). Church Rock uranium monitoring project 2003-2007. Church Rock Chapter (through Navajo Education & Scholarship Foundation). https://commons.clarku.edu/churchrock/1

41 Lewis, J. (2009, November 4). Uranium legacy: Impacts on health of residents: DiNEH project update. EPA Stakeholders' Workshop. U.S. Environmental Protection Agency. https://archive.epa.gov/region9/superfund/web/pdf/wplenary-johnnyelewis-dineh.pdf

living close to uranium mine sites found indicators of autoimmune disease more than double the average U.S. autoimmune disease prevalence rate.[42]

In the nearby mining community of Shiprock, a community-driven study found that babies of women living near the mine were 1.83 times more likely to have birth defects.[43] This study inspired the Navajo Birth Cohort Study, which monitored uranium concentrations in urine and blood samples as well as neurodevelopmental assessments of children as they grew. The more than 1,000 participants that they assessed had median uranium concentrations above the national median. Figure 3 depicts the sample population, with the black line indicating the national median.

Uranium exposures in children in the study reached adult level concentrations by age four. Students in the cohort scored below average on verbal development scores. The study also indicated risk of preterm birth that could contribute to significant negative health outcomes for both mother and baby.[44] Living with multiple health conditions and seeing the degradation of their native lands have contributed to adverse mental health outcomes, and substance abuse, anxiety, depression, bipolar disorders have impacted this community.[45]

One of the communities that lives among the mines and at ground zero of the mill spill is the Diné community on Red Water Pond Road. The Multicultural Alliance for a Safe Environment formed to unite uranium mining communities to share their experiences. In one video testimony gathered by the group, Teracita Keyanna, an advocate for uranium mining community health, shared how she has seen family members and livestock sickened from the legacy of mining on their land. Teracita's family home was declared a Superfund site–an area containing hazardous waste and requiring long-term cleanup–and the EPA gave them the option to move into the city, off of their native reservation lands. This decision was hard, as her community has a close connection with the environment and history on their land, but as a mother, she also worried about the health of their children. In a video testimony for the Multicultural Alliance for a Safe Environment, She said that she misses her home, standing on the mesa, and not having to lock her doors at night like she does now living in the city.[46]

The Superfund program, established in 1980 by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), requires responsible parties to fund—and where there are no responsible parties identified—provides funds to address the United States' most dangerous hazardous waste sites. Since 1994, the EPA has worked with the Navajo Nation through the Superfund program, meeting regularly with the Navajo Nation Environmental Protection Agency and collaborating with chapter governments, but more work is needed. Through Superfund and private companies, who are held liable through lawsuits and settlements, funding is available to clean up 230 of the 523 abandoned uranium mines. Since 2007 there have been two five-year plans consisting of scoping surveys and recommendations for studying soil around the site, as well as a ten-year plan to clean up the sites. The current ten-year plan will work towards addressing the cleanup at those 230 sites. The program also includes groundwater remediation plans, well water studies, and support for community health services. The EPA's 2023 Removal Assessment Report identified areas of radioactive waste that have moved onto residents'

42 Erdei, E., Shuey, C., Miller, C., Hoover, J., Cajero, M., & Lewis, J. (2023). Metal mixture exposures and multiplexed autoantibody screening in Navajo communities exposed to uranium mine wastes. Journal of translational autoimmunity, 6, 100201. https://doi.org/10.1016/j.jtauto.2023.100201

43 Shields, L. M., Wiese, W. H., Skipper, B. J., Charley, B., & Benally, L. (1992). Navajo birth outcomes in the Shiprock uranium mining area. Health physics, 63(5), 542–551. https://doi.org/10.1097/00004032-199211000-00005

44 Navajo Birth Cohort Study. (2021, October 14). Navajo Birth Cohort Study, ECHO (Environmental influences on Child Health Outcomes) powerpoint presentation. Southwest Research and Information Center. http://sric.org/nbcs/docs/NBCS%20update%20for%20TCRHCC%2010%2014%202021.pdf

45 Keyanna, T., Neal, R., & Roybal, C. (2024, February). The health impacts of uranium mining in Native American communities. Native American Budget & Policy Institute. https://nabpi.unm.edu/assets/documents/research/health-impacts-uranium-mining-policy-brief-final.pdf

46 Red Water Pond Road Community Association. (2020, July 15). Teracita Keyanna. Retrieved March 18, 2025, from https://swuraniumimpacts.org/teracita-keyanna/

grazing lands, migrated off site by wind and rain, and eroded downstream.[47] The next step in the ten-year plan is an Engineering Evaluation and Cost Analysis.[48]

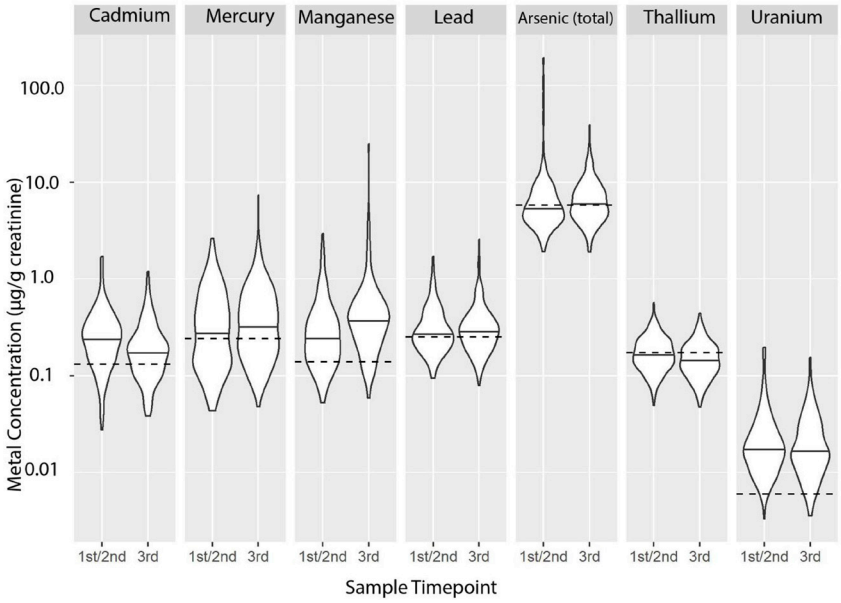


FIGURE 3: LEVEL OF URANIUM PRESENT IN URINE SAMPLES OF THE NAVAJO BIRTH COHORT STUDY COMPARED TO U.S. MEDIAN; FROM: "NAVAJO BIRTH COHORT STUDY, ECHO (ENVIRONMENTAL INFLUENCES ON CHILD HEALTH OUTCOMES) POWERPOINT PRESENTATION" NAVAJO BIRTH COHORT STUDY, 2021

Even while the land is contaminated and undergoing costly cleanup programs, extractivist corporations still seek to exploit the land. Today, uranium mining is primarily used for the generation of nuclear energy, but could still be used for weapons because of its dual-use purpose. In 2016, Laramide, a company "engaged in the exploration and development of high-quality uranium assets," purchased the Church Rock property from Uranium Resources Inc. Laramide described Church Rock as an "advanced stage portfolio of high-quality In Situ Recovery ("ISR") projects which have near-term development potential and significant mineral resources." Laramide expects to extract profit from the area, noting the "Transaction provides both companies with an opportunity to realise value from assets and provides Laramide with a low cost production opportunity."[49]

47 Tetra Tech, Inc. (2023, August 25). Old Church Rock Mine Removal Assessment Report. Submitted to the U.S. Environmental Protection Agency.

48 U.S. Environmental Protection Agency. (2025, January 27). Old Church Rock Mine. Retrieved April 16, 2025, from https://www.epa.gov/navajo-nation-uranium-cleanup/old-church-rock-mine

49 Laramide Resources Ltd. (2015, December 31). Laramide Resources executes definitive share purchase agreement to acquire the Church Rock and Crownpoint ISR projects in New Mexico. https://laramide.com/laramide-resources-executes-definitive-share-purchase-agreement-to-acquire-the-church-rock-and-crownpoint-isr-projects-in-new-mexico/

Enrichment/Processing: Oak Ridge, Tennessee and Hanford, Washington

> "I want those who read our stories to understand that Hanford operations caused grave physical and emotional harm. The care required to protect the public in the process of manufacturing nuclear weapons needs to be understood if we, as a country, are to continue to produce and stockpile these weapons"
>
> MARLENE CAMPBELL, FROM THE BOOK "HANFORD PLAINTIFFS: VOICES FROM THE FIGHT FOR ATOMIC JUSTICE" BY TRISHA PRITIKIN

After getting extracted from the earth and exposing miners and their communities to radiation, natural uranium ore is brought to an enrichment plant to increase the concentration of the U-235 isotope for it to be "weapons grade."

The Secret Cities: The Manhattan Project Era

In 1942, two "secret cities" were created in Hanford, Washington, and Oak Ridge, Tennessee as part of the Manhattan Project to enrich the uranium and separate the plutonium required to make nuclear bombs. At the conclusion of the project, "Fat Man" and "Little Boy" were dropped on Nagasaki and Hiroshima, killing over 80,000 people instantly. The enrichment process also sickened and killed Americans along the way.

The two sites serve as a symbol for the rest of the nuclear enterprise. Despite massive environmental and public health catastrophes surrounding the now-abandoned radioactive Hanford site, the Oak Ridge Reservation across the country continues to operate despite similar histories. This demonstrates how the nuclear enterprise continues to produce without addressing past harms and without taking lessons to reduce present risks. The defense industry's hunger is ravenous, allowing no reductions in production to address the contamination.

The Hanford plant's final plutonium reactor shut down in 1989, and the plant is now abandoned. Even though it is not in operation today, the destruction it did to the public health of surrounding communities persists, and waste at the site leaks from eroding storage containers. While many of the legacy sites at Oak Ridge have been abandoned, and—similar to Hanford—continue to contaminate the surrounding area, Oak Ridge still serves as a crucial site for nuclear energy and weapons. The two sites' legacies did not end at the conclusion of WWII: they continued through years of environmental remediation, communities sickened, massive hazardous waste releases, radiation exposures, congressional hearings, and lawsuits.

During the Manhattan Project era, many workers at both Hanford and Oak Ridge had no idea what they were producing and thus were not aware of the hazards of their work. The jobs paid working-class people middle-class salaries and provided cheap housing, at the cost of working with radioactive chemicals without protective equipment. In Hanford, General Groves, the leader of the Manhattan Project, ordered the reduction of cooling time for the radioactive fuel, which normally required 120 days to reduce the radioactive exposure to workers. Thus young lab techs at Hanford removed fuel rods before cooling, releasing around 75,000 curies of radiation a month. Groves objected to informing workers at the plants of the health hazards, for fear that it would dissuade workers and slow progress.[50]

The Manhattan Project had many scientists working to understand the health effects of radiation contaminants, but this knowledge was neither communicated to the public nor across the entirety of the Project workforce. Even in the 1940s, project directors at Hanford knew that small quantities of plutonium waste in soil and water transferred dangerous levels of radiation to crops and livestock. In 1945, scientists found more than a thousand times the

50 Brown, Kate (Kathryn L.). (2013). Plutopia : nuclear families, atomic cities, and the great Soviet and American plutonium disasters. Oxford :Oxford University Press.

permissible level of radioiodine in the thyroids of sheep near the Hanford reservation. Instead of working to reduce the levels of pollution, Manhattan Project scientists analyzed this information for the possible weaponization of radioactive waste on an adversary population.[51]

Minority and native communities were heavily exploited in the race to build the bomb. Often poor and Black workers did the most risky work around hazardous waste. Joe Williams worked at Hanford where plutonium was separated from radioactive fuel slugs. "I was assigned out as being chief rubberizer... Weren't but eight peoples in the United States in that trade and I was dumb enough to be one out [of] the eight," he said of his time at the plant.[52] Housing in the secret cities was reserved for white wealthier families, where access to good schools and doctors were provided. The cities surrounding the Hanford plant were racially segregated, and Black and Mexican-American communities were subject to poor living conditions. The Wannapum Native American tribe of Washington was denied access to their traditional fishing grounds, which they would access through the land that became fenced off around the Hanford reservation. Radioactive effluent flowed into their river, sickening the fish.[53] The Wannapum tribe still cannot return to their native fishing land due to the radioactive contamination of the site.

Due to the nature of radiation, denial of responsibility by the government and corporations in court was possible because health consequences and the geography of impacted communities were not uniform: radioactive hot spots do not form perfect circles around the original source and dilute linearly as distance grows; due to varying wind patterns and geographic formations like mountains, radioactive hot spots are not patterned. For example, hot spots popped up 50 miles away from the Hanford reactor with 2.5 times the permissible environmental dose. When communities sought justice for their health conditions, the government or industry could point to a community that was closer to the plant but did not receive a high dose of radiation or negative health effects. Secondly, radiation does not cause uniform health effects. A 1944 experiment by Manhattan Project scientists that exposed mice to radiation revealed that while most mice died, no two deaths were alike. Many of their immune systems were weakened from exposure, so it looked like they died from common tuberculosis or pneumonia. This phenomenon occurred in Oak Ridge, where there were cases of tuberculosis outbreaks, but residents could not prove that it was linked to the radiation.[54] The combination of irregular geographic dispersion and nonuniform outcomes to exposure put plaintiffs seeking justice or workers applying for compensation at a disadvantage.

Since the declassification of reports of radiation releases in 1986, surrounding community members have realized that many of their illnesses are related to Hanford contamination. The most common ailments that they face are thyroid issues: goiters, hypo- and hyperthyroidism, Hashimoto's disease, and thyroid cancers. A previous litigation attempt—discussed further in Section Four—by Utah downwind farmers to gain compensation from the U.S. government for their sheep failed because the government was granted sovereign immunity in the courts. Hanford downwinders learned from this and in 1991, five thousand community members who believed they were sick from Hanford operations filed suit against the corporations that operated at Hanford for the government: General Electric, E.I. du Pont de Nemours, Atlantic Richfield Co., United Nuclear, and Rockwell International. However, due to the Price-Anderson Act—a government agreement with companies who produced plutonium for U.S. nuclear weapons systems—these corporations' legal fees were entirely paid for by the United States government.[55] Without having to pay out of pocket, the companies were able to drag out the case. One health study known as the Battelle Team Dose Reconstruction Project—paid for by the government—used flawed dose reconstruction methods, but this scientific study was wielded against the plaintiffs, concluding they were not exposed to

51 ibid
52 Arata, L., Bauman, R., Franklin, R., & Marceau, T. E. (2022). Echoes of exclusion and resistance. WSU Press.
53 ibid
54 Brown, Kate (Kathryn L.). (2013). Plutopia : nuclear families, atomic cities, and the great Soviet and American plutonium disasters. Oxford :Oxford University Press.
55 Addicott, Chris. (1997) Double Indemnity for Operators of Nuclear Facilities? In re Hanford Nuclear Reservation Litigation, the Price-Anderson Act, and the Government Contractor Defense. Washington Law Review. https://digitalcommons.law.uw.edu/cgi/viewcontent.cgi?article=4187&context=wlr

dangerous levels of radiation.[56] Many of the personnel who worked on the study had also worked for the same law firm that defended the corporations, a glaring conflict of interest that the courts did not address.[57] In the end, two downwinders were awarded $545,000. In comparison, taxpayers paid for $70 million in dose studies and $80 million for the legal fees of the corporations, all so the responsible companies could avoid paying out settlements or awarding the sickened communities.[58]

In Trisha Pritkins' book, The Hanford Plaintiffs, around one hundred of the thousands of plaintiffs from the trial explained their exposure to Hanford contaminants and their resulting health effects. The plaintiffs' families were also widely affected; many of the community members who were alive at the peak of Hanford contamination release had offspring who suffered similar ailments that can be linked to radiation exposure. Some of the symptoms community members and their offspring faced include allergies, dry eyes, diarrhea, severe joint pains, rashes, fatigue, chronic sore throat, and lightheadedness. Some of the diseases that are not thyroid related include Non-Hodgkin lymphoma, acute myeloid leukemia, rheumatoid arthritis, osteoporosis, diverticulitis, bone cancer, COPD, prostate cancer, cataracts, and heart disease.[59]

Operations for plutonium processing ran for around 30 years at Hanford. In 1989, the Department of Energy, the EPA, and the Washington State Department of Ecology signed an agreement to cooperate on the hazardous waste management of Hanford. But today, the site is still considered the most radioactive site in the United States. Approximately 56 million gallons of waste at Hanford sits in 177 underground storage drums that were originally built during the Manhattan Project era to last 20 years.[60]

Despite the disastrous public health consequences, Hanford's twin city of Oak Ridge continues operations for nuclear weapons production today, despite pollution into nearby rivers, exposure to residents, and contaminated Manhattan Project buildings falling apart.

Oak Ridge Contamination

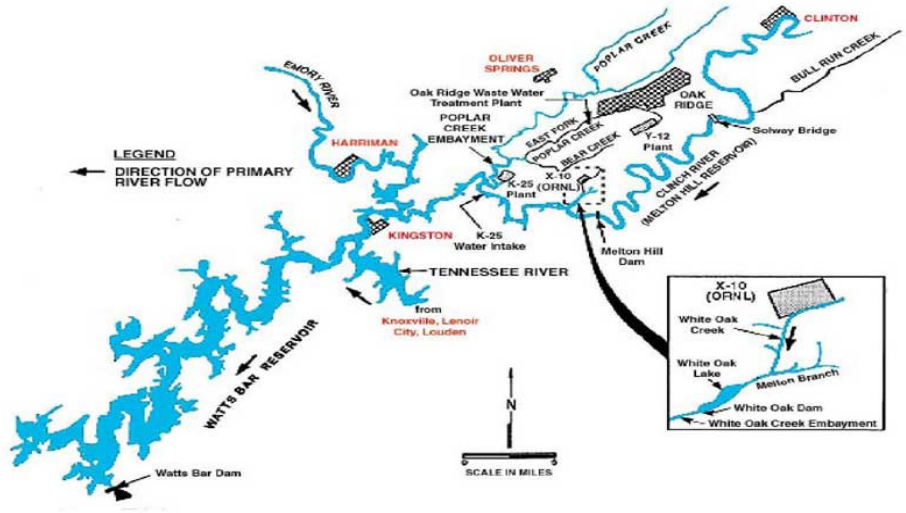
The Oak Ridge Reservation includes three sites pertinent to the nuclear weapons industry: the Y-12 plant and K-25 plants for enriching uranium, and the X-10 site for separating plutonium. Multiple creeks run through the Oak Ridge Reservation, including one which feeds into the Clinch River and eventually the Watts Bar Reservoir. These sites released radionuclides, mercury, and Polychlorinated Biphenyl (PCBs) pollutants into water, the atmosphere, and soil, with the majority of contaminating releases occurring between 1950s to the 1980s. Radionuclides and chemicals from these operations are still present in the soil and contaminate 82 miles of the river and lake to this day.[61] Figure 4 shows the close proximity of these plants to Tennessee water sources. Rain and wind erosion create an easy pathway for contaminants to flow into creeks that connect to the larger Clinch River.

The plants related to nuclear weapons production are marked with a history of chemical and radionuclide releases into the surrounding environment. From 1950-1982, the Y-12 plant released 70,000 pounds of mercury into the

56 Pritikin, T. T. (2020). The Hanford plaintiffs: Voices from the fight for atomic justice (Foreword by R. C. Eymann & T. H. Foulds). University Press of Kansas.
57 ibid
58 ibid
59 ibid
60 Washington State Department of Ecology. (n.d.). Hanford overview. https://ecology.wa.gov/waste-toxics/nuclear-waste/hanford-cleanup/hanford-overview. Accessed February 20, 2025.
61 Oak Ridge Health Agreement Steering Panel. (1999, December). Releases of contaminants from Oak Ridge facilities and risks to public health (Final report). Tennessee Department of Health. https://www.tn.gov/content/dam/tn/health/documents/healthy-places/appletree/oak-ridge-health-studies/ORHS_Final_Report_ORHASP_1999.pdf ; U.S. Environmental Protection Agency. (n.d.). Oak Ridge Reservation (USDOE) | Superfund Site Profile. Retrieved April 16, 2025, from https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0404152

atmosphere and 280,000 pounds into the nearby East Poplar Creek.[62] PCBs were used at all the facilities due to their nonflammable properties. PCBs flowed from K-25 and Y-12 into nearby water sources and posed a risk of illness to people eating fish from the Clinch River. From 1944 to 1956, the X-10 plant released between 9,000 40,000 curies of radioiodine into the atmosphere. The Tennessee Department of Health estimated 1999 that radioactive iodine released from the X-10 plant during this period of operations contributed to 25-150 cases of thyroid cancers.[63]

Figure 4. Location of White Oak Creek and the Relationship Between X-10, White Oak Lake, White Oak Dam, the Clinch River, and the Watts Bar Reservoir



Source: ChemRisk 1993b

FIGURE 4: LOCATION OF Y-12, K-25 AND X-10 IN RELATIONSHIP WITH WHITE OAK CREEK AND CLINCH RIVER; FROM: "PUBLIC HEALTH ASSESSMENT: WHITE OAK CREEK RADIONUCLIDE RELEASES, OAK RIDGE RESERVATION," AGENCY FOR TOXIC SUBSTANCES AND DISEASE 2006[1]

When the facilities were originally constructed in 1943, the government planned to release the radionuclide waste into the man-made White Oak lake as a settling basin, but the radionuclides overflowed past the dam into the Clinch River. The Agency for Toxic Substances and Disease Registry (ATSDR), a federal health agency within the Department of Health and Human Services, conducted an evaluation of other radionuclides released into the White Oak Creek and Clinch River from the X-10 plant in 2006. An estimated 200,000 curies of radioactive waste flowed into the Clinch River, and sediment and water from the river flowed further down into the Watts Bar Dam. The ATSDR claimed "their concentrations will dilute" and "past current, and future exposures to radionuclides released from White Oak Creek to the Clinch River/Lower Watts Bar Reservoir are not a public health hazard."[64] The accuracy and reliability of ATSDR investigations are discussed in Section Five of this report.

1 Agency for Toxic Substances and Disease Registry. (2006, August). Public health assessment: White Oak Creek radionuclide releases, Oak Ridge Reservation (USDOE), Oak Ridge, Roane County, Tennessee (EPA Facility ID: TN1890090003). U.S. Department of Health and Human Services. https://www.atsdr.cdc.gov/hac/pha/oakridge0806-tn/oakcreek_part1.pdf

62 Oak Ridge Health Agreement Steering Panel. (1999, December). Releases of contaminants from Oak Ridge facilities and risks to public health (Final report). Tennessee Department of Health. https://www.tn.gov/content/dam/tn/health/documents/healthy-places/appletree/oak-ridge-health-studies/ORHS_Final_Report_ORHASP_1999.pdf ; Agency for Toxic Substances and Disease Registry (ATSDR). (1999). Public health assessment, Oak Ridge Reservation (USDOE) Y-12 uranium releases. Centers for Disease Control and Prevention. https://www.atsdr.cdc.gov/hac/pha/oakridgey12/oak_p4.html

63 Oak Ridge Health Agreement Steering Panel. (1999, December). Releases of contaminants from Oak Ridge facilities and risks to public health (Final report). Tennessee Department of Health. https://www.tn.gov/content/dam/tn/health/documents/healthy-places/appletree/oak-ridge-health-studies/ORHS_Final_Report_ORHASP_1999.pdf

64 Agency for Toxic Substances and Disease Registry. (2006, August). Public health assessment: White Oak Creek radionuclide releases, Oak Ridge Reservation (US DOE), Oak Ridge, Roane County, Tennessee. Retrieved March 20, 2025, from https://www.atsdr.cdc.gov/hac/pha/OakRidge0806-TN/whiteoakcreek/woc_p1.html

FIGURE 5: TOTAL DISCHARGE OF RADIONUCLIDES IN CURIES 1949-1994

RADIONUCLIDE OF CONCERN	CESIUM 137	RUTHENIUM 106	STRONTIUM 90	CERIUM 144	ZIRCONIUM 95	IODINE 131	COBALT 60
ESTIMATED DISCHARGES FROM WHITE OAK CREEK	699.6	6,931.6	1,214.6	341.93	376.61	175.33	325.58
PEAK ANNUAL RELEASES FROM WHITE OAK DAM	200	2,100	190	94	210	68	85

Adapted From: "Public health assessment:White Oak Creek radionuclide releases, Oak Ridge Reservation," Agency for Toxic Substances and Disease Registry, 2006

The ingestion exposure pathways for these chemicals and radionuclides result in increased risk of illness for women, children, and poorer communities. The Oak Ridge Health Agreement Steering Panel identified "local children drinking milk from a 'backyard' cow or goat in the early 1950s, and fetuses carried in the 1950s and early 1960s by women who routinely ate fish taken from the contaminated creeks and rivers located downstream," were most at risk to exposure from contaminants. Chemicals and radionuclides become more concentrated as they move up the food chain in a process called biomagnification, so when family cows or goats eat the grass grown from contaminated sediment or drink from the creek, contaminants are then concentrated in their milk. From the 1940s to 1970s, families living along the river often got much of their food supply from backyard gardens and milk from their own cattle or goats. Children played in the creek and ate fish that they caught from it. In a 1983 New York Times article, one member of the Scarboro community, a predominantly Black community living less than a mile from the complex and along Poplar creek, recounted eating bluegill from the creek and swimming in the creek. Since there was a high unemployment rate, he noted that fishing was a primary food source for community members.[65]

Today

This is not just a Manhattan Project-era issue. The buildings, waste, and contamination from this time period still linger on the campus and the surrounding environment. Former Manhattan Project facilities are crumbling: Oak Ridge facilities are responsible for 55% of the DoE's liability at legacy nuclear sites.[66] In 2023 the Department of Energy estimated that the cleanup of mercury, which Oak Ridge Environmental Management identified as the biggest environmental risk, is expected to cost $3.2 billion through 2043. The Government Accountability Office identified potential risks that could increase costs by $180 million in the best case to $1.2 billion in a worst case scenario, and could delay expected completion dates.[67]

The Department of Energy tore down K-25 in 2020 as part of the cleanup of "high risk excess contaminated facilities," but the soil surrounding it is still highly contaminated.[68] At the still-standing Y-12 complex, in 2025 workers found yellow uranium dripping down the walls. Additionally, crews found tubes of tritium and weapons-grade uranium sitting unguarded in an abandoned building.[69]

65 Smothers, R. (1983, May 26). Discovery of mercury contamination prompts dispute in Oak Ridge, Tenn. The New York Times. https://www.nytimes.com/1983/05/26/us/discovery-of-mercury-contamination-prompts-dispute-in-oak-ridge-tenn.html
66 Dassow, D. (2025, January 2). UCOR's Oak Ridge nuclear cleanup expands with ORNL, Y-12 demolitions. Knoxville News Sentinel. https://www.knoxnews.com/story/news/environment/2025/01/02/ucor-oak-ridge-nuclear-cleanup-expands-with-ornl-y12-demolitions/76949910007/
67 Government Accountability Office. (2024, September 12). Oak Ridge mercury cleanup: Opportunities exist to enhance risk management and technology development. U.S. Government Accountability Office. https://www.gao.gov/products/gao-24-107096
68 Dassow, D. (2025, January 2). UCOR's Oak Ridge nuclear cleanup expands with ORNL, Y-12 demolitions. Knoxville News Sentinel. https://www.knoxnews.com/story/news/environment/2025/01/02/ucor-oak-ridge-nuclear-cleanup-expands-with-ornl-y12-demolitions/76949910007/
69 ibid

Despite the dilapidated buildings on site, work continues at the Y-12 complex. New buildings are being built alongside demolition sites of the old buildings to keep up with the U.S. nuclear modernization program. The DOE and its contractors expect to demolish 100 buildings and extract 700,000 pounds of mercury contaminated soil. The buildings are so contaminated that demolition will require a lengthy process to ensure safety and health. More contamination could be spread if the project is done without precision. Alpha-2, a uranium enrichment facility built in 1944, is three stories tall and spans 2.5 acres. Crews deactivated parts of the building in 2023, and in February 2025 the south side of the building was demolished. The demolition process for this one building is set to be completed in 2027.[70] The crumbling Alpha-5 building, also poised for demolition, contains black mold and mercury particulates.[71]

Because the United States is modernizing its nuclear arsenal, work has increased at Oak Ridge. Today, Oak Ridge no longer enriches uranium, but manufactures and processes the "secondary" component of thermonuclear weapons using uranium and lithium. Oak Ridge recycles and refurbishes this secondary component for life-extension programs or dismantlement and storage. To keep up with modernization, Oak Ridge is constructing a new building for processing nuclear warheads while demolishing old, dangerous radioactive buildings.[72]

Operations at Hanford and Oak Ridge have undoubtedly polluted the surrounding environment and exposed local communities to hazardous radionuclides and chemicals. Contractors and government face no consequences and are not held responsible for negative health consequences. The hazards left behind by nuclear weapons production sit at Hanford and Oak Ridge while "cleanup" budgets go up and projected completion dates get pushed to the right. Meanwhile, new projects that will also produce waste are added to the calendar. American taxpayers pay for these programs, while downwinders grow sick and die without justice.

70 U.S. Department of Energy. (n.d.). Modernization. Oak Ridge Office of Environmental Management. https://www.energy.gov/orem/modernization. Accessed February 20, 2025.

71 Dassow, D. (2025, January 2). UCOR's Oak Ridge nuclear cleanup expands with ORNL, Y-12 demolitions. Knoxville News Sentinel. https://www.knoxnews.com/story/news/environment/2025/01/02/ucor-oak-ridge-nuclear-cleanup-expands-with-ornl-y12-demolitions/76949910007/

72 Werner, J. D., & Woolf, A. F. (2021, March 31). The U.S. nuclear weapons complex: Overview of Department of Energy sites (CRS Report No. R45306). Congressional Research Service. https://www.congress.gov/crs-product/R45306

Assembly and Disassembly: Amarillo, Texas

> "I am sitting here and I'm thinking of people that I've visited with. Obviously, there are lung cancers. There are bladder cancers and kidney cancers, and a lot of those are craftspeople. These will be construction, plumbers. And also guards. I've seen a lot of blood cancers, COPD, asthma, oral cancers—we've had several oral cancers, the pharynx, the hypopharynx, the nasopharynx."
>
> SARAH D. RAY, FILES CLAIMS FOR PANTEX WORKERS FOR THE EEOICPA, A QUOTE FROM PERSONAL COMMUNICATION

In Amarillo, Texas, the Pantex Plant is the sole weapons assembly and disassembly plant in the U.S. nuclear weapons enterprise. Pantex was not part of the Manhattan Project; it was built during WWII as a high explosives plant and shut down at the end of the war. In 1951, the Atomic Energy Commission reopened the plant for the purpose of atomic weapons assembly, but these activities were not made public until 1969. The plant was expanded in 1975 to become the sole nuclear weapons assembly and disassembly plant in the United States. In the 1990s, it became the storage site for 20,000 plutonium pits that were brought there after the FBI raid on the contaminated Rocky Flats plant. Today, the plant sits on over 16,000 acres of land and hosts over 300 buildings. Around half of the site is dedicated to storage and disposal, and 2,000 acres are dedicated to assembly and high-explosive machinery. The rest is owned by Texas Tech University as a buffer zone for site security and community safety and is used for agricultural research.[73]

At Pantex, workers assemble separate parts into final warheads for the Department of Defense. The combining of high explosives with nuclear materials—pits and secondaries—occurs in a highly restricted area within a containment cell. The below ground-level cells are separated and linked via tunnels with interlocking doors to minimize damage due to accidental detonations or leaks. After assembling the high explosives and nuclear materials, the "physics package" goes to mechanical assembly. A subsequent vacuum check to test against leaks, as well as a spin test, ensure the weapon does not leak radiation contaminants. After its paint job, it is staged for shipment by the Department of Defense, hosted in the same facility but in a separate room.[74] Within the stockpile, weapons are randomly pulled for nuclear surety testing. Once weapons are marked for disassembly, the parts come to Pantex and are checked for safety, evaluated, and sent back to their respective DOE facilities.[75]

Until the 1980s, the liquid waste used to cool and clean machines for the high explosives was piped into unlined ditches outside and then into artificial ponds or "playas," soaking into the soil and potentially groundwater, or otherwise evaporating. The metal tools used to work with the high explosives were lined with beryllium, which prevented sparks that could ignite the explosives, but beryllium is a toxic chemical, which chipped off tools and spread across the campus and onto the dirt outside before being blown into the air in dust storms.

Sarah D. Ray is a former worker at the Pantex plant. Much of her family worked at Pantex or other nuclear weapons enterprise locations in the United States. Her husband, who worked at Pantex, passed away from lung cancer. In a conversation with the author, Ray said that prior to the creation of Occupational Safety and Health Administration (OSHA) guidelines in the 1970s, it was common for chemicals, including DDT, to be poured onto the ground outside for disposal at Pantex. In addition to contamination of water sources, there was a risk that the particulates would be swept into the atmosphere or carried offsite. Amarillo's constant high winds, at around 30-50 mph, assist in carrying particulates.[76]

73 U.S. Department of Energy. (1990, February). Tiger Team Assessment of the Pantex Plant, Amarillo, Texas. Office of Scientific and Technical Information (OSTI). https://www.osti.gov/servlets/purl/7271831
74 National Institute for Occupational Safety and Health. (2004, March 30). Technical basis document for the Pantex Plant – Site description (ORAUT-TKBS-0013-2). Oak Ridge Associated Universities. https://www.cdc.gov/niosh/ocas/pdfs/arch/pantex2.pdf
75 ibid
76 S. Ray, personal communication, March 4, 2025

Additionally, solvents contaminated with high explosives were placed in unlined landfills or burning grounds, resulting in both radiation and chemical particle contamination in the surrounding environment.[77] In 1988 the Department of Energy "detected acetone, TCE, tetrahydrofuran, toluene, 1,2-dichloroethane, 2-butanone, tetrachloroethylene, and 1,1,1-trichloroethane in soil underlying a chemical burn pit used for evaporation and percolation of solvents contaminated with high explosives, and uranium in soil underlying firing grounds FS-4, FS-5, and FS-10."[78]

On May 17, 1989, a nuclear component containment failure led to an accidental release of radioactive tritium gas.[79] Workers evacuated as 40,000 curies of tritium were released from Cell 12-44-1 through an open valve to the room where the tunnels connected to the rest of the facility. According to the official report on the incident, "at approximately 4 p.m. on the day of the accident, a decision was made to vent the release through large doors in a warehouse, Building 12-42, connected to the Cell 12-44-I tunnel ramp. This venting would disperse the tritium directly to the outdoor environment and prevent its build-up in the tunnel and connected buildings."[80] Environmental monitoring for three years after the incident found a continued presence of tritium in the soil and vegetation, and air monitoring 100 meters from the site continued to find elevated levels of tritium.[81] Following the incident, a Department of Energy environmental assessment "tiger team" found "inadequacies in the plant's radiation protection program, and OSHA found numerous violations with general worker safety standards." Pantex expanded the radiation protection program to address safety issues, increasing the number of employees in the radiation safety department from 7 to 50.[82] The Governmental Accountability Office found that Pantex had only completed 32 out of 66 required Safety Analysis Reports (SARs), which ensured safe design of the facility. Even after the accident, the GAO reported concerns on the level of priority Pantex placed on SARs, deciding to complete low-hazard facilities SARs before addressing high and moderate-hazard facilities.[83] Additionally, sampling protocols for surface and groundwater, air, and ecology were below industry standards.[84]

Sarah Ray noted how during her time working at Pantex, there were also pathways for exposure not just for workers in the basin and storage cells, but also to office workers. Each single component was shipped with an inventory card that has a serial number for tracking purposes. Office workers would receive the cards to go into a "bomb book" for administrative purposes. Inventory cards were not swiped before handling, so a card belonging to a tritium bottle could have had dried tritium particulates on it, inadvertently exposing the workers to radioactive material.[85] Ray said that by the 1990s, every worker was given a "TLD"—if workers hit a certain level in the month, then they were removed from the specific area they were working in. However, after the end of each month, the monitor zeroes out "so they could go right back into working with that very hot weapon." [86]

77 U.S. Department of Energy, Office of Environmental Management. (1997, January). Linking legacies: Connecting the Cold War nuclear weapons production processes to their environmental consequences. https://tauxian.com/files/DOE_EM-0319.pdf
78 U.S. Environmental Protection Agency. (2015, July 28). NPL site narrative for Pantex Plant (USDOE). Retrieved May 20, 2025, from https://semspub.epa.gov/work/06/300275.pdf
79 Snyder, S. F., & Hwang, S. T. (1994, March). Pantex Plant Cell 12-44 tritium release: Re-assessment of environmental doses for 1990 to 1992. Prepared for Battelle Pantex and Mason & Hanger-Silas Mason Co., Inc., under a Related Services Agreement with the U.S. Department of Energy (Contract No. DE-ACO6-76RLO1830). Office of Scientific and Technical Information (OSTI). https://www.osti.gov/servlets/purl/10139733
80 ibid
81 Snyder, S. F., & Hwang, S. T. (1994, March). Pantex Plant Cell 12-44 tritium release: Re-assessment of environmental doses for 1990 to 1992. Prepared for Battelle Pantex and Mason & Hanger-Silas Mason Co., Inc., under a Related Services Agreement with the U.S. Department of Energy (Contract No. DE-ACO6-76RLO1830). Office of Scientific and Technical Information (OSTI). https://www.osti.gov/servlets/purl/10139733
82 Snyder, S. F., & Hwang, S. T. (1994, March). Pantex Plant Cell 12-44-1 tritium release: Re-assessment of environmental doses for 1990 to 1992 (PNL-9367). Pacific Northwest National Laboratory. https://doi.org/10.2172/10139733
83 U.S. General Accounting Office. (1991, April 15). More attention to health and safety needed at Pantex (GAO/RCED-91-103). https://www.gao.gov/assets/rced-91-103.pdf
84 U.S. Department of Energy. (1990, February). Tiger Team Assessment of the Pantex Plant, Amarillo, Texas. Office of Scientific and Technical Information (OSTI). https://www.osti.gov/servlets/purl/7271831
85 S. Ray, personal communication, March 4, 2025
86 ibid

These facilities were also contaminated with asbestos.[87] Any time the site underwent renovations for sewage, steam lines, or internet cables, drilling into the walls potentially released asbestos particles. Former workers have been diagnosed with COPD and cancers associated with asbestos contamination.[88] Electricians working in the labs or plastic shops were also at risk of exposure to chemicals.

In the past, farmers and ranchers have united against Pantex due to the chemical waste pollution into the soil and groundwater that threatened crops and livestock. Jim Osborne, who worked on his family farm, was part of this community. In 1995, an explosion from the plant damaged the foundation of his house and chunks of metal were found in his field. In a letter to his sister thanking her for contributing to Panhandle Area Neighbors and Landowners, a coalition formed to fight a potential plutonium processing facility at Pantex, he said:

> "I wish we hadn't built our home here and I wish we hadn't raised our children here. I hope they haven't been exposed to harmful amounts of hazardous materials. I'm still proud to be an American but I'm not as proud of the DoE as I once was. I think they consider downwind residents to be expendable. I also feel like they have cut our and your property values in half... I feel like we have been and are being violated by the system."[89]

Since the mid-1990s, the EPA has been engaged with cleanup at the site, removing more than 25,000 cubic yards of contaminated soil and building infrastructure to attempt to contain the waste.[90] The EPA lists current "Contaminants of Concern"—chemicals that "pose an unacceptable risk to human health or the environment"—at the site. These pollutants are site-wide, not limited to certain sections of the plant, and are listed in Figure 6, along with the source of contamination. The EPA monitors the list in order for the chemicals to be addressed in the site-wide cleanup; this list includes the contaminants of concern as of the beginning of 2025.[91]

FIGURE 6: EPA'S CONTAMINANTS OF CONCERN AT PANTEX

CONTAMINANT NAME	CONTAMINATED MEDIA
1,2-DICHLOROETHANE	GROUNDWATER
1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCANE (HMX)	GROUNDWATER
1,3,5-TRINITROBENZENE	GROUNDWATER
1,3-DINITROBENZENE	GROUNDWATER
1,4-DIOXANE	GROUNDWATER
2,4,6-TRINITROTOLUENE	GROUNDWATER
2,4,6-TRINITROTOLUENE	SOIL
2,4-DINITROTOLUENE	GROUNDWATER
2,6-DINITROTOLUENE	GROUNDWATER
2-AMINO-4,6-DINITROTOLUENE	GROUNDWATER

87 Ward, R. (2023, November 15). Amarillo asbestos worker at Pantex refinery. Ward Asbestos Claims. https://ward.asbestosclaims.law/ward/tx-amarillo-asbestos-worker-pantex-refinery/?artf44f12444f110f116

88 S. Ray, personal communication, March 4, 2025

89 Genay, L. (2022). Under the cap of invisibility. University of New Mexico Press.

90 U.S. Environmental Protection Agency. (n.d.). Superfund site: Pantex Plant (USDOE), Pantex Village, TX. EPA Superfund. Retrieved March 17, 2025, from https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0604060

91 U.S. Environmental Protection Agency. (n.d.). Superfund site: Pantex Plant (USDOE), Pantex Village, TX. EPA Superfund. Retrieved March 17, 2025, from https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0604060 ; United States Department of Energy, National Nuclear Security Administration. (2008, September). Record of decision for groundwater, soil, and associated media: Pantex Plant, Carson County, Texas (U.S. EPA ID No. TX4890110527). Prepared by Babcock & Wilcox Technical Services Pantex, LLC, with Sapere Consulting, Inc. https://semspub.epa.gov/work/06/859584.pdf

FIGURE 6: EPA'S CONTAMINANTS OF CONCERN AT PANTEX

CONTAMINANT NAME	CONTAMINATED MEDIA
4-AMINO-2,6-DINITROTOLUENE	GROUNDWATER
BORON	GROUNDWATER
CHLOROFORM	GROUNDWATER
CHROMIUM	GROUNDWATER
CHROMIUM(VI)	GROUNDWATER
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE (RDX)	SOIL
HEXAHYDRO-1,3,5-TRINITRO-1,3,5-TRIAZINE (RDX)	GROUNDWATER
PERCHLORATE	GROUNDWATER
TETRACHLOROETHENE	GROUNDWATER
TRICHLOROETHENE	GROUNDWATER
URANIUM-235	SOIL
URANIUM-238	SOIL

Adapted From: "Superfund site: Pantex Plant," U.S. Environmental Protection Agency, 2025 [92]

"Interim Corrective Measures" occurred between 1996 and 2003 to reduce public health risk. This included covering and extracting some of the contaminated soil.[93] However, in 2008, the EPA identified that contaminated groundwater continued to migrate off-site. The perched groundwater aquifer at the Pantex Plant is an area of groundwater that is closest to the surface and therefore more vulnerable to contamination, containing about 15.1 billion gallons of water. The contaminants have not yet reached the Ogallala Aquifer, an essential water supply for the wheat and cattle production in the Texas panhandle. This aquifer also provides drinking water for eight states. But "in the absence of corrective measures in the perched groundwater, the Ogallala Aquifer could be impacted above drinking water standards within approximately 20 years."[94] Contamination could cause major food and water insecurity for the entire United States. Since these discoveries were published in 2008, the perched aquifer has been the focus of cleanup and remediation efforts, with more than 510 pounds of contaminants being pumped from the groundwater.[95] The infrastructure systems working to remove the contamination from the groundwater include "two pump and treat systems, with 76 operating extraction wells and 4 injection wells that are capable of treating at least 550 gallons per minute (gpm) of contaminated perched groundwater."[96] Today, the southeast portion of this aquifer that is at most risk of contaminating the Ogalla Aquifer "poses unacceptable risk if consumed or used for

92 U.S. Environmental Protection Agency. (n.d.). Superfund site: Pantex Plant (USDOE), Pantex Village, TX. EPA Superfund. Retrieved March 17, 2025, from https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0604060
93 ibid
94 United States Department of Energy, National Nuclear Security Administration. (2008, September). Record of decision for groundwater, soil, and associated media: Pantex Plant, Carson County, Texas (U.S. EPA ID No. TX4890110527). Prepared by Babcock & Wilcox Technical Services Pantex, LLC, with Sapere Consulting, Inc. https://semspub.epa.gov/work/06/859584.pdf
95 U.S. Department of Energy, National Nuclear Security Administration Production Office. (2023, September). Annual site environmental report: Pantex Plant 2022. Prepared by the Environmental Compliance Department, Waste Operations Department, and Environmental Projects Department. https://pantex.energy.gov/sites/default/files/2022_pantex-annual-environmental-report_iro84837.pdf
96 U.S. Department of Energy. (2024, October). Perched groundwater pump and treat systems (Pantex Fact Sheet). National Nuclear Security Administration. https://pantex.energy.gov/sites/default/files/P%26Tfactsheet_2024_Final.pdf

domestic purposes" because "on-site groundwater below the plant indicate 16 contaminates that violate potable water standards."[97]

Consequences of Exposure at Pantex

Interaction with hazardous chemicals has left many employees with chronic health problems, many of whom have passed due to complications. The annual National Day of Remembrance for Nuclear Weapons Program Workers honors those who have passed due to illnesses from exposure to hazardous materials. At a 2018 gathering for the National Day of Remembrance, Mo Morgan, who has since succumbed to liver disease due to exposure to heavy metals and chemicals, said, "It's estimated that close to a million people have participated in the nuclear weapons complex. It is important for the public to recognize their sacrifice because, in a lot of ways, they put themselves in harm's way, not knowing fully what the risk may have been to help secure our nation's nuclear defense."[98]

Many of the workers at Pantex were not aware of the health risks of working at the plant. Pantex is an essential part of the Amarillo community's economy, but many generations have seen the real cost, including an assembly worker whose throat and tongue cancer were caused by the chemicals in the assembly line and maintenance warehouse.[99]

Workers around the country exposed to these harmful substances may qualify for compensation under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA), but the burden is on workers to prove their illness is connected to their work, and claims are often denied.[100] Sarah Ray, a former Pantex employee, helps other workers make EEOICPA claims. She noted that in order to qualify for compensation, people must have written confirmation from a doctor that their illness was caused by working at Pantex, which doctors around Amarillo are usually unwilling to provide.[101] Additionally, community members who may have been impacted by the plant but did not work there do not qualify for any compensation.

More than $171 million has been paid through EEOICPA to 1,300 workers but many of the claims that get filed are never paid.[102] In addition, since not many people know that it was their work that caused their illness, even more claims go unfiled. According to one story by the Fort Worth Star-Telegram, "'Until they hear about the deteriorating health of co-workers and friends, most people seldom realize the harm that has been done,' said Clarence Rashada, an instrument technician at the plant for 21 years." People who have filed claims enter into a long process that often results in payments until after the death of the worker. "Many claimants have commented that they think the claims are drug out so that the claimants die," before the government has to pay, said Ray in an interview with the Fort Worth Star-Telegram.[103]

97 United States Department of Energy, National Nuclear Security Administration. (2008, September). Record of decision for groundwater, soil, and associated media: Pantex Plant, Carson County, Texas (U.S. EPA ID No. TX4890110527). Prepared by Babcock & Wilcox Technical Services Pantex, LLC, with Sapere Consulting, Inc. https://semspub.epa.gov/work/06/859584.pdf ; U.S. Department of Energy. (2024, October). Perched groundwater pump and treat systems (Pantex Fact Sheet). National Nuclear Security Administration. https://pantex.energy.gov/sites/default/files/P%26Tfactsheet_2024_Final.pdf

98 Carr, L. (2018, October 30). National Day of Remembrance: Cold War Patriots group honors fallen heroes and living legends. Amarillo Globe-News. https://www.amarillo.com/story/news/2018/10/30/national-day-of-remembrance-cold-war-patriots-group-honors-fallen-heroes-and-living-legends/9410970007/

99 Berard, Y. (2018, October 23). The perils of Pantex: Hundreds of workers sickened at Texas nuclear weapons plant. Star-Telegram. https://www.star-telegram.com/news/state/texas/article49500030.html#storylink=cpy

100 Cold War Patriots. (n.d.). Energy Employees Occupational Illness Compensation Program Act (EEOICPA). Retrieved March 20, 2025, from https://coldwarpatriots.org/benefits/eeoicpa/

101 S. Ray, personal communication, March 4, 2025

102 Berard, Y. (2018, October 23). The perils of Pantex: Hundreds of workers sickened at Texas nuclear weapons plant. Star-Telegram. https://www.star-telegram.com/news/state/texas/article49500030.html#storylink=cpy

103 Berard, Y. (2018, October 23). The perils of Pantex: Hundreds of workers sickened at Texas nuclear weapons plant. Star-Telegram. https://www.star-telegram.com/news/state/texas/article49500030.html#storylink=cpy

In any case, comprehensive healthcare that includes preventative measures and screening could prevent workers from getting sick in the first place and needing compensation from EEOICPA. However, in 2015, Consolidated Nuclear Security LLC, which managed and operated Pantex until 2024, attempted to cut some healthcare and benefits.[104] This cost-saving measure by CNS would have put workers, who are at risk for exposure to hazardous materials, unable to rely on work-provided healthcare for preventative measures. The Pantex workers union, Workers of the Metal Trades Council, participated in a strike, recognizing that the work they do "necessarily involves exposure to dangerous chemicals and substances," thus substantial medical coverage is necessary for the wellness of the employees.[105] The strike resulted in a deal that improved medical coverage with lower out-of-pocket costs.[106] While the workers, with the help of union organizing, succeeded in keeping their healthcare, this attempt by CNS to cut healthcare benefits demonstrates nuclear weapons corporations' disregard for workers' health in exchange for profit.

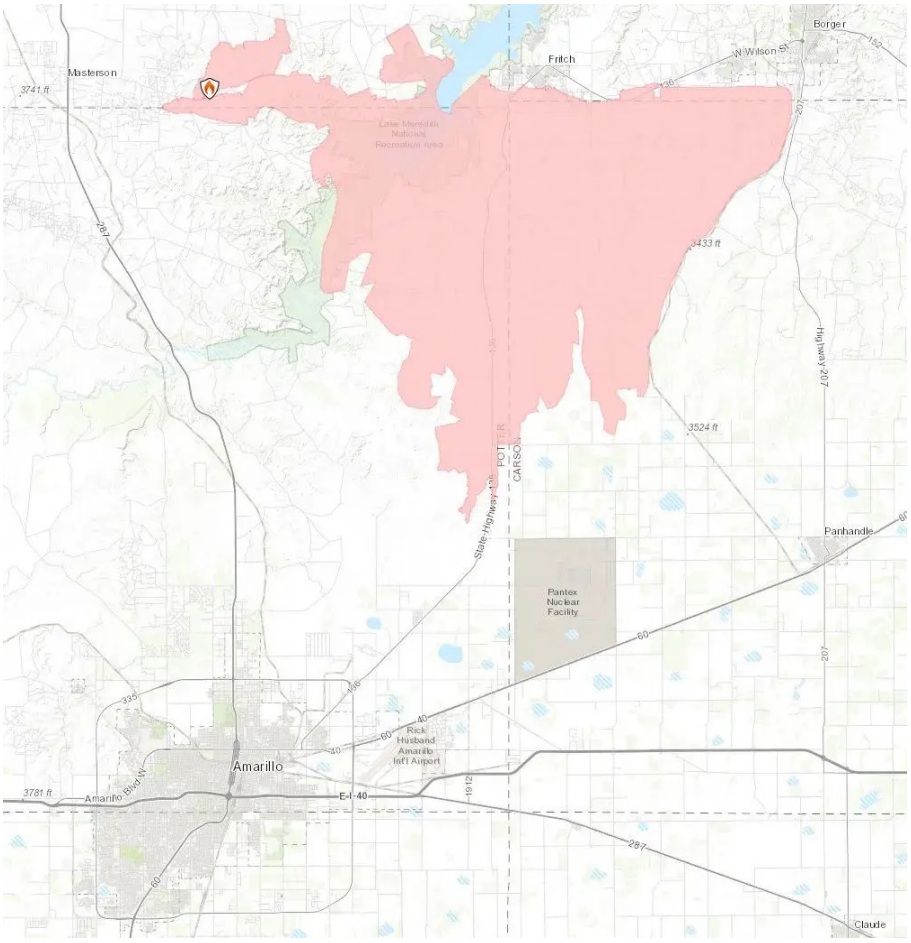


FIGURE 7: PROXIMITY OF 2024 WILDFIRES TO PANTEX PLANT; FROM: "CLIMATE CHANGE AND NUCLEAR WASTE ARE A TOXIC SLEW," GONGLOFF, 2024

In a sociological analysis of Amarillo, A. G. Mojtabai notes in the book Blessed Assurance how residents know that hosting an important nuclear weapons industry makes them a target in an adversarial attack, but have "denial and displacement."[107] While fallout shelters are visible around town, there is not much talk about what exactly happens inside the plant. As an important site to the nuclear weapons industry, the residents know that they are a target, but they accept this as an "easy way to go" in the case of nuclear war. This demonstrates that while physical health impacts are pervasive in a country that produces nuclear weapons, psychological and cultural effects are also present but manifest in different ways.[108] As previously explored in enrichment and mining, individuals burdened by constant health issues often fall victim to depression, anxiety, substance abuse, and bipolar disorders. In the case of Amarilloans, struggles with morality, denial, and

104 ExchangeMonitor (2015, April 14) Pantex Workers Eyeing Strike Over Proposed Cuts to Benefits. Exchange Monitor https://www.exchangemonitor.com/pantex-workers-eyeing-strike-over-proposed-cuts-to-benefits/?printmode=1
105 Marx, J. (2015, September 11). Massive worker strike at Pantex should ring alarms in DC. Project on Government Oversight. https://www.pogo.org/analysis/massive-worker-strike-at-pantex-should-ring-alarms-in-dc
106 SMART Union. (2015, October 8). Deal reached in Pantex strike. SMART Union. https://www.smart-union.org/deal-reached-in-pantex-strike/
107 Mojtabai, A. G. (1986). Blessed assurance: At home with the bomb in Amarillo, Texas. Houghton Mifflin Harcourt.
108 Mojtabai, A. G. (1986). Blessed assurance: At home with the bomb in Amarillo, Texas. Houghton Mifflin Harcourt.

cognitive dissonance due to the nuclear weapons plant in their backyard influences social, cultural, and economic discussions in the town.

The Amarillo community largely accepts Pantex as an economic boost for high-paying jobs, even while in a harm-dependency loop. During the nuclear freeze campaign of the 1980s, clashes occurred between boosters of the plant and the coalition of advocates against the bomb, including some religious leaders, farmers, and "out of towners." Many Amarilloans labeled the anti-bomb crowd as unpatriotic, or "peaceniks." Some residents, prompted by religious leaders, such as Bishop Leroy Matthiesen, felt Catholic values were incongruent with the mission of the nuclear weapons industry, and called on other Catholics to protest the plant. Some city and economic leaders worried that the plant was essential to the lifeblood of Amarillo, and if the plant were to shut down, it would have ruinous implications for "employment education economy and overall quality of life."[109] What results is a sacrificial economy, where communities are forced to trade their health and sometimes morals for financial stability.

Another looming threat to safety at Pantex is the increase in intensity and propensity of wildfires due to climate change. In early 2024, intense wildfires in the Texas Panhandle caused Pantex to shut down for multiple days. Luckily the facility was not harmed, but this does not mean it will remain safe in the future. If wildfire were to directly mix with the radioactive, highly explosive, and chemical elements, the health effects could be vast.[110] Figure 7 shows the proximity of the 2024 fires to the Pantex plant.

109 Genay, L. (2022). Under the cap of invisibility. University of New Mexico Press.
110 Yancey-Bragg, N. (2024, February 28). Texas wildfire burned near nuclear weapons site. Is that dangerous? USA Today. https://www.usatoday.com/story/news/nation/2024/02/28/texas-wildfire-burned-near-nuclear-weapons-site-is-that-dangerous/72772407007/

Testing: Nevada

> "People don't even know how many tests were conducted in Nevada. We conducted more tests than any other country in our own backyard. People still don't know that. I give them the number, 928, and they go, "Woah, what?" and they don't know that it went right over where they lived. When it rained and snowed it went into their crops. It went into their water. It went everywhere and they still don't know."

MARY DICKSON, OUTRIDER NUCLEAR REPORTING CONFERENCE, DECEMBER 6, 2024

Between 1945 and 1992, 60 Miles Northwest of Las Vegas, Nevada, the Atomic Energy Commission (AEC) and eventually the U.S. Department of Energy facilitated 928 nuclear explosive tests at the Nevada Test Site.[111] In 1946, the AEC began the search for an additional continental site to test nuclear weapons, as testing only in the Pacific was not ideal for security reasons and the Trinity test site was too small. The Nevada Test Site, a 1,350 square mile area of Native Shoshone land, was chosen because the area was home to a "low-use segment of the population."[112] When choosing the site, members of the AEC and scientific experts like Enrico Fermi and Edward Teller knew there would be measurable radioactive fallout above the safe medical rate.[113] However, the dominant narrative—still explained by the Nevada Test Site museum today—was that Nevada was chosen because it was a remote location where no one lived.[114] The majority of radioactive exposure in America occurred as a result of above-ground explosive testing at the Nevada Test Site between 1951 and 1962.[115] These tests alone are thought to have released around 150 million curies of Iodine-131, a radioisotope of iodine in nuclear fission products, and 12 billion total curies.[116]

St. George, Utah, is 137 miles east of the Nevada Test Site (NTS) (Figure 8). In 1953, it had roughly 4,500 residents. On May 19th, 1953, the U.S. government conducted its 29th test at the site, named Dirty Harry, dropping a nuclear device from a 300-foot tower yielding 32.4 kilotons—more than double the firepower of the bomb dropped on Hiroshima. The steel tower vaporized, and 1,734 tons of earth were lifted into the air to accompany a giant fireball and mushroom cloud.[117] Unpredicted by the scientists conducting the tests, the cloud carried fallout to St. George and beyond, irradiating 16,200 people.[118] As farmers and ranchers worked outdoors, a dark pink cloud floated overhead.

Since the federal government issued no warnings ahead of time, by the time an AEC local monitoring station noticed the off-the-charts geiger counter warning and alerted the local government to warn civilians, radiation had already spread across St. George. Rural workers and many residents—for whom it was normal to work and play outdoors all day—did not hear the public radio broadcast that followed. Afterwards, the AEC downplayed the level of radiation to St. George residents, saying it was as harmless as receiving an x-ray.[119] Over the course of the

111 Downwinders Claims. (2023, September 8). Understanding the Nevada Test Site: From nuclear tests to environmental impact. Downwinders Claims. https://www.downwinders.info/2023/09/08/understanding-the-nevada-test-site-from-nuclear-tests-to-environmental-impact/
112 Gallagher, C. (1993). American ground zero: The secret nuclear war. MIT Press.
113 Fehner, T. R., & Gosling, F. G. (2000, December). Origins of the Nevada Test Site [Report No. DOE/MA-0518]. U.S. Department of Energy. https://nnss.gov/wp-content/uploads/2023/04/DOE_MA0518-1.pdf
114 Miller, D. B., & Shapiro, M. (Directors). (2023). Downwind [Film]. Etheredge Shapiro Productions.
115 Philippe, S., Alzner, S., Compo, G. P., Grimshaw, M., & Smith, M. (2023). Fallout from US atmospheric nuclear tests in New Mexico and Nevada (1945-1962). arXiv preprint arXiv:2307.11040.
116 Stringfellow, K. (2021, September 7). The deadly impact of nuclear testing on unsuspecting desert communities. PBS SoCal. https://www.pbssocal.org/shows/artbound/downwind-upshot-knothole
117 Stringfellow, K. (2021, September 7). The deadly impact of nuclear testing on unsuspecting desert communities. PBS SoCal. https://www.pbssocal.org/shows/artbound/downwind-upshot-knothole
118 Stringfellow, K. (2021, July). Downwind Upshot-Knothole. The Mojave Project. https://mojaveproject.org/dispatches-item/downwind-upshot-knothole/
119 Stringfellow, K. (2021, September 7). The deadly impact of nuclear testing on unsuspecting desert communities. PBS SoCal. https://www.pbssocal.org/shows/artbound/downwind-upshot-knothole

following days, residents developed skin lesions, rashes, burns, blisters, nail loss, and hair loss. Internally, general fatigue, nausea, fever, diarrhea, and vomiting plagued people in St. George. In total, 16,200 people were irradiated at 300-350 milliroentgens per hour (mR/h).[120] For comparison, when a radioactive cloud passed over Pripyat, the town closest to Chernobyl the morning after the reactor explosion, the rate was 180-600 mR/h, and the town was evacuated that afternoon.[121] St. George was not evacuated. Less than a week later, the government conducted the next test in the series, Grable, (Figure 10) followed by 898 more tests at the Nevada site until 1992.[122]

A foreshadowing of further health impacts on humans came from the deaths of thousands of sheep. Following the Upshot-Knothole series of tests in the summer of 1953—which included the Dirty Harry detonation—1,420 adult lambs and 2,970 newborn lambs died.[123] This was more than a third of the total sheep population in Iron County. Ranchers and their veterinarians were alarmed at the mysterious deaths and alerted the Department of Agriculture. Scientists from the U.S. Public Health Service and veterinarians from the Department of Agriculture published research concluding that radiation was to blame for the deaths, but the AEC stepped in and classified all reports mentioning radiation; they then created new reports blaming the sheep deaths on malnutrition.[124] Dr. Paul B. Pearson, the chief of the AEC's Division of Biology and Medicine at the time, said that the AEC could not set a precedent of compensating for animal or human exposure to fallout.[125] Cedar City sheep owners sued the AEC in 1955 in Bulloch v. the United States. Pressured by the AEC and the Justice Department, the scientists and veterinarians revoked

FIGURE 8: MAP OF NEVADA INCLUDING NTS AND ST. GEORGE UTAH; FROM: "ATMOSPHERIC NUCLEAR WEAPONS TESTING," U.S. DEPARTMENT OF ENERGY, 2006[1]

1 U.S. Department of Energy. (2006, September). Atmospheric nuclear weapons testing (DOE/NV–209 Rev. 15). National Nuclear Security Administration Nevada Field Office. https://www.energy.gov/sites/prod/files/DOENTSAtmospheric.pdf

120 Stringfellow, K. (2021, July). Downwind Upshot-Knothole. The Mojave Project. https://mojaveproject.org/dispatches-item/downwind-upshot-knothole/

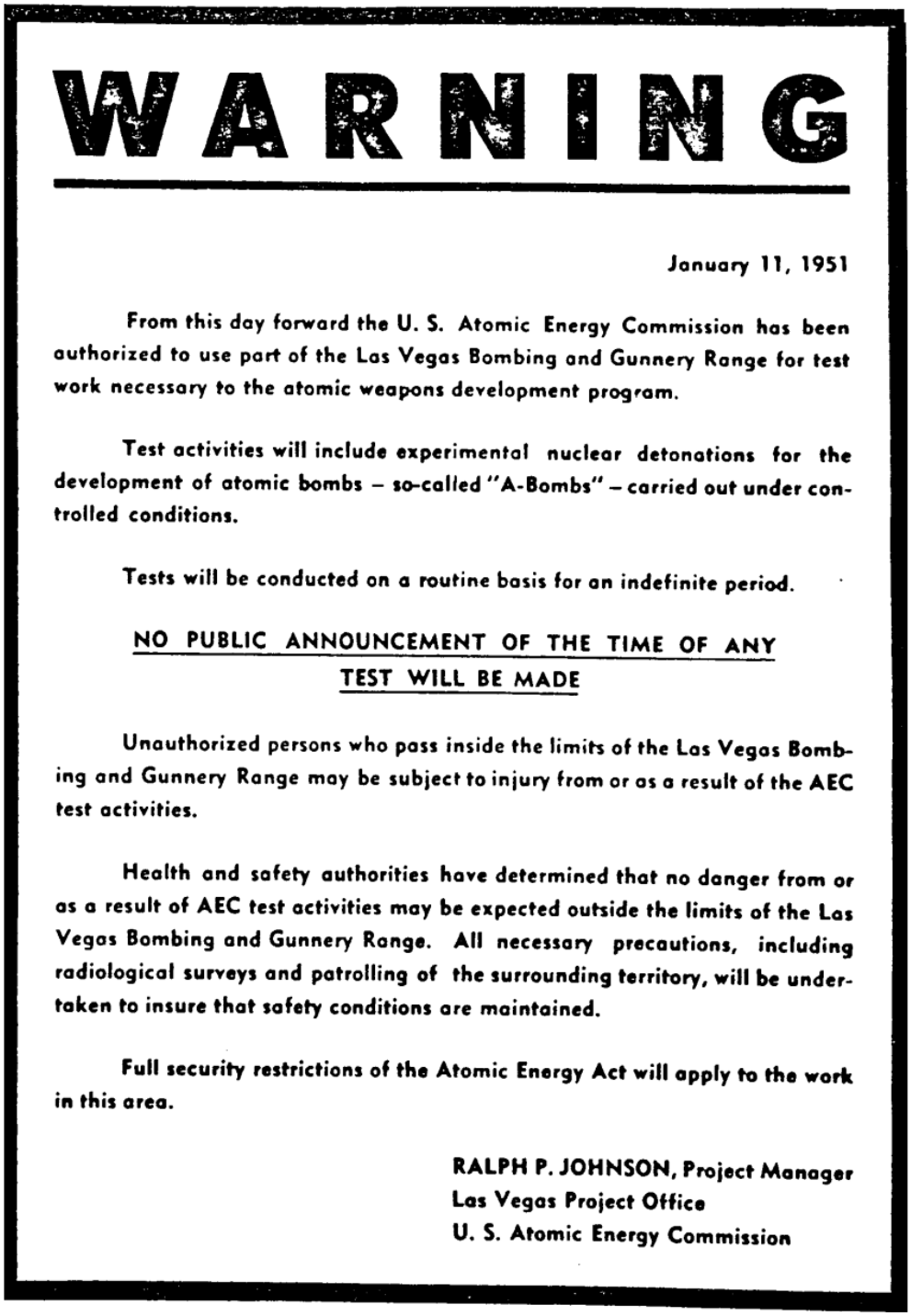
121 Ilyin, L. A., & Pavlovskij, O. A. (1987). Radiological consequences of the Chernobyl accident in the Soviet Union and measures taken to mitigate their impact. IAEA Bulletin, 29(4), 17–24. Retrieved March 20, 2025, from https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull29-4/29402791724.pdf

122 U.S. Department of Energy. (2000, December). United States nuclear tests, July 1945 through September 1992 (DOE/NV–209 Rev. 15). National Nuclear Security Administration Nevada Field Office. https://www.osti.gov/opennet/manhattan-project-history/publications/DOENuclearTests.pdf

123 J. Willard Marriott Library, University of Utah. (2025, March 19). Downwinders of Utah Archive: An interactive, geospatial timeline depicting the story of Utah nuclear fallout related to atmospheric testing of the Nevada Test Site. Marriott Library. Retrieved June 25, 2025, from https://lib.utah.edu/services/geospatial/downwinders/

124 Seegmiller, J. B. (n.d.). Nuclear testing and the downwinders. Utah State Historical Society. Retrieved May 20, 2025, from https://historytogo.utah.gov/downwinders/

125 Kichas, J. (2015, June 26). Downwind in Utah. Utah Division of Archives and Records Service. https://archives.utah.gov/2015/06/26/downwind-in-utah/



WARNING

January 11, 1951

From this day forward the U. S. Atomic Energy Commission has been authorized to use part of the Las Vegas Bombing and Gunnery Range for test work necessary to the atomic weapons development program.

Test activities will include experimental nuclear detonations for the development of atomic bombs – so-called "A-Bombs" – carried out under controlled conditions.

Tests will be conducted on a routine basis for an indefinite period.

NO PUBLIC ANNOUNCEMENT OF THE TIME OF ANY TEST WILL BE MADE

Unauthorized persons who pass inside the limits of the Las Vegas Bombing and Gunnery Range may be subject to injury from or as a result of the AEC test activities.

Health and safety authorities have determined that no danger from or as a result of AEC test activities may be expected outside the limits of the Las Vegas Bombing and Gunnery Range. All necessary precautions, including radiological surveys and patrolling of the surrounding territory, will be undertaken to insure that safety conditions are maintained.

Full security restrictions of the Atomic Energy Act will apply to the work in this area.

RALPH P. JOHNSON, Project Manager
Las Vegas Project Office
U. S. Atomic Energy Commission

FIGURE 9: AEC POSTER ALLEGING EXPLOSIVE TESTS PRESENT "NO DANGER" TO THE PUBLIC; FROM: "ORIGINS OF THE NEVADA TEST SITE," FEHNER & GOSLING, 2000[1]

1 Fehner, T. R., & Gosling, F. G. (2000, December). Origins of the Nevada Test Site (DOE/MA-0518). U.S. Department of Energy, History Division. https://nnss.gov/wp-content/uploads/2023/04/DOE_MA0518-1.pdf. Accessed February 20, 2025.

their assertion that radiation caused the death of the sheep, leading to the judge siding with the government and its "expert testimony."[126]

Over 25 years later, the original sheep studies and cover-up by the AEC were made public, and the same judge from the trial in 1955 found the government had committed fraud through the manufacturing of evidence; the judge then ordered a new trial. However, the decision to conduct a new, fair trial was overturned in the Tenth Circuit Court of Appeals, a decision which was sustained by the Supreme Court. Similar to the sheep deaths trial, 1,200 downwind residents from Utah and Nevada sued the government in Irene Allen v. United States.[127] They originally were awarded damages for cancer caused by radiation exposure in 1984, but when the government appealed, the Tenth Circuit Court of Appeals overturned their ruling.[128] The sheep farmers did not get justice for their lost livestock, and many downwind residents have since passed from cancers, never receiving justice from the government.

The famous film "The Conqueror," featuring "America's Cowboy," John Wayne, was filmed in St. George from May through August 1954. The crew would bring dirt from the surrounding area onto the set to film the desert scenes. Of the 220 people involved in the filming of the movie, 110 reportedly passed from cancer.[129] John Wayne himself battled lung cancer in 1956 and passed from stomach cancer in 1979.[130] While reports argue over whether the cancer came from the crew's heavy smoking or radiation, the film is known now as the "RKO Radioactive Picture."[131] There is even a photo of John Wayne standing on set with a Geiger counter that "crackled so loudly, Wayne thought it was broken."[132] Due to its connection to Hollywood, the story became famous and received a lot of attention after People magazine published an article on it in 1980 and a documentary covering the tragedy was released in 2023.[133]

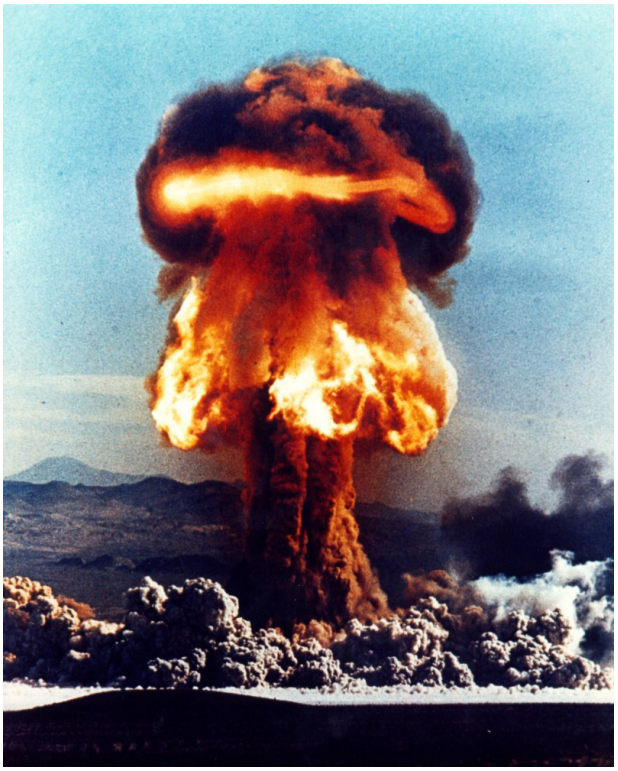


FIGURE 10: IMAGE OF NUCLEAR TEST "GRABLE"; GRABLE WAS A NUCLEAR AIRBURST TEST YIELDING 15 KILOTONS, LESS THAN HALF THE KILOTONS OF THE DIRTY HARRY TEST ON MAY 19, 1953; FROM:"NEVADA TEST SITE GUIDE," U.S. DEPARTMENT OF ENERGY, 2023[1]

1 U.S. Department of Energy. (2023, April). Nevada Test Site guide (DOENV 715 Rev. 1). National Nuclear Security Administration Nevada Field Office. https://nnss.gov/wp-content/uploads/2023/04/DOENV_715_Rev1.pdf

126 Bulloch v. United States, 145 F. Supp. 824 (D. Utah 1956).
127 Allen v. United States, 588 F. Supp. 247 (D. Utah 1984).
128 Kichas, J. (2015, June 26). Downwind in Utah. Utah Division of Archives and Records Service. https://archives.utah.gov/2015/06/26/downwind-in-utah/
129 Miller, D. B., & Shapiro, M. (Directors). (2023). Downwind [Film]. Etheredge Shapiro Productions.
130 Variety. (1979, June 11). John Wayne, 72, dies of cancer. Retrieved March 20, 2025, from https://variety.com/1979/film/news/john-wayne-72-dies-of-cancer-1201343873/
131 Child, B. (2015, June 6). How nuclear fallout contaminated John Wayne's movie—and killed many who made it. The Guardian. Retrieved March 20, 2025, from https://www.theguardian.com/film/2015/jun/06/downwinders-nuclear-fallout-hollywood-john-wayne
132 Child, B. (2015, June 6). How nuclear fallout contaminated John Wayne's movie—and killed many who made it. The Guardian. Retrieved March 20, 2025, from https://www.theguardian.com/film/2015/jun/06/downwinders-nuclear-fallout-hollywood-john-wayne
133 Jackovich, K. G., & Sennet, M. (1980, November 10). The Children of John Wayne, Susan Hayward and Dick Powell Fear That Fallout Killed Their Parents. People, 14(19), 42–46. Retrieved from https://people.com/archive/the-children-of-john-wayne-susan-hayward-and-dick-powell-fear-that-fallout-killed-their-parents-vol-14-no-19/ ; Nunez, W. (Director). (2023). The Conqueror: Hollywood Fallout [Film].

In 1962, AEC Scientist Dr. Harold Knapp developed a model for estimating the doses of iodine-131 in thyroids following nuclear test fallout from the Nevada site. Before his discovery, most concerns surrounding fallout from nuclear tests focused on strontium-90 and cesium-137, which are external exposure radionuclides with long half-lives. Knapp found that while I-131 had a much shorter half-life of eight days, it posed a greater threat to downwind communities because of internal exposure. I-131 fallout fell onto cattle pastures and biomagnified when ingested by livestock, proliferating in thyroid glands after people consumed the milk. Using his model, Knapp discovered that just one of the Upshot-Knothole tests from 1953 resulted in I-131 doses 150 to 170 times above the permissible dose for infants living in the radioactive hotspot surrounding St. George.[134] There were 11 tests in the Upshot-Knothole series.

After his discovery, the AEC used multiple methods to embargo the publication and protect the commission from scrutiny and political fallout. The AEC claimed Dr. Knapp's report contained restricted data, which required security clearance to access, and attacked the validity of the paper. To test the validity, the AEC Nevada Test Organization placed beagles in cages between 30 to 45 miles away from its next test, a 100-kiloton shallow underground test conducted in July 1962 named "Sedan." The resulting hazard was greater than Knapp had predicted. In a historical analysis of Knapp's discovery, Scott Kirsch, a nuclear historian and geographer, points out that the AEC's decision to conduct beagle experiments, rather than assess the health of the endangered communities already living in the area further demonstrated the secrecy and distancing of the human health effects of the AEC's actions.[135] After considerable censorship attempts by the AEC, the eventual publishing of Knapp's report in 1963 can be considered one of the first publicized exposures of the truth of nuclear testing fallout.

Exposure to these levels of radiation, especially from I-131, resulted in various negative health consequences, thyroid cancer being the most common. According to the NCI, "exposure to I-131 from the Nevada atmospheric tests will produce between 11,300 and 212,000 excess lifetime cases of thyroid cancer with a point or central estimate of 49,000 cases."[136] Other studies estimate that fallout from the U.S. continental tests resulted in 186,000 crude deaths and 63,500 deaths from cancer.[137]

Impacts of Testing Today

These impacts are not limited to the past. While the United States has not conducted explosive nuclear testing since 1992, ramifications of exposure continue to impact families—mutations are passed down through generations and new cancers and defects are recorded every day. In 2015, 60 percent of patients entering the Radiation Exposure Screening and Education Program at Dixie Regional Medical Center in St. George diagnosed with leukemia, lung, breast, thyroid, and colon cancer were new patients.[138]

The 2023 documentary, Downwind, directed by Douglas Brian Miller and Mark Shapiro, tells the stories of some of these impacted communities. In the film, residents of Nevada and Utah describe their personal and familial health issues related to radiation exposure. Claudia Peterson, from southern Utah, has experienced significant loss in her family from health issues that she believes are linked to radioactive fallout. Peterson's youngest daughter was

134 Kirsch, S. (2004). Harold Knapp and the Geography of Normal Controversy: Radioiodine in the Historical Environment. Osiris, 19, 167–181. http://www.jstor.org/stable/3655238

135 ibid

136 Institute of Medicine (US) Committee on Thyroid Screening Related to I-131 Exposure, & National Research Council (US) Committee on Exposure of the American People to I-131 from the Nevada Atomic Bomb Tests. (1999). Exposure of the American people to iodine-131 from Nevada nuclear-bomb tests: Review of the National Cancer Institute report and public health implications. National Academies Press (US). https://doi.org/10.17226/6283

137 Meyers, K. (2017, June 16). Some unintended fallout from defense policy: Measuring the effect of atmospheric nuclear testing on American mortality patterns (Version 6) [Working paper, University of Arizona]. https://mronline.org/wp-content/uploads/2019/11/Meyers.Fallout.Mortality.v6.pdf

138 Carroll, R. (2015, June 6). Hollywood and the downwinders still grapple with nuclear fallout. The Guardian. https://www.theguardian.com/film/2015/jun/06/downwinders-nuclear-fallout-hollywood-john-wayne

diagnosed with neuroblastoma at the age of three and passed from complications at age six in 1987. Her sister passed away from skin cancer within one month of her daughter passing. Native Shoshone Ian Zabarte's uncle, first cousins, and grandfather either all passed away from or are actively succumbing to cancer. He noted that before his grandfather passed, his skin became hard and peeled off, a condition linked to radiation exposure.[139]

Mary Dickson, a downwind survivor from Utah, is an advocate for nuclear justice, and more recently, the Radiation Exposure Compensation Act (RECA). RECA, enacted in 1990 and discussed further in the conclusion of this report, was the only justice that downwinder communities received from the federal government, but only covers 10 counties in Utah and 12 in Nevada and Arizona combined. Her advocacy is driven by the injustice she and her family have faced because of the United States' nuclear testing. In 1985, she was diagnosed with thyroid cancer. Her sister passed away from lupus, and her niece's breast cancer recently spread to her bones. During an interview with the Nuke Talk podcast, Mary shared the emotional and financial toll that constant health issues have on downwind families.[140] Despite the toll, Mary continues to fight for justice. She has formed coalitions with other impacted communities, including Navajo communities and mothers from St. Louis Missouri, travelled to Washington D.C., written op-eds, and given speeches at universities and public events—all to shed light on downwind communities that have been ignored and denied justice.[141]

High-ranking officials who served in the first Trump administration, however, have expressed an interest in resuming nuclear explosive testing at the Nevada National Security Site. According to the New York Times, President Trump's former National Security Advisor, Robert O'Brien—who has written in support for resuming nuclear testing—assisted the president in picking a new NNSA Administrator, and suggested that they were searching for a candidate who would be willing to resume tests, despite technological necessity.[142] In a 2023 interview with Arms Control Today, former NNSA Administrator Jill Hruby said: "the three NNSA lab directors do an evaluation every year on the technical health of our weapons, and a major part of the determination is to say whether there is a technical reason to resume nuclear explosive testing. That evaluation has been done for about 27 years and has resulted in a finding every year that there is no technical reason to conduct nuclear explosive testing." Brandon Williams, the Trump administration's pick for NNSA Administrator, noted in a Senate hearing, "I would not advise testing, and I think we should rely on the scientific information," but that the decision to resume "would certainly be above my pay grade."[143] Under current law, the President has the authority to resume testing whether or not it is technologically necessary. [144]

In May 2025, the Nevada state legislature unanimously passed a resolution calling for the continuation of the moratorium on nuclear testing.[145]

139 Miller, D. B., & Shapiro, M. (Directors). (2023). Downwind [Film]. Gravitas Ventures.
140 Kellett, A. (Producer). (2024, September 23). The Nuclear Ballot: The fallout generations [Audio podcast episode featuring M. Dickson]. In NukeTalk. Ploughshares. https://ploughshares.org/nuketalk/the-nuclear-ballot-the-fallout-generations/
141 Summers, F. (2024, August 26). Welcome, Mary Dickson: Fall 2024 Community Practitioner in Residence. Environmental Humanities Graduate Program, University of Utah. https://environmental-humanities.utah.edu/blog/posts/2024/dickson_intro.php ; Dickson, M. (2024, December 2). Utah's victims of nuclear fallout are stuck in limbo. We need our congressional delegation's help. The Salt Lake Tribune. https://www.sltrib.com/opinion/commentary/2024/12/02/voices-victims-nuclear-fallout-we/
142 Fountain, H. (2025, January 17). Trump taps Brandon Williams to oversee nuclear weapons program. The New York Times. https://www.nytimes.com/2025/01/17/science/trump-brandon-williams-nuclear-weapons.html
143 Fountain, H. (2025, April 8). U.S. considers resuming nuclear testing amid global tensions. The New York Times. https://www.nytimes.com/2025/04/08/science/nuclear-testing-nnsa-williams.html
144 Clinton, W (1993, November 3). Presidential Decision Directive (PDD) 15: U.S. Policy on Stockpile Stewardship Under an extended Moratorium and a Comprehensive Test Ban. Retrieved from https://irp.fas.org/offdocs/pdd/pdd-15.pdf
145 Nev. Assemb. J. Res. 13, 83rd Leg., Reg. Sess. (2025). https://www.leg.state.nv.us/App/NELIS/REL/83rd2025/Bill/12648/Overview

Waste: St. Louis, Missouri

> "The creek that is contaminated, it's a 14 mile creek. It goes all the way to the Missouri River. None of that is rural area; that is all heavily populated area, where people have their homes and apartments and condos and so the amount of people that have moved in and out over the decades– that's a lot of exposure. Since 1949 our creek has been contaminated. They have rerouted that creek, they have built homes on top of it, and schools and parks. Since 1949."

DAWN CHAPMAN, JUST MOMS STL, OUTRIDER NUCLEAR REPORTING SUMMIT DECEMBER 6, 2024

Every process of warhead manufacturing described above generates chemical and radioactive waste. For radioactive waste, the long half-lives of the chemical byproducts mean that many of the materials will remain radioactive for thousands of years. This means that the waste must be properly stored and monitored throughout the weapons manufacturing process.

The waste produced from nuclear weapons production and nuclear energy is the subject of security, health and environmental concern for many Americans, particularly those who live near waste storage sites. Finding a permanent home for waste generated from energy, weaponry, and other radiation technology uses is a long process, and nuclear waste in America still faces an uncertain future. For nuclear energy waste, there are no current permanent solutions. Currently, waste sits decentralized at each site where it is originally generated in dry casks. In the 1980s, the Department of Energy decided that Yucca Mountain in Nevada would become the United States' deep geological repository site—a permanent home for nuclear waste. Nevadans greatly opposed the program, citing seismic activity in the area and an aquifer that waters most of the region's agriculture in the region. Additionally, the state of Nevada contends that even if all nuclear waste was put into Yucca Mountain, the facility would run out of room by 2036.[146] The Obama administration halted the process in 2010, in part due to these concerns, but there has been no viable alternative long term solution proposed since.

Despite heavy political opposition from New Mexico residents and court challenges, the Waste Isolation Pilot Plant (WIPP) for the storage of nuclear weapons waste was authorized in 1979, began construction in the 1980s, and received its first batch of waste for storage in 1999. Since then, over 12,000 shipments of waste have arrived at the site.[147] This site is a deep geologic repository where waste is buried under a thick salt bed.[148] But this does not mean all waste from nuclear weapons activities has been safely contained. One community in particular, St. Louis Missouri, has made recent headlines for the public health consequences that some of the first U.S. nuclear weapons waste continues to generate today.

Many tons of radioactive waste were generated during the early atomic age, before the International Atomic Energy Agency set standards in 1958 protecting the environment and public health from exposure to radioisotopes.[149] During this time, there were no guidelines for mandating proper use, disposal, cleanup, and stewardship of nuclear materials.[150] Mallinckrodt Chemical Works processed uranium in downtown St. Louis, Missouri, for the first nuclear

146 Nevada Attorney General. (n.d.). The fight against Yucca Mountain. State of Nevada. Retrieved May 20, 2025, from https://ag.nv.gov/Hot_Topics/Issue/Yucca/

147 U.S. Department of Energy, Office of Environmental Management. (2019, April 23). Fight for WIPP: A history of the nation's deep geologic nuclear waste repository. https://www.energy.gov/em/articles/fight-wipp-history-nations-deep-geologic-nuclear-waste-repository

148 U.S. Department of Energy. (n.d.). History/timeline. Waste Isolation Pilot Plant. Retrieved May 20, 2025, from https://wipp.energy.gov/historytimeline.asp

149 International Atomic Energy Agency. (1958). Safety series No. 1: Fundamental Safety Principles (Safety Series No. 1). IAEA. https://gnssn.iaea.org/Superseded%20Safety%20Standards/Safety_Series_001_1958.pdf

150 Gil, L. (2018, December 5). Sixty years ago today: IAEA released its first safety standard. International Atomic Energy Agency. https://www.iaea.org/newscenter/news/sixty-years-ago-today-iaea-released-its-first-safety-standard

reactor at the University of Chicago during the Manhattan Project.[151] From 1946 until 1957, Mallinckrodt stored its radioactive byproducts in an area of land near the St. Louis Airport for temporary storage, where it sat in decaying steel drums or—in some cases—uncovered in the open.[152] During transport from the Mallinckrodt Chemical Works' downtown plant to the airport storage area, waste would fall off the trucks onto the roads of St. Louis, "only to be picked up by a single worker carrying a shovel and broom and loaded back onto the bed of a pickup truck."[153] The land in the surrounding area was used for recreation and farmland, and Coldwater Creek ran past this land into residential and industrial neighborhoods. Mallinckrodt knew the dangers of radioactive waste; a 1949 internal Mallinckrodt memo stated that the company would not move the waste out of residential areas because of the hazards it would present to their workers.[154] Thus, the runoff into Coldwater Creek contaminated water and sediments that flowed through the city and settled in various locations from flooding or normal creek flow.[155]

The barrels of waste were passed through multiple companies and locations, leaving behind contamination at each site. In 1966, the government sold "74,000 tons of Belgian Congo pitchblende raffinate containing about 113 tons of uranium; 32,500 tons of Colorado raffinate containing about 48 tons of uranium; and 8700 tons of leached barium sulfate containing about 7 tons of uranium," to Continental Mining and Milling Company and moved the waste down creek to an industrial site on Latty Avenue, in the Hazelwood neighborhood of St. Louis.[156] In 1969, Cotter Corp., whose parent company is General Atomics, bought the waste. The new owner dried the waste in open pits and shipped the rest of the usable materials to Colorado, leaving 8,700 tons of leached barium sulfate and 10,000 tons of raffinate-contaminated waste behind.[157] Cotter Corp began illegally dumping it in the free public West Lake Landfill in the 1970s.[158]

In 1976, Oak Ridge National Laboratory surveyed the drainage ditches surrounding the airport site, finding elevated levels of uranium-238 and radium-226.[159] According to uncovered documents from an investigation by MuckRock and the Missouri Independent, the sources were five times the average yearly radiation dose and 220 times higher than the EPA limits for potable water.[160] At the Latty Avenue site, An Oak Ridge National Laboratory survey found thorium and radium contaminates exceeding federal regulations within the top 18 inches of soil. The new owners of the property, Jarboe Realty & Investment Co., Inc. excavated 32,000 cubic yards of contaminated soil into a pile onsite, but a radiological survey of the area post-excavation still found excess contamination along the road and properties past Hazelwood Avenue. In October 1989, the EPA placed the St. Louis Airport site and the Latty Avenue site on the National Priorities List, which guides the EPA on which hazardous substance-contaminated sites most warrant investigation and cleanup due to threat to human health and the environment.[161]

151 Kite, A. (2023, July 12). Records reveal 75 years of government downplaying, ignoring risks of St. Louis radioactive waste. Missouri Independent. https://missouriindependent.com/2023/07/12/st-louis-radioactive-waste-records/
152 Agency for Toxic Substances and Disease Registry. (2019, April 30). Evaluation of community exposures related to Coldwater Creek: St. Louis Airport/Hazelwood Interim Storage Site (HISS)/Futura Coatings NPL Site. https://coldwatercreekfacts.com/wp-content/uploads/2022/10/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508-1.pdf
153 Kite, A. (2023, July 12). Records reveal 75 years of government downplaying, ignoring risks of St. Louis radioactive waste. Missouri Independent. https://missouriindependent.com/2023/07/12/st-louis-radioactive-waste-records/
154 ibid
155 Agency for Toxic Substances and Disease Registry. (2019, April 30). Evaluation of community exposures related to Coldwater Creek: St. Louis Airport/Hazelwood Interim Storage Site (HISS)/Futura Coatings NPL Site. https://coldwatercreekfacts.com/wp-content/uploads/2022/10/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508-1.pdf
156 U.S. Nuclear Regulatory Commission. (1988, June). Radioactive material in the West Lake Landfill: Summary report (NUREG-1308, Rev. 1). U.S. Environmental Protection Agency. https://semspub.epa.gov/work/07/40055920.pdf
157 U.S. Army Corps of Engineers, St. Louis District. (n.d.). Hazelwood Interim Storage Site (HISS). Retrieved May 20, 2025, from https://www.mvs.usace.army.mil/Missions/FUSRAP/HISS/
158 Kite, A. (2023, July 12). Records reveal 75 years of government downplaying, ignoring risks of St. Louis radioactive waste. Missouri Independent. https://missouriindependent.com/2023/07/12/st-louis-radioactive-waste-records/
159 U.S. Army Corps of Engineers, St. Louis District. (n.d.). FUSRAP: Latty Avenue Properties slide show. U.S. Army Corps of Engineers. Retrieved March 10, 2025, from https://www.mvs.usace.army.mil/Missions/FUSRAP/HISS/
160 Kite, A. (2023, July 12). Records reveal 75 years of government downplaying, ignoring risks of St. Louis radioactive waste. Missouri Independent. https://missouriindependent.com/2023/07/12/st-louis-radioactive-waste-records/
161 U.S. Army Corps of Engineers, St. Louis District. (n.d.). FUSRAP: Latty Avenue Properties slide show. U.S. Army Corps of Engineers. Retrieved March 10, 2025, from https://www.mvs.usace.army.mil/Missions/FUSRAP/HISS/

During this time, people living close to the creek breathed in dust while riding bikes around the creek, gardening in their backyards, or playing in the creek. This community had no idea that these radioactive waste sites were contaminating the water and sediment around the creek.[162] In 1950, 7,550 people lived within one mile of the creek and the population steadily grew to 66,387 by 2010.[163]

Contamination, 80 years later

From 1990 until 1997, the Department of Energy was in charge of remediation at the Latty Avenue Site, with the U.S. Army Corps of Engineers taking over in 1997. This process of evaluation, excavation, and remediation of contaminated soil continues to this day. Waste also still exists at the West Lake Landfill. A 1982 study by the Nuclear Regulatory Commission found that the contaminated deposits of the West Lake Landfill ranged between 2 to 15 feet in depth and covered an area of 16 total acres, for an estimated total volume of 170,000 tons of contaminated soil.[164] In 2010, the subsurface radioactive waste in the West Lake Landfill started smoldering—essentially a fire underneath the layers of soil. Nearby residents smelled the putrid emissions.[165] When the landfill owners went to build a fence around the property and perform cleanup efforts, the tires of trucks tracking dirt in and out of the site showed levels of radiation up to 50 times above normal levels.[166] For many, this was the first time they learned that their landfill contained radioactive waste. Parents started wondering what the effects of this would have on their children. [167]

The Missouri Department of Health investigated reports of nine cases of cancer "including lymphoma, thyroid, prostate, colon, breast, melanoma, and three different types of leukemia,"

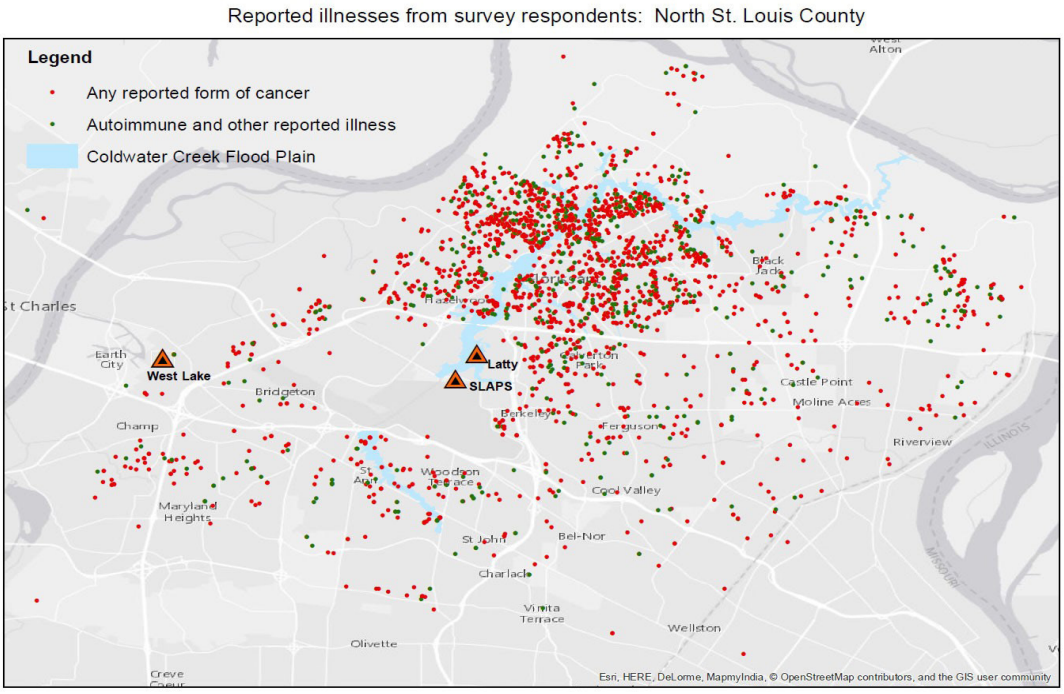


FIGURE 11: DISTRIBUTION OF ILLNESS REPORTED BY SURVEY RESPONDENTS SURROUNDING COLDWATER CREEK; FROM: "2015 HEALTH MAPS'" BY COLDWATER CREEK FACTS, 2015

162 Dawn Chapman, Outrider Nuclear Reporting Summit, December 2024
163 Agency for Toxic Substances and Disease Registry. (2019, April 30). Evaluation of community exposures related to Coldwater Creek: St. Louis Airport/Hazelwood Interim Storage Site (HISS)/Futura Coatings NPL Site. https://coldwatercreekfacts.com/wp-content/uploads/2022/10/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508-1.pdf
164 U.S. Nuclear Regulatory Commission. (1982, May). Radiological survey of the West Lake Landfill, St. Louis County, Missouri (NUREG/CR-2200). https://www.nrc.gov/docs/ML2005/ML20053E785.pdf
165 Kite, A. (2023, July 12). Records reveal 75 years of government downplaying, ignoring risks of St. Louis radioactive waste. Missouri Independent. https://missouriindependent.com/2023/07/12/st-louis-radioactive-waste-records/
166 ibid
167 ibid

in residents living on Nyflot Avenue from 1963 to 1989. They concluded that "radiation induction could not be ruled out for any of the cases except melanoma." In 2013, the Department found that the cancer incidence rate for breast, colon, prostate, and kidney from the zip codes surrounding the creek was higher than the rest of the state of Missouri.[168] Groups of neighbors worked together to collect and hand-enter survey data from a community health survey in 2015. They found 448 cases of autoimmune disease and 1993 total cases of cancer. Maps from the Coldwater Creek Facts database depict disease clusters below.

In 2019, an Agency for Toxic Substances and Disease Registry (ATSDR) study titled "Evaluation of Community Exposures Related to Coldwater Creek" found that exposure to the contamination "prior to remediation activities, could have increased the risk of some types of cancer in people."[169] Exposure between the 1960s to 1990s could have increased the risk of lung cancer, bone cancer, and leukemia, but recreational exposures past the 2000s did not increase risk, and residential exposures only could have increased the risk of lung cancer. In the end the study decided that no further health studies or monitoring needed to be done.

St. Louis residents expressed concerns that this study underestimated the risk and the health status of the community. In community testimonies– all anonymized– from August 2018, many cited that other forms of cancer or autoimmune diseases were prevalent in the community, but not included in the study.

> "I by no means want to take cancer lightly but, I know for a fact living in Hazelwood next to Coldwater Creek from 1979-2005 that my family and friends have other health issues that need to be mentioned and not ignored. A lot of us either have some type of autoimmune disorder such as Hashimoto's, Hypothyroidism. My sister was just diagnosed with ALS and if you study that disease you will see that being exposed to radiation is one of the factors."[170]

The study quotes another former resident who lived in the area from 1971-1997: "I am currently 47, and deaf in my right ear from a congenital birth defect. At age 31, I was diagnosed with Grave's Disease, as well as a tumor in my parotid gland, a pleomorphic adenoma. From 2006-2009, I went through many fertility procedures including multiple rounds of ART (assisted reproductive technology), to no avail." She elaborated that many of her former classmates, teachers, and even her parents had "a wide range of maladies to include autoimmune diseases, tumors, bone diseases, GBM's, childhood testicular cancer, among others, and other unusual illnesses."[171] The ATSDR report includes 30 pages of similar public comments and concerns.

A 2023 joint MuckRock, Missouri Independent, and Reuters investigation looked into the ATSDR reporting process. They found that 38% of the 1,582 health-related findings that the ATSDR had made—more than two-thirds of which either concluded that the community was safe, or that it was unclear whether the contamination led to poor community health outcomes—relied on faulty data and methods. A 2008 congressional investigation demonstrated ATSDR's " keenness to please industries and government agencies that prefer to minimize public health consequences of environmental exposures," and also found examples of the Agency's use of "jackleg science."[172] The ATSDR's studies are often used by private companies like in the case of St. Louis Missouri, the owners of West Lake Landfill, Republic Services subsidiary Bridgeton Landfill LLC, to downplay the exposure to the community, and skirt responsibilities for cleaning up waste or compensating sick community members.[173]

168 Agency for Toxic Substances and Disease Registry. (2019, April 30). Evaluation of community exposures related to Coldwater Creek: St. Louis Airport/Hazelwood Interim Storage Site (HISS)/Futura Coatings NPL Site. https://coldwatercreekfacts.com/wp-content/uploads/2022/10/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508-1.pdf

169 ibid

170 ibid

171 ibid

172 Gordon, B. (2009, March 12). ATSDR: Problems in the past, potential for the future? Hearing before the Subcommittee on Investigations and Oversight, Committee on Science and Technology, House of Representatives, One Hundred Eleventh Congress, First Session (Serial No. 111–10). U.S. Government Publishing Office. https://www.congress.gov/111/chrg/CHRG-111hhrg47718/CHRG-111hhrg47718.pdf

173 Dowdell, J., Pell, M. B., Lesser, B., Conlin, M., Quinton, P., & Cunningham, W. (2024, August 7). How a US health agency became a shield for polluters. Reuters. https://www.reuters.com/investigates/special-report/usa-pollution-atsdr-landfill/

In 2013, mothers of the St. Louis community banded together to form Just Moms STL, an advocacy group founded by Dawn Chapman and Karen Nickel that focuses on advocating for RECA. Following the MuckRock and Reuters investigations, media attention brought a new wave of support for the renewal of RECA. In 2024, Just Mom STL joined other advocacy groups from nuclear testing sites at the Capitol to advocate for expanding and renewing RECA before it expired. Unfortunately, after passing the Senate, RECA was held up in the House of Representatives after Speaker Mike Johnson did not bring it to the floor for a vote.

While much of these harmful activities occurred in the mid-20th century, the legacy lives on in the lives of those impacted, as harmful materials persist in the environment. Even today, the creation of waste from the development and construction of nuclear weapons is inevitable. A relentless pursuit of profit and shortcuts can trigger accidents at waste sites, causing harmful releases into the environment. Despite the lack of a sustainable plan for long-term nuclear waste disposal, tech companies have been embracing the prospect of a nuclear renaissance to power energy-hungry technologies.[174] The Yucca Mountain process demonstrates that while there is tremendous need for long-term storage for the nuclear waste that currently exists, there are no communities that want it in their backyard. Even at plants that have been completed and are storing waste, including the WIPP, there are still accidents. In 2014, an accidental release of radioactive material from one of the transuranic waste containers into the environment, internally exposing 21 workers.[175]

174 Penn, I., & Weise, K. (2024, October 16). Amazon, Google and Microsoft are investing in nuclear power. The New York Times. https://www.nytimes.com/2024/10/16/business/energy-environment/amazon-google-microsoft-nuclear-energy.html

175 U.S. Department of Energy, Office of Environment, Health, Safety & Security. (2015, April 21). Accident investigations of the February 14, 2014, radiological release at the Waste Isolation Pilot Plant, Carlsbad, NM. https://www.energy.gov/ehss/articles/accident-investigations-february-14-2014-radiological-release-waste-isolation-pilot

Conclusion

Although they are situated at different steps in the nuclear weapons cradle-to-grave process and in different geographical areas across the United States, these communities have multiple shared experiences. The United States government—often in conjunction with private companies and scientific agencies—has downplayed, understated, or covered up negative health impacts associated with the releases of chemical or radioactive waste. Often, these cover-ups did not necessarily have to be very elaborate, as information was already highly classified. In each of the instances described above, the government told the public and its employees that there was minimal risk from exposure. Community members in many of these scenarios explained that they did not know why they had so many health issues until years later, when a neighbor or reporter from a local newspaper told them about the possibility of radiation or chemical exposure. Uranium mining in Navajo lands across the western United States left behind abandoned mines and radiological waste that pushed people from their homes and caused negative health effects, specifically among infants and women. Enrichment of uranium for nuclear weapons caused thyroid issues in nearby cities from rushed and irresponsible stewardship of waste. Radioiodine, PCBs, and mercury seeped into nearby water sources in Oak Ridge, Tennessee, and into the atmosphere in Hanford, Washington. Despite these facilities having been built during the Manhattan Project eighty years ago, the waste still exists. Weapons assembly in Amarillo, Texas, has put workers at risk for cancers from chemical particulate and radiation exposure. Particulate matter is carried by high winds and through the water, migrating off-site. Nuclear weapons testing spread fallout across the entire continental United States but delivered potent doses of iodine-131 to communities in Utah, Nevada, and New Mexico. Waste from the first nuclear experiments in the 1940s to the present day sits in a smoldering public landfill in St. Louis, Missouri. Neighborhoods surrounding the landfill and creek where waste has leaked experience high rates of cancer and autoimmune disorders. Throughout its existence, the nuclear weapons industry actively sickens and kills American communities.

While radiation illnesses are difficult to track because they can produce many different health implications as genetic mutations occur, some common illnesses among multiple steps in the nuclear weapons production process are cancers—most notably thyroid cancers for radiation exposure and lung cancers for particulate exposure. While many of the health studies that did come out of the nuclear justice effort focused on monitoring cancer rates, downwinder communities also suffer from autoimmune diseases, birth defects, and other disabilities.

While these major incidents occurred in the 20th century, they continue affecting people today. Not only are the primary exposants at risk of illness, but intergenerational illnesses are also a regular occurrence. Many feel guilt about having children and possibly passing down illnesses to future generations.

In addition, there are psychological, social, and economic consequences to environmental pollution and health issues. In the case of native populations living near Hanford, the uranium mines, and the Nevada National Security Site, who have a deep connection to the land, many tribes have been forced to evacuate the land that their people had inhabited for thousands of years. The land was the source of their livelihoods—used for fishing, agriculture, and hunting—and these activities were no longer safe following chemical and radiological contamination. Evacuation has caused psychological harm through concerns about economic prospects, the possibilities of them or their family members getting sick, and homesickness. People who have faced chronic illnesses or experienced watching their family members go through chronic illness not only face the mental health toll of chronic pain or emotional exhaustion, but the economic burden of high healthcare costs.

The Oak Ridge National Laboratory, the Nevada National Security Site, and the Pantex Plant are still in operation, and there are calls for nuclear testing to be resumed at the Nevada site. While there are no longer operating mills in the Missouri area, the waste perpetuates in the landfill and contaminates previous sites. Between 140,000-300,000

abandoned mines are littered across the western United States, 22,500 of which pose environmental hazards.[176] In all these situations, radiation persists in the environment and waste has not been fully contained away from possible human exposure. While historical failures to protect civilians from exposure could have served as lessons to the nuclear weapons industry in Oak Ridge and at Pantex, operations continue at a rapid pace despite the heavy contamination existing onsite.

Creating nuclear weapons requires significant amounts of natural, labor, and fiscal resources. As radioactive, heavy metal, and chemical resources are extracted from the earth for the United States' nuclear deterrent, people provide the labor, land, and infrastructure. This report demonstrates just some of the costs that nuclear weapons impose on the American homeland; further studies could look into the local economic opportunity costs of the nuclear weapons industry.

Policy Recommendations

Policy action can be taken to provide justice through medical compensation, addressing remaining waste, understanding the full scale of harm to communities, and preventing future harm.

The Radiation Exposure Compensation Act was enacted in 1990 to provide medical compensation to downwind populations. Until June 7, 2024, the most recent version of the Act provided one-time payments to people who worked on-site at testing or mining locations or downwinders from testing. The Act provided $75,000 to on-site nuclear testing workers and $100,000 to uranium mine, mill or ore transporters. To be eligible for downwinder compensation of $50,000, individuals must be able to prove that they lived in one of the listed counties in Utah, Nevada, and Arizona and had one of the eligible cancers listed in the Act. Additionally, they have to prove that they were "physically present for a period of at least 24 consecutive months between January 21, 1951, and October 31, 1958; or for the entire period between June 30, 1962, and July 31, 1962."[177] These restrictive conditions made it impossible for communities outside the bounds of the specified counties to seek justice for their illnesses. Downwinders from the Trinity Test Site in New Mexico were excluded from the Act. Additionally, as explained in previous sections of this report, radiation exposure presents in various illnesses—cancer not always being one of them. The limited list of illnesses prohibits exposure survivors with autoimmune diseases and non-cancerous illnesses from receiving compensation.

In its proposed expanded version during the 118th Congress, the Radiation Exposure Compensation Act covered more areas surrounding and sites with Manhattan Project waste including Tennessee and Missouri.[178] Advocates from mining, testing, and waste communities formed coalitions to lobby in favor of the bill. After expiring in June 2024, a renewed version passed in a 69-30 Senate vote in March. However, the Speaker of the House did not bring the bill to the floor for a vote before the conclusion of the session, leaving survivors without medical compensation. As a result, individuals can no longer submit new claims for compensation.

Similar to RECA, the Energy Employees Occupational Illness Compensation Program provides compensation for workers at certain Department of Energy sites who can prove certain health impacts.[179] The EEOICPA should be expanded to include additional worker categories—such as contractors, who were excluded from the Act—more

176 U.S. Government Accountability Office. (2020, March 5). Abandoned hardrock mines: Information on number of mines, expenditures, and factors that limit efforts to address hazards (Report No. GAO-20-238). https://www.gao.gov/products/gao-20-238

177 Szymendera, S. D. (2015, March 16). The Radiation Exposure Compensation Act (RECA): Compensation related to exposure to radiation from atomic weapons testing and uranium mining (CRS Report No. R43956). Congressional Research Service. https://www.congress.gov/CRSProduct/?prodCode=R43956

178 U.S. Congress. (2024). S. 3853 — Radiation Exposure Compensation Reauthorization Act. 118th Congress. https://www.congress.gov/bill/118th-congress/senate-bill/3853/text

179 U.S. Department of Energy. (n.d.). Energy Employees Occupational Illness Compensation Program. https://www.energy.gov/ehss/energy-employees-occupational-illness-compensation-program

autoimmune disorders and rare cancers, and more support for filing claims. As many of the former workers who faced the brunt of exposure are now elderly, easier filing systems and legal advice should be provided.

The Treaty on the Prohibition of Nuclear Weapons is the first international treaty to address the humanitarian consequences of use and testing. Articles 6 and 7 of the treaty call for victim assistance and environmental remediation for communities affected by nuclear use and testing. A working group led by Kazakhstan and Kiribati was set up to create an international trust fund for these victims. The treaty's preamble, however, which calls for the rights of the peaceful use of nuclear technology, and thus condones nuclear energy, means that uranium mining and nuclear-waste affected communities are excluded from justice or potential compensation in the current form of the treaty. Since many of the signatories to the treaty have active nuclear energy industries, they are not in favor of opening compensation to communities affected by uranium mining and waste because of its dual-use nature. At the Third Meeting of States Parties to the TPNW, affected communities at side events shared their experiences as survivors of nuclear testing and use, both of which are banned by the treaty. Communities affected by uranium mining also held events with other hibakusha, standing in solidarity and declaring that nuclear weapons harm communities from "cradle-to-grave." On top of the fact that the TPNW excludes uranium mining communities, the eligibility of individuals living within nuclear weapons states that have not signed the TPNW—including the United States—is unclear. Further clarity and progress towards a working trust fund is expected to be completed at the first Review Conference of the TPNW in 2026.

Despite observing a moratorium on nuclear testing, the United States still maintains the capability to conduct nuclear explosive tests at the Nevada National Security Site. Proposals to resume nuclear testing for primarily political signaling purposes would have significant environmental health consequences if implemented. The National Nuclear Security Administration's Stockpile Stewardship and Management Plan uses computer simulations using the data gathered in previous decades of nuclear tests to demonstrate that the warheads are viable. Only the U.S. President currently has the authority to call for the resumption of tests, but Congress could amend current legislation to provide checks to the President's power. Specifically, Congress could require the NNSA administrator to certify that testing is necessary to maintain the surety of the stockpile. [180]

At many of the sites described above, nuclear waste has sat for over 80 years while new waste is generated. For any new programs, the NNSA is required by the National Environmental Policy Act to conduct an Environmental Impact Statement (EIS) to analyze the environmental and related social and economic effects, and present a non-action alternative. In June 2021, a coalition of environmental groups filed a lawsuit against the NNSA over its failure to conduct a proper EIS for plutonium pit production— another nuclear modernization program at Savannah River Site and Los Alamos National Laboratory. These sites are not discussed in this report, but they face similar contamination concerns amid continued production.[181] President Trump recently eliminated the White House's Council on Environmental Quality's NEPA regulations.[182] In order to ensure the environment and public health is protected, Congress should expand NEPA, introduce stricter protections, and add requirements for public hearings when new programs threaten to impact the environment and public health. Nuclear waste is not history; waste that the U.S. government and corporations generated while building its nuclear weapons arsenal made people that are alive today sick, and waste that the government will generate during the next several decades of nuclear modernization could also make Americans sick.

180 Maloney, A. (2024, October 25) Introducing Certification of Technical Necessity for Resumption of Nuclear Explosive Testing. Federation of American Scientists. https://fas.org/publication/certification-necessity-nuclear-explosive-testing/

181 Maloney, A. (2024, November 6). Opinion: The sad legacy of the Savannah River plutonium plant. The Atlanta Journal-Constitution. https://www.ajc.com/opinion/opinion-the-sad-legacy-of-the-savannah-river-plutonium-plant/WCOLIFK3NBEQDIRUGGNSUTCD6M/ ; Nuclear Watch New Mexico. (2025, January). Settlement reached in historic NEPA lawsuit over plutonium pit bomb core production. https://nukewatch.org/wp-content/uploads/2025/01/Settlement-Reached-in-Historic-NEPA-Lawsuit-Over-Plutonium-Pit-Bomb-Core-Production.pdf

182 Farah, N. H. (2025, March 6). 3 questions answered about NEPA under Trump. E&E News. https://www.eenews.net/articles/3-questions-answered-about-nepa-under-trump-2/

There are clear ways to prevent future harms to American civilians from the nuclear weapons industry. More funding should be diverted to cleanup programs and community health surveys, in order to address current dangers and consequences of exposure from nuclear weapons industry hazards. Furthermore, while cleaning up waste, the nuclear modernization program—which will generate more waste—should be reevaluated to include the environmental health hazards in its cost benefit analysis. In reevaluating the necessity of modernization programs, the United States should also reevaluate the role that nuclear weapons play in national security, especially as their possession has harmed—and continues to harm—members of the American public that these same weapons are supposed to protect.

FAS FEDERATION OF AMERICAN SCIENTISTS

About the Federation of American Scientists

The Federation of American Scientists is dedicated to democratizing the policymaking process by working with new and expert voices across the science and technology community, helping to develop actionable policies that can improve the lives of all Americans. For more about the Federation of American Scientists, visit **FAS.org.**