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Does the Weapon of Mass Destruction Impact Masses Equally? Examining the Disproportionate Impacts of Nuclear Weapons

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Abstract

Regarded as the most powerful weapon ever created, the nuclear weapon is associated with mass destruction and even total annihilation. This thesis aims to answer the question: does the weapon of mass destruction impact masses equally? The use of three theoretical lenses is employed to guide this thesis' analysis: the lenses of internal colonialism, neocolonialism, and feminism. These lenses allow for previously marginalized experiences to be placed at the center of analysis. The entirety of the 'nuclear web', from nuclear scholarship and nuclear decision-making to weapons design, creation, production, and disarmament is analyzed to understand the total impacts of the weapon and dismantle the belief that the impacts of nuclear weapons are limited to war-time use. This thesis concludes that nuclear weapons impact people of color and women disproportionately, as nuclear powers both operate in and perpetuate a patriarchal, colonial system.

Introduction

The alarm rings. You get under your desk, aware it will be useless in protecting you. You see a flash of white light, and then… nothing. The world as you know it is gone.

This is the scene that has been painted by popular media and political campaigns alike to describe a nuclear attack. The two notions underpinning this scene, and that guide most people's perceptions of nuclear weapons, are mass destruction and/or total annihilation. Scholar Daniel Wojcik affirms this, asserting that "the most spread and persistent belief that emerges from… speculation about nuclear weapons is that they will be used to about the end of the world."[1] These commonly held beliefs of widespread destruction cement the nuclear weapon as the ultimate weapon of mass destruction (WMD); a weapon that, if used, assures extensive, indiscriminate harm. Afterall, a WMD is a weapon that is intended to harm vast swaths of people when used, and nothing harms more people than a so-called doomsday weapon.

But what if the ultimate weapon of mass destruction does not impact masses equally? Furthermore, what if the detrimental impacts of the nuclear weapon are not limited to the actual wartime detonation of an atomic bomb? Many assume that the known impacts of nuclear weapons are limited to the consequences of Hiroshima and Nagasaki, the only two cities to have had atomic bombs dropped on them. However, it is imperative to investigate nuclear weapons in their entirety, including scholarship, production, testing, use, and disarmament, to effectively understand the impacts of the

[1] Daniel Wojcik, "Embracing Doomsday: Faith, Fatalism, and Apocalyptic Beliefs in the Nuclear Age," *Western Folklore* 55, no. 4 (1996): 297–330, https://doi.org/10.2307/1500138.

weapon. The term ‘nuclear web’ will be used moving forward to encapsulate this entirety.

A cursory review of the current literature within nuclear scholarship highlights three key impacts of nuclear weapons that give this investigation merit: first, the racist underpinnings of the nuclear production process, second, the biased selection of nuclear testing sites, and third, the disproportionate impacts of radiation on women’s bodies.

A *Bulletin of the Atomic Scientists* article discusses the racism ingrained in the nuclear web, arguing that at the time of inception of the nuclear field in the early 1940s, racist and colonial ideals abounded, and the nuclear field formed with these ideas built into its foundation.[2] These norms, practices, and attitudes are apparent in the displacement of minority communities to build nuclear production facilities, the enforced racial segregation at many of these facilities, the exploitation of Native American land for uranium, and the decision to test nuclear weapons in former colonies and/or on indigenous land.

Furthermore, the nuclear field was not immune to the misogynistic ideals that were the norm at the time of its inception. The field can be characterized by the exclusion of women from virtually every aspect of the nuclear web, including ideation, development, use, scholarship, and disarmament. This exclusion ensured that the perspectives and experiences of women were not considered in the production process of nuclear weapons or in studies of the effects of nuclear weapons.

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[2] Katlyn M. Turner, Lauren J. Borja, Denia Djokić, Madicken Munk, Aditi Verma, “A Call for Antiracist Action and Accountability in the US Nuclear Community,” *Bulletin of the Atomic Scientists* (blog), August 24, 2020, https://thebulletin.org/2020/08/a-call-for-antiracist-action-and-accountability-in-the-us-nuclear-community/.

Ultimately, this thesis aims to answer the question, "does the weapon of mass destruction impact masses equally?" This question will be answered by analyzing the impacts of the nuclear web and determining if these impacts are equal across different sub-groups of the population, or if the nuclear weapon in fact impacts mass populations disproportionately. The nuclear web will be broken into three parts for analysis: one, the nuclear fuel cycle, which drives the production of nuclear weapons, two, nuclear weapons testing, and three, the aftermath of nuclear weapons detonation, focusing primarily on radioactive fallout.

My desire to investigate the impact of nuclear weapons is driven in part by a personal conviction to think critically about the most powerful weapon ever created, and by an academic interest in ensuring that the experiences of marginalized communities are not continuously sidelined in security studies scholarship.

Numerous calls have been made to better engage issues of race and feminism in the field of security studies; the prominent security journal *Security Dialogue* stated that "the spectres of race and racism haunt the field of critical security studies", and scholar Ann Tickner argued that "international relations is a man's world, a world of power and conflict in which warfare is a privileged activity."[3] Therefore, this thesis will use the three theoretical lenses of internal colonialism, neo-colonialism, and feminism to ensure the experiences of marginalized communities are at the center of analysis.

[3] J. Ann Tickner, "Hans Morgenthau's Principles of Political Realism: A Feminist Reformulation," *Millennium* 17, no. 3 (December 1, 1988): 429–40, https://doi.org/10.1177/03058298880170030801.

Internal colonialism was coined by Robert Blauner to describe the conditions and experiences of people of color in the United States.[4] Internal colonialism therefore represents the ideal theoretical lens through which to understand the racial and colonial underpinnings of the nuclear regime, particularly the nuclear weapons production process, and understand whether the impacts of the nuclear regime disproportionately affect communities of color.

Neo-colonialism is related to internal colonialism, and these two theoretical lenses will at times overlap. Neo-colonialism was theorized by Kwame Nkrumah to "call attention to a historical and structural condition of dependency between certain territories."[5] It is the process of turning formerly colonized states "into victims of political, mental, economic, social, military and technical forms of domination carried out through indirect and subtle means that did not include direct violence."[6] Neo-colonialism provides a useful lens through which to view nuclear testing, as the majority of nuclear testing took place in former colonies or on contested land with populations different than that of the political elite.

The final theoretical lens employed in this thesis is feminism, also referred to as feminist security studies. The core element of feminism in the context of security studies is the centering of gender as the key category of analysis. Feminist IR theory allows us to de-emphasize traditional state actors and instead place gender at the forefront of analysis. This will be vital in investigating the roles or lack of roles women play in the nuclear

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[4] Robert Blauner, "Internal Colonialism and Ghetto Revolt," *Social Problems* 16, no. 4 (1969): 393–408, https://doi.org/10.2307/799949.
[5] Kwame Nkrumah, *Neo-Colonialism: The Last Stage of Imperialism* (Panaf, 1974).
[6] Kwame, Ibid.

weapons regime, as well as in understanding the impacts of nuclear weapons on women in particular.

In sum, this thesis will flow in three parts: first, a chapter applying the lens of internal colonialism to the nuclear production process, using the primary case study of uranium mining in the Navajo Nation. The second chapter will use the primary lens of neo-colonialism and secondary lens of internal colonialism to investigate the impacts of nuclear weapons testing, using the case studies of U.S. nuclear testing in the Marshall Islands and at the Nevada Test Site. The third chapter employs the lens of feminism to investigate the exclusion of women from each stage of the nuclear process, and the impacts this exclusion created. The primary case study in the third chapter is the impact of radiation on women's bodies in places where nuclear weapons were detonated.

Ultimately, the answer to my research question is no, the ultimate weapon of mass destruction does not impact masses equally. Communities of color, particularly indigenous communities, bear far more severe consequences of the nuclear weapons production process, and women are not only primarily excluded from the nuclear weapons regime but are also forced to bear more severe physical and emotional consequences because of this exclusion. These findings have significant implications for our understanding of the role nuclear weapons play in the world, as they dismantle the belief that effects are limited to war-time use, and that mass destruction does not mean masses are impacted equally. The nuclear weapons regime must gain awareness of this issue, and provide recognition and compensation to these victims that are disproportionately affected. This thesis' investigation is important for the field of international security and social sciences scholarship more broadly, as it centers the

experiences of typically sidelined voices and dismantles preconceived notions about the most powerful weapon in the world.

Chapter 1: Internal Colonialism and the Nuclear Fuel Cycle

Arundhati Roy, an Indian author and activist, wrote that nuclear weapons are "at the very heart of whiteness."[7] This chapter aims to unpack Roy's statement and examine the inequalities produced by the nuclear enterprise through the lens of race. Two related, instrumental lenses through which one can measure racial inequality perpetrated by the state are internal colonialism and neo-colonialism. When looking at the system of nuclear weapons as a whole, which includes nuclear weapons research, creation, development, testing, and use, the lenses of internal colonialism and neo-colonialism allow us to analyze the unequal impacts that the nuclear system produces. This chapter will specifically focus on how the nuclear web was built, and in what ways nuclear weapons creation and production exploit, dehumanize, and subjugate people of color.

Introduction to Theoretical Lenses of Internal Colonialism and Neo-Colonialism

The lenses of internal colonialism and neo-colonialism provide a means through which we can examine the nuclear web as a whole to better understand the unequal impacts it creates. Both theories are complex, and often used hand in hand with each other and other theories of discrimination. Critically, both theories rely upon a foundation of racism; racism and colonialism theories go hand in hand, as forms of colonialism rely upon the subjugation of people of color.

Internal Colonialism

Internal colonialism was coined by Robert Blauner in his 1969 seminal piece

[7] Arundhati Roy, *The End of Imagination* (Chicago, Illinois: Haymarket Books, 2016).

"Internal Colonialism and the Ghetto Revolt" to describe the conditions and experiences of people of color in the United States.[8] Blauner notes that, unlike conventional colonialism, internal colonialism refers to relations within a society; notably, the colonizer-colony geographic separation is absent.[9] Instead, Blauner explains internal colonialism in terms of the core and the periphery: arguing that "major industrial countries such as the U.S. seek to bring their peripheral regions under the control of the core, after which the core develops exploitative relations with the periphery, using is natural resources and cheap labor."[10] Peripheral regions refer to regions characteristically different from power centers; whether that means they are geographically farther or different from power centers, or the populations who make up the periphery hold different identities than those in power. The exploitation of the periphery is particularly visible in the context of the nuclear production process, as the United States was able to use its power to exploit and disrupt communities of color for uranium mining and weapons production.

Blauner's theory of internal colonialism has been widely criticized for flaws in analysis. Scholar Charles Pinderhughes offered a reassessment of internal colonialism in his 2011 article "Toward a New Theory of Internal Colonialism." Pinderhughes established an analytical framework for internal colonialism theory that relies upon a definition of internal colonies as "a geographically based pattern of subordination of a differentiated population with each geographically separate territory as a distinct

[8] Blauner, ibid.
[9] Blauner, Ibid.
[10] Blauner, Ibid.

colony."[11] He therefore characterizes Native American reservations and predominantly black communities as individual colonies across the United States. Furthermore, Pinderhughes defines the outcome of internal colonialism as systematic group inequality that is evident in the practices and policies of various social institutions. The outcomes of the practices and policies of the nuclear establishment can therefore be analyzed through this lens of internal colonialism to better understand what effects are faced by communities of color.

Internal colonialism is also a helpful theory for this chapter's analysis as it is especially applicable to the case studies of Native American reservations, which took the brunt of the nuclear production process. Dorceta Taylor affirms the applicability of internal colonialism to case studies of Native American tribes in her book *Toxic Communities*, as "these entities arose out of military conquest and subsequent military domination."[12] Taylor references a number of relevant works that assert that forms of internal colonialism can explain the locations of Native American reservations and the hazards the tribes were subsequently exposed to, in part by practices such as uranium mining and milling.[13] Internal colonialism provides a critical lens through which the experiences of and impacts on communities of color at the hands of the nuclear establishment can be examined. This chapter will rely primarily on the lens of internal colonialism to view these impacts, but the lens of neo-colonialism will also be employed

[11] Charles Pinderhughes, "Toward a New Theory of Internal Colonialism," *Socialism and Democracy* 25, no. 1 (March 1, 2011): 235–56, https://doi.org/10.1080/08854300.2011.559702.
[12] Dorceta, 49.
[13] Dorceta, 49.

and therefore must be defined.

Neo-Colonialism

First and foremost, the modifier 'neo' signifies a difference from the term 'colonialism'. This is important; colonialism, defined as the "deliberate imposition of the rules and policies of a nation on another nation", is not the relationship at question in this case.[14] As colonization has evolved in the 21st century, particularly as blatant colonization has become taboo, it is necessary to unpack other exploitative relationships to better understand the cases at hand.

Neocolonialism was first defined in 1961, in the context of African independence, at the AAPC's "1961 Resolution on Neocolonialism."[15] It was defined as:

> "the deliberate and continued survival of the colonial system in independent African states, by turning these states into victims of political, mental, economic, social, military and technical forms of domination carried out through indirect and subtle means that did not include direct violence."[16]

This definition highlights the entrenched nature of neocolonialism; despite no longer being victims of blatant colonization, former colonial states are subjected to more subtle means of oppression by their former colonizers, who are able to take advantage of the inherent weakness of the newly independent state. In this sense, colonialism didn't die when states

[14] Ronald J. Horvath, "A Definition of Colonialism," *Current Anthropology* 13, no. 1 (1972): 45–57.
[15] Tatah Mentan, *Africa in the Colonial Ages of Empire: Slavery, Capitalism, Racism, Colonialism, Decolonization, Independence as Recolonization, and Beyond* (Mankon, Bamenda: African Books Collective, 2017), 280. .
[16] Tatah, ibid.

became independent; it lurked beneath the surface, subtly exploiting left-over weaknesses from former colonization.

In 1965, the first president of an independent Ghana, Kwame Nkrumah, published *Neo-colonialism: The Last Stage of Imperialism*, which subsequently made neocolonialism a relevant term in international relations. Nkrumah defined neo-colonialism as:

> "the subtle propagation of socio-economic and political activity by former colonial rulers aimed at reinforcing capitalism, neo-liberal globalization, and cultural subjugation of their former colonies. In a neocolonial state, the former colonial masters ensure that the newly independent colonies remain dependent on them for economic and political direction."[17]

Nkrumah builds on the definition put forth by the AAPC, emphasizing the subtlety of the phenomenon while expanding on the most common modes of neocolonialism.

Economic activity is the most common form of neocolonialism. Typically, one sees a former colonial ruler exploiting the local and national resources of weaker communities and countries, enforcing their systems of capitalism, and ignoring indigenous practices and trades.[18] Indeed, economic exploitation is the most researched form of neocolonialism, given its prevalence and visibility.

Discussions of neocolonialism are rare in the context of security studies, but significant analyses have taken place nonetheless. For example, in "The Postcolonial Moment in Security Studies," Tarak Barkawi and Mark Laffey assert the necessity to reframe assumptions and core theories in security studies, as they are derived from a

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[17] Kwame, 7.

[18] Marielle, "Let's Talk about Neo-Colonialism in Africa |," *Africa at LSE* (blog), November 15, 2017, https://blogs.lse.ac.uk/africaatlse/2017/11/15/lets-talk-about-neo-colonialism-in-africa/.

particular understanding of the European experience and 'great power' framework.[19] Generating non-Eurocentric analyses in security studies provide fruitful and necessary re-understandings for the contemporary security environment, an environment characterized by transnational actors.

Other scholars have applied the lens of neo-colonialism to relevant security case studies. A 2018 University of Kent report examined the neo-colonialist implementation of Security Sector Reform from developed countries onto nations recovering from war; the study concludes that these Eurocentric SSR policies have no guarantee of securing a more peaceful environment for war-afflicted developing countries.[20] The report highlights a vital reason the lens of neocolonialism is important in IR scholarship; without it, we lack a complete understanding of the international system and the security environments within it.

That being said, few scholars have attempted to use the lens of neocolonialism to examine the sub-field of nuclear security. Richard Butler, former Australian Ambassador to the UN, attempted to offer a neo-colonialist explanation for India's possession of nuclear weapons in his book *Fatal Choice*. Butler references a conversation he had with an Indian man in Mumbai, during which the man said "But you must know that this nuclear colonialism will not stand. India's security is as important as America's. We fought for our independence from the British just as America did. We will defend it."[21]

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[19] Tarak Barkawi and Mark Laffey, "The Postcolonial Moment in Security Studies," *Review of International Studies* 32, no. 2 (2006): 330.
[20] University of Kent, "Neo-Colonial Attitudes to Security in War-Torn Nations out-of-Date and Unhelpful," ScienceDaily, accessed April 21, 2022, https://www.sciencedaily.com/releases/2018/10/181018125154.htm.
[21] Richard Butler, *Fatal Choice: Nuclear Weapons: Survival or Sentence* (Basic Books, 2003).

Butler asserts that India views the necessity of nuclear possession from the lens of neocolonialism; if India possesses nuclear weapons, it can fend off former colonial powers, and assure its security in an international system dominated by Western powers.

Returning to the AAPC definition of neocolonialism, one notes the many forms of neocolonialism: political, mental, economic, social, military, and technical forms of domination. These forms of neocolonialism highlight a wide-ranging applicability of the lens to studies within international security, and are particularly relevant in investigating the impacts of the nuclear establishment.

Analysis

In this section, I analyze three aspects of nuclear weapons development. For each aspect, I will use the theoretical lenses of internal colonialism and neocolonialism to investigate whether exploitation helps us understand the unequal effects of the nuclear weapons regime.

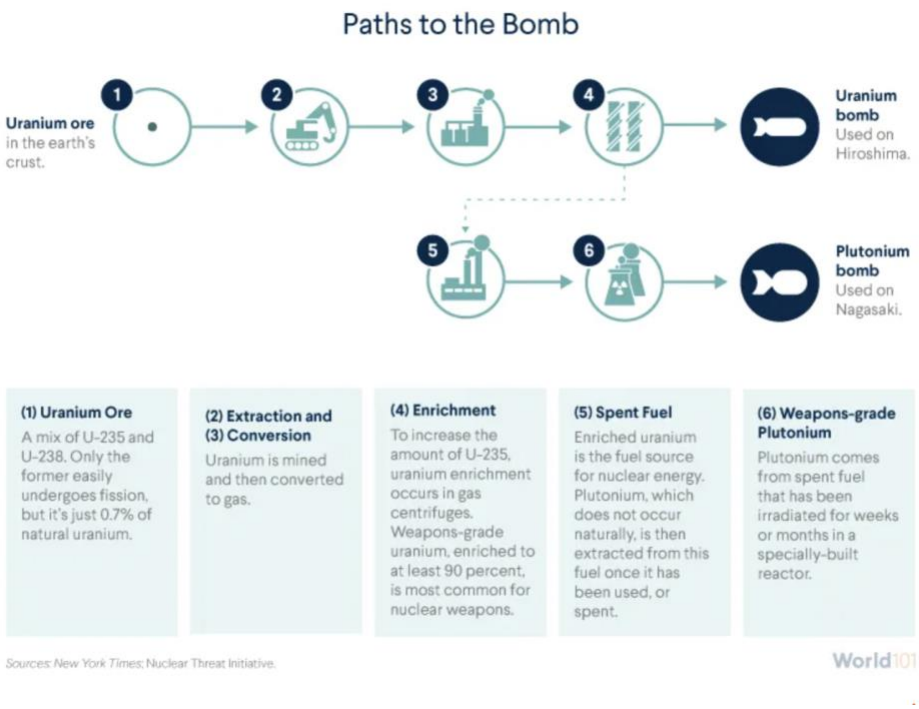
Nuclear Fuel Cycle

The nuclear fuel cycle is the cycle that allows for nuclear energy to be harnessed. The nuclear fuel cycle is most often referred to in the field of nuclear energy, but is the same for the production of nuclear weapons, except that uranium for nuclear weapons is typically highly enriched at 90 percent or more U-235, whereas uranium for nuclear power has less than 20 percent enriched U-235.[22]

[22] "How Do Countries Create Nuclear Weapons?," World101 from the Council on Foreign Relations, accessed April 21, 2022, https://world101.cfr.org/global-era-issues/nuclear-proliferation/how-do-countries-create-nuclear-weapons.

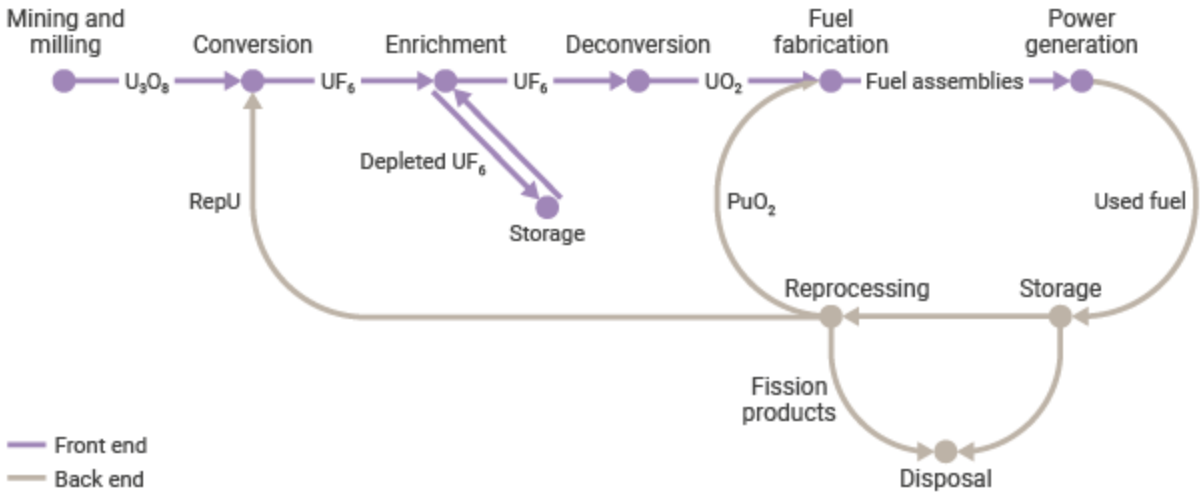
Figure 1 demonstrates "paths to the bomb," and Figure 2 details the nuclear fuel cycle more specifically. Both figures demonstrate the various steps involved in the production of nuclear weapons; this analysis will use the lenses of internal colonialism and neocolonialism to examine three steps in particular: mining and milling, production (enrichment, deconversion, fuel fabrication, power generation) and waste (storage and disposal), that demonstrate the disproportionate impacts of nuclear weapons on communities of color.

Figure 1: Paths to the Bomb[23]



[23] World101, ibid.

Figure 2: Nuclear Fuel Cycle[24]



Mining and Milling

Mining and milling uranium ore is the first step in the path to creating a nuclear weapon or harnessing nuclear power. Mining is also one of the stages of nuclear production most mired by racist practices.

Uranium is typically mined in one of four ways, depending on the nature of the uranium deposit. The first type of mining is surface or open-pit mining, which is typical of most mining in the eastern United States.[25] Surface mining involves the removal of an environment's surface and the extraction of uranium ore. Uranium tailings, the material left over after surface mining processing, are radioactive and toxic.[26]

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[24] "Nuclear Fuel Cycle Overview - World Nuclear Association," accessed April 3, 2022, https://world-nuclear.org/information-library/nuclear-fuel-cycle/introduction/nuclear-fuel-cycle-overview.aspx.
[25] Geoffrey H Fettus and Matthew G McKinzie, "Nuclear Fuel's Dirty Beginnings," *National Resources Defense Council*, n.d., 104.
[26] Geoffrey, ibid.

Underground mining is used if uranium deposits are located deeper than surface mining would allow. It involves extracting ore deposits from deep in the earth's surface; after it is extracted, it is arranged in piles near the mine surface, then transported to a mill where it becomes uranium 'yellowcake.' Yellowcake refers to the solid form of mixed uranium oxide.[27] Although underground mining creates less waste rock than surface mining, it exposes workers to the highest levels of radiation.[28]

Heap leach mining is the third method, and involves "treating crushed ore on the surface with a wash of chemicals to extract uranium."[29] Heap leach mining took place in the 70s and 80s in the United States, after which sites were decommissioned.

The first elements of internal colonialism become visible when examining where uranium mines were primarily located. The majority of uranium mines in the United States were located either on or near Native American reservations. Figure 3 demonstrates this; black triangles represent uranium mines, and bright blue represents reservations.[30]

It is important to note that uranium deposits do not solely exist on or near reservations; in fact, Native American reservations are located on only 37% to 55% of the country's uranium reserves, yet more than 75% of the country's uranium mines are on

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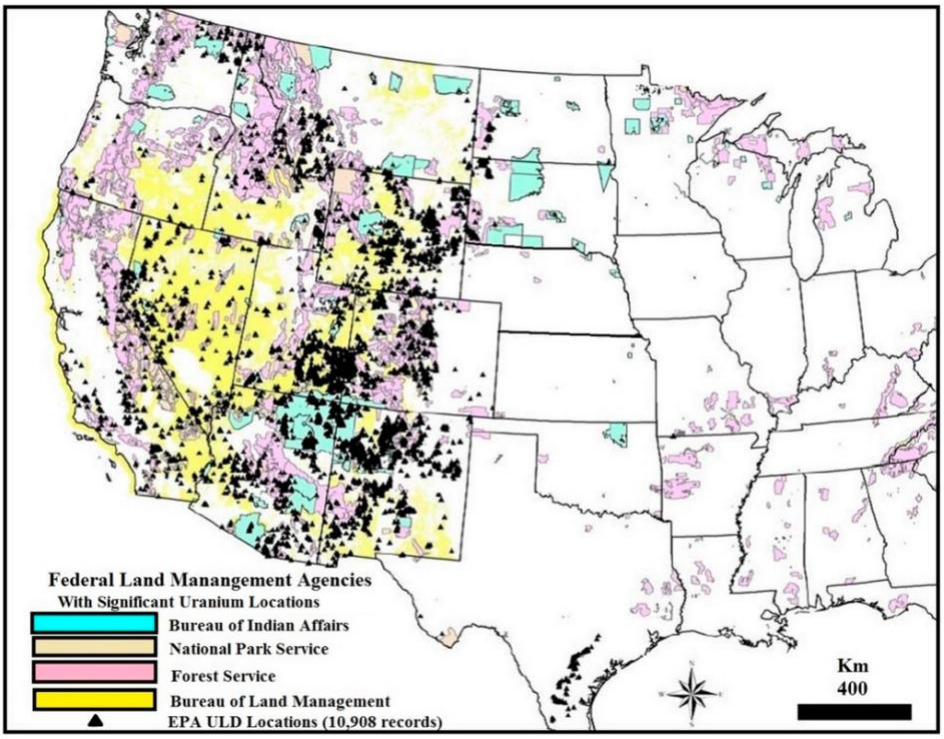
[27] "Yellowcake | NRC.Gov," United States Nuclear Regulatory Commission, accessed April 3, 2022, https://www.nrc.gov/reading-rm/basic-ref/glossary/yellowcake.html.
[28] Geoffrey, ibid.
[29] Geoffrey, ibid.
[30] It is important to note here that the United States entirely is on Native land; although most uranium mines were on or near indigenous reservations, land not included in reservations once also belonged to indigenous peoples.

Native land.[31] A significant amount of uranium deposits exist in the upper-Midwest, as demonstrated on the map, as well as in the southeastern United States. However, these deposits were not chosen to be the sites of uranium mines, raising the question of why uranium deposits on Native American reservations were prioritized in the establishment of uranium mines and mills. Three possible explanations can be found: first, that the United States government chose to establish the majority of uranium mines on Southwestern reservations because they were close in proximity to the Manhattan Project in Los Alamos, New Mexico. Second, due to tribal sovereignty, Native American reservations have less strict environmental regulations and therefore the U.S. government could more easily meet its goal of mining vast amounts of uranium at a rapid pace. Third, that the U.S. government viewed Native American reservations as less valuable than other domestic land, and was willing to expose Natives to more risks. These three explanations will be unpacked in further analysis, but the answer is likely a combination of all three explanations.

[31] Winona LA Duke Westigaard, "Uranium Mines on Native Land | The Harvard Crimson," accessed April 21, 2022, https://www.thecrimson.com/article/1979/5/2/uranium-mines-on-native-land-pthe/.

Figure 3: Map of EPA Uranium Mines and Native American Reservations[32]

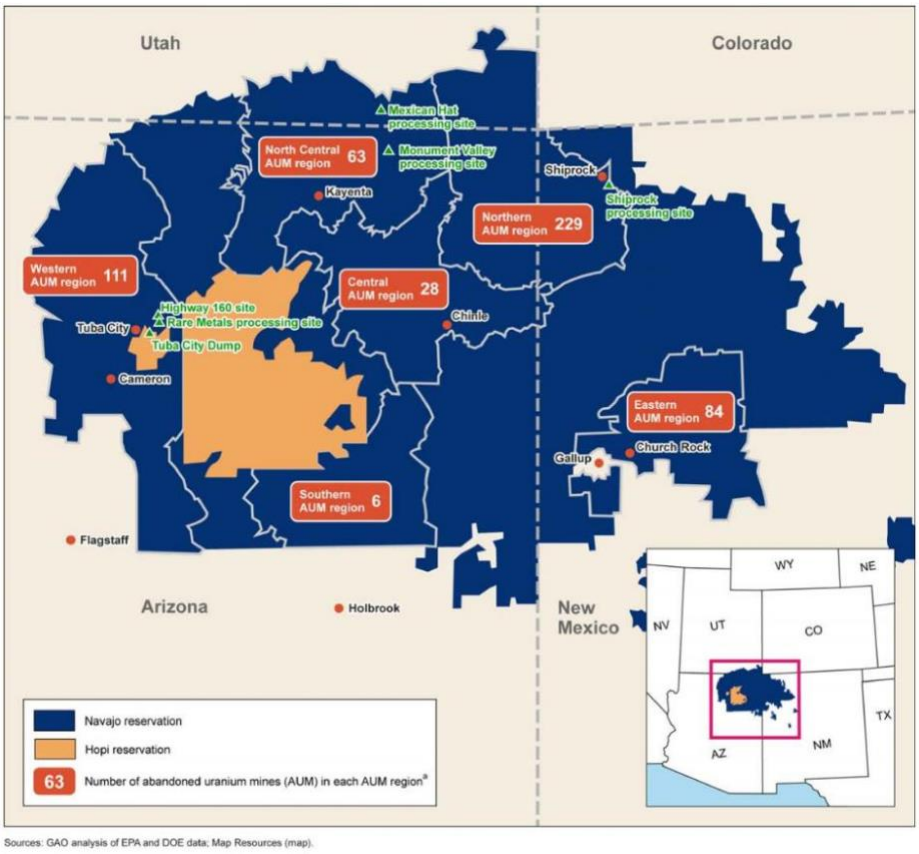


Case Study: Uranium Mining and Milling in the Navajo Nation

The Navajo Nation, located in the Southwestern U.S. states of Arizona, New Mexico, and Utah bore the greatest concentrations of uranium mines, as Figure 4 demonstrates.

[32] Anita Moore-Nall, "The Legacy of Uranium Development on or Near Indian Reservations and Health Implications Rekindling Public Awareness," *Geosciences* 5, no. 1 (March 2015): 15–29, https://doi.org/10.3390/geosciences5010015.

Figure 4: Map of Navajo Nation and Uranium Mines[33]



Given the extensive presence of uranium mining, the Navajo Nation mines present a prime opportunity for examining the first stage of nuclear weapons production through the lens of internal colonialism.

The Navajo Nation reservation lands and surrounding areas have been mined for uranium since 1942.[34] After the end of WWII and the increased interest in nuclear weapons production due to the Cold War ramping up, the demand for uranium grew dramatically. The Navajo Nation initially resisted uranium mining, wanting to prevent

[33] U. S. Government Accountability Office, "Uranium Contamination: Overall Scope, Time Frame, and Cost Information Is Needed for Contamination Cleanup on the Navajo Reservation," accessed April 21, 2022, https://www.gao.gov/products/gao-14-323.
[34] "Nuclear War: Uranium Mining and Nuclear Tests on Indigenous Lands," Cultural Survival, accessed April 3, 2022, https://www.culturalsurvival.org/publications/cultural-survival-quarterly/nuclear-war-uranium-mining-and-nuclear-tests-indigenous.

intrusions into their land. However, as the Cold War intensified and the economic opportunities associated with uranium mining grew, the Navajo Nation could not prevent the rapid establishment of uranium mines, as mining appeared to be a solid economic opportunity for unemployed Navajo men.[35]

Mining did indeed give unemployed Navajo men access to jobs, but wages were often suppressed, and miners worked without any protective equipment or knowledge of the harms they were being exposed to.[36] Dorceta Taylor expands on the economic subjugation Navajos faced at the hands of the government, particularly the Department of Energy and private corporations the DOE funded, detailing the presence of a split and a dual labor market in uranium mining. The split market meant that Navajo workers were paid less than non-Native workers, despite doing the same work.[37] The dual market meant that Navajo workers were relegated to the secondary labor market, which was filled with dangerous, low-wage jobs, whereas non-Native workers had access to the primary labor market in the least hazardous parts of the industry.[38]

The dual and split markets created by the DOE highlight key themes of internal colonialism; not only was Native land exploited for its uranium reserves, but Native people were exploited for labor. Navajo men were taken advantage of, offered low-wage, dangerous jobs which the government and private corporations that worked for it justified by arguing they were creating economic opportunities. These were not economic

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[35] "Uranium Mining," Atomic Heritage Foundation, July 30, 2018, https://www.atomicheritage.org/history/uranium-mining.
[36] Uranium Mining, ibid.
[37] Dorceta, ibid.
[38] Dorceta, ibid.

opportunities; they were explicit manifestations of internal colonialism, prioritizing government and private interests at the physical expense of Native people.

Demand for uranium skyrocketed in the 1950s and 60s as the arms race between the United States and the Soviet Union escalated; ultimately, over 1,000 mines were established on Navajo land, resulting in nearly 4 million tons of uranium mined from 1944-1989.[39] After uranium mining ceased on the Navajo Nation, more than 500 abandoned uranium mines, four inactive uranium milling sites, and a former dump site were left behind, creating an environment rife with land and water contamination.[40]

Uranium mining on Navajo Land also created the largest release of radioactive material on United States soil during the July 16, 1979 Castle Rock accident.[41] The uranium mill experienced a breach in its disposal pond wall, which served as a dam to prevent the radioactive waste from entering a tributary for the Puerco River, a vital body of water for the Navajo Nation and surrounding communities in New Mexico and Arizona. The wall breach resulted in 1,100 tons of solid radioactive waste and 93 million gallons of liquid waste entering the river.[42]

While the accident itself was devastating, the effects were made disastrous by slow and limited government and private cleanup efforts. Atomic Heritage points out that "some Native American communities did not even realize there had been a disaster until several days later."[43] This lack of awareness from communities exposed to the accident highlights two key elements of uranium mining: first, communities on or near the mines

[39] Uranium Mining, ibid.
[40] Geoffrey, ibid.
[41] Uranium Mining, ibid.
[42] Uranium Mining, ibid.
[43] Uranium Mining, ibid.

were continuously and purposely left in the dark about the impacts of mining, and second, the private corporations running the mine and the U.S. government agencies funding them did not view these communities as important enough to be informed of impacts and accidents.

Additionally, despite the Castle Rock accident being far more severe in terms of waste released than the high profile Three Mile Island accident in Pennsylvania, little public or national attention was devoted to the accident, further slowing the cleanup efforts. A number of wells, which supplied critical drinking and recreational water to nearby communities, were contaminated and often abandoned rather than cleaned. The vast amounts of radioactive waste released meant that in some places, the water's radioactivity levels were up to 7000 times that of legal drinking water.[44] Immediate health consequences abounded for the affected community, including radiation burns for children who swam in the river following the spill, and death of wildlife who ingested significant amounts of the radioactive water.[45]

The Castle Rock accident points to a number of insidious racial underpinnings of the uranium mining and milling processes. The general lack of attention from the public and the federal government is tied to both internal colonialism and general racism. Within the government's nuclear regulatory committees, the minimal and sluggish response highlights an institutional disregard and apathy towards the Native American communities targeted by uranium mining. The greater public's disinterest points to a

[44] Uranium Mining, ibid.
[45] Uranium Mining, ibid.

system-wide disregard for the plights of Native communities, compounded by the government and media's history of underrepresentation for these issues.

A key consequence of the internal colonialism underpinning the U.S. government's nuclear regulatory bodies is that for decades, uranium mining and milling processes were not regulated in any meaningful way.[46] Not only were regulations not meaningful, but when recommendations were made to secure better health outcomes for workers and nearby communities, they were ignored. Stephanie Malin, a sociologist at Colorado State University, confirms this, stating: "They made recommendations — better ventilation in the mines, radiation monitors. But these recommendations were made in classified public health documents in the 1950s. The government responded by not doing anything until the 1970s."[47] In the late 1970s, after more than 30 years of unregulated mining and milling, the nuclear policy establishment, consisting of Congress, the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA), finally instituted a legal and regulatory framework to address the environmental and physical impacts of uranium milling.[48]

It was too late. The decades of under-regulation and suppression of information ensured that disproportionate health and environmental impacts were created for miners and their families. First and foremost, the government never informed the Navajo and other tribal groups living nearby of the dangers that came with uranium mining and milling.[49] This meant that many of those who lived on or near the mines drank from

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[46] Geoffrey, ibid.
[47] Nathanael Johnson, "Meltdowns, Waste, and War: Here Are the Real Risks of Nuclear Power," Grist, April 11, 2018, https://grist.org/technology/nuclear-is-scary-lets-face-those-fears/.
[48] Geoffrey, ibid.
[49] Uranium Mining, ibid.

contaminated pools of water and built their homes with radioactive material from mine sites.[50] Therefore, an estimated 600 dwellings on Navajo land are contaminated with radiation.[51] Additionally, a 2015 study found that 85 percent of Navajo homes are still contaminated with uranium.[52]

These astronomical levels of radiation and uranium contamination have created significant health consequences for members of the Navajo Nation as well as surrounding tribe members. A 2015 study found that tribe members living "near uranium mines have more uranium in their bones than 95 percent of the U.S. population."[53] Additionally, a CDC study found that 27 percent of Navajos have high levels of uranium in their urine, a percentage that is "more than five times higher than that of the US population as a whole."[54]

Furthermore, studies suggest that Navajos who worked in or near uranium mines suffer from health complications such as lung cancer and pneumoconiosis.[55] Lung cancer rates among the nearly 5,000 Navajo who worked in the mines have skyrocketed since the 1950s, likely due to the inhalation of ore dust and no protective measures to prevent inhalation.[56] Navajo communities also suffer disproportionately from stomach cancer; the

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[50] Uranium Mining, ibid.
[51] Nuclear War, ibid.
[52] Johanna M. Blake et al., "Elevated Concentrations of U and Co-Occurring Metals in Abandoned Mine Wastes in a Northeastern Arizona Native American Community," *Environmental Science & Technology* 49, no. 14 (July 21, 2015): 8506–14, https://doi.org/10.1021/acs.est.5b01408.
[53] Johanna, ibid.
[54] Laurel Morales, "For The Navajo Nation, Uranium Mining's Deadly Legacy Lingers," *NPR*, April 10, 2016, sec. Public Health, https://www.npr.org/sections/health-shots/2016/04/10/473547227/for-the-navajo-nation-uranium-minings-deadly-legacy-lingers.
[55] Uranium Mining, ibid.
[56] Geoffrey, ibid.

rates for stomach cancer are fifteen times higher than average, and in some areas reach close to 200 times.[57]

Unfortunately, not much has been done by state and federal governments to remediate these consequences. In 2000, reparations for victims of uranium mining and milling were finally approved after yet another study confirmed that Navajo members were disproportionately suffering from radiation related diseases.[58] Funding for victims was included in the preexisting Radiation Exposure Compensation Act (RECA), which had not previously included any coverage for uranium mining or mill workers. The amendment to RECA enabled Navajo members better access to claim compensation, but a number of challenges still persist.

As Atomic Heritage points out, "language barriers and inaccessibility to medical clinics or civil courts where individuals might start their claimant processes remain difficult obstacles to surmount."[59] Furthermore, RECA does not apply to those who are exposed to radiation from unsealed mines; only to those who worked in the mines themselves.[60] This is a significant issue, as many former uranium mines on Navajo are abandoned and unsealed, continuing to pose health risks to nearby inhabitants. In fact, a Montana State University study found that the Environmental Protection Agency (EPA) has "identified 15,000 abandoned uranium mine locations with uranium occurrence in 14 western states with about 75% of those on federal and tribal lands."[61]

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[57] Uranium Mining, ibid.
[58] Uranium Mining, ibid.
[59] Uranium Mining, ibid.
[60] Uranium Mining, ibid.
[61] Anita, ibid.

The lack of attention for the cleanup of former uranium mines and mills further cements the notion that internal colonialism is at play. Funding for cleanup is limited, and the current cleanup program has received backlash from communities due to its low rank on the National Priorities List, a list of sites in the United States that release or threaten to release hazardous substances.[62] Ultimately, the program is too little too late. The system put forth by the National Priorities List prioritizes sites that are most harmful to humans to be cleaned first, shelving other cleanups until more funding becomes available. According to Atomic Heritage, this system has "caused many of the most contaminated mines to remain unclean, as they lie in relatively low-density population areas."[63] Although the Navajo land near abandoned mines may be lower-density in terms of population than U.S. population centers, there are still thousands of people living on or near these reservations that continue to bear the consequences of these toxic mines.

In fact, the abandoned mines are associated with unique health risks, as they are constantly emitting radioactive elements, but are unseen by the public.[64] Nuclear Princeton, a project by Princeton University, details the adverse effects of these mines, stating: "Abandoned and un-reclaimed uranium mines in the Navajo Nation remain highly radioactive and continue to leach toxic and radioactive sludge into tribal waterways, contaminating them with uranium, arsenic, lead, vanadium, and manganese."[65] Members of the Navajo Nation have filed multiple lawsuits regarding the cleanup of abandoned mines, but no cases have been resolved.

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[62] Uranium Mining, ibid.
[63] Uranium Mining, ibid.
[64] Uranium Mining, ibid.
[65] "Navajo Nation," accessed April 3, 2022, https://nuclearprinceton.princeton.edu/los-alamos.

The federal government's under-prioritization of mine cleanup, coupled with the refusal to include victims of exposure from these abandoned mines in RECA, cements the notion that the process of nuclear production is guided by internal colonialism. The practices of the government to prioritize private mining companies over the local Navajo people, the exorbitant amounts of mining despite Navajo protest simply to meet the country's competition with the USSR, the lack of recognition and compensation for the full extent of suffering by Navajo and nearby communities, and the refusal to prioritize cleanup of abandoned facilities all qualify as racist, colonial practices within the nuclear institution and among the U.S. system more broadly.

The Navajo people were devastated by uranium mining and milling, and will continue to have to pick up the pieces of these practices for many years to come. The impacts of uranium mining and milling can best be summarized by a 2007 statement to Congress by a senior representative of the Navajo Nation:

> "Uranium mining and milling on and near the reservation has been a disaster for the Navajo people. The Department of the Interior has been in the pocket of the uranium industry, favoring its interests and breaching its trust duties to Navajo mineral owners. We are still undergoing what appears to be a never-ending federal experiment to see how much devastation can be endured by a people and a society from exposure to radiation in the air, in the water, in mines, and on the surface of the land. We are unwilling to be the subjects of that ongoing experiment any longer."[66]

The Navajo people faced economic, physical, and environmental exploitation at the hands of the United States government. This exploitation created immense devastation, measured in numerous public health crises. There is a clear sentiment of

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[66] United States Congress House Committee on Oversight and Government Reform, *The Health and Environmental Impacts of Uranium Contamination in the Navajo Nation: Hearing Before the Committee on Oversight and Government Reform, House of Representatives, One Hundred Tenth Congress, First Session, October 23, 2007* (U.S. Government Printing Office, 2008).

colonial/racial supremacy guiding the uranium mining and milling practices; Native peoples are consciously and subconsciously viewed as lesser than those in power, and as such, are treated with less respect and bodily dignity. The U.S. government subverted the health and well-being of Native peoples in pursuit of its security objectives, and continues to do so by refusing to offer adequate clean-up and compensation.

Case Study: Mining in the Congo

The colonial extent of the United States nuclear weapons production process is not limited to domestic uranium mining; in fact, mining in the Congo represented distinct forms of exploitation, rooted in racism. Therefore, the secondary lens of neocolonialism can be applied to this case. Mining in the Congo for the U.S. nuclear program took place primarily during in the 1940s; in fact, during uranium mined from Congo was used in the "Little Boy" bomb dropped on Hiroshima.[67]

The primary mining site was the Shinkolobwe Mine, at which the uranium was sixty times more usable than uranium at an average mine. An initial stockpile of 1,000 tons of uranium was used to enable the Manhattan Project, after which hundreds of tons were shipped monthly to various domestic production sites.[68]

The mines in the Congo were especially secretive, with most of the human and environmental impacts still unknown. Little is known about the initial working conditions, although it has been confirmed that daily laborers worked for minimal wages to "meet demand for the United States."[69] An MIT report goes even further, arguing that

[67] Uranium Mining, ibid.
[68] Uranium Mining, Ibid.
[69] Uranium Mining, ibid.

mining laborers worked "virtually as slaves of the Belgian mining giant Union Meniere du Haut Katanga (UMHK), the owner of the Shinkolobwe mining site."[70] The report goes on to state that "there was surprisingly no research carried out on the long-term effects of uranium ingestion in humans in the extraction site in the Congo. Still, there is no plan today to protect the population from uranium mining activity which will persist for generations. We will never know the number of Congolese victims as the suppliers of the uranium which ended WWII." It can be inferred that impacts on miners and surrounding communities is on par with the consequences faced by those on or near Navajo land, including increased cancer rates, birth deformities, and other health complications. This refusal to unpack the effects of mining in the Congo is racist in and of itself; the miners and those in surrounding communities were not viewed as worth the resources needed to conduct a serious investigation. Instead, the victims must deal with the consequences in darkness.

The relationship between the United States and the Congo that characterized the mining was essentially one of exploitation and distinct neocolonialism. At the time, the country was called the Belgian Congo, as it had been colonized by Belgium in 1908. Belgium's colonization of the Congo was characterized by brutality and severe exploitation.[71] In 1960, the country finally gained independence, and is now known as the Democratic Republic of Congo. Unfortunately, given the decades of brutality faced by

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[70] "The Legacy of the Involvement of the Democratic Republic of the Congo in the Bombs Dropped on Hiroshima and Nagasaki," *MIT Faculty Newsletter* (blog), February 27, 2021, https://fnl.mit.edu/january-february-2021/the-legacy-of-the-involvement-of-the-democratic-republic-of-the-congo-in-the-bombs-dropped-on-hiroshima-and-nagasaki/.

[71] Neil Munshi, "Belgium's Reckoning with a Brutal History in Congo," *Financial Times*, November 13, 2020, https://www.ft.com/content/a17b87ec-207d-4aa7-a839-8e17153bcf51.

the Congolese, the country has struggled immensely with political and economic instability, and remains one of the poorest countries in the world.[72]

The United States bargained with Belgium to gain access to the Congo's uranium. The U.S. pressured Belgium to allow access to uranium in exchange for their support of Belgium's continued colonial rule of the Congo. Ultimately, Belgium ceded much of its power to the United States when it came to Congo's uranium; in this sense, when it came to uranium mining, the United States became the indirect colonizer of the Congo, exploiting the country for its resources and cheap labor.[73] Furthermore, once the United States had established enough mining sites domestically, it decided it no longer needed the Congo, and offered little support to clean up the mines. Despite not being the direct colonizer, the United States exploited the Congo through multiple forms of neocolonialism, including economic and physical. Furthermore, despite being the leader of the 'free world,' the United States propped up the brutal colonial Belgium in exchange for access to the Congo's resources.

An *Outrider* report written by Ward Wilson, one of the leading scholars on nuclear weapons development and use, confirms this exploitation, arguing that "the history of uranium mining is rife with exploitation: time and again, communities native to uranium-rich areas have suffered from the effects of mining without sharing in the profits."[74] In fact, communities surrounding the mines in the Congo still deal with the impacts of the uranium mines today. A poem titled " "Shinkolobwe's Tear" by a local 14-

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[72] "DR Congo: Neglected Massacre of Indigenous Group," *Human Rights Watch* (blog), February 9, 2022, https://www.hrw.org/news/2022/02/09/dr-congo-neglected-massacre-indigenous-group.
[73] Legacy, ibid.
[74] Ward Wilson, "The Human Cost | Outrider," accessed April 3, 2022, https://outrider.org/nuclear-weapons/articles/human-cost.

year-old named Benina Mombilo details the devastation: “When the predator took Africa’s mines, he left behind death, poverty, conflict and war.”[75] Ultimately, uranium mining and milling for the United States nuclear program is defined by the exploitation of minority communities, both domestically and abroad. The lenses of internal colonialism and neocolonialism help demonstrate this exploitation, and detail how pervasive racist subjugation is in the practices that characterize mining and milling.

Nuclear Production and Maintenance

The nuclear production and maintenance stage is the next stage to be analyzed using the lens of internal colonialism. Nuclear weapons production complexes are associated with large amounts of radioactive waste. Perhaps the most illustrative example is the Hanford Site in Washington state, where the plutonium for most of America’s 60,000 nuclear weapons was produced. The site was largely decommissioned in 1989 and is now the most contaminated site in the United States.

According to Wilson, “Approximately two-thirds of the nation’s high-level radioactive waste is at the Hanford Site. Clean up efforts will likely continue for the next 50 years and have already cost $110 billion.”[76] The waste in and around Hanford has led to significant river pollution, heavily impacting nearby communities. In fact, people around Hanford report high rates of health complications, including cancer and thyroid

[75] Ward, ibid.
[76] Ward, ibid.

disorders. Native American communities have been particularly impacted, as they rely on the river to support their way of life.[77]

Another example of the disproportionate impacts of nuclear production facilities on communities of color is the Savannah River Site. The Savannah River Site was used primarily to refine nuclear materials, particularly plutonium, into weapons. The Savannah River Site is located in South Carolina, and the areas surrounding the site are primarily communities of color. In fact, the surrounding area of the Savannah River Site has the largest percentage of minorities of all sites the government considered for its plutonium program.[78] Furthermore, the proportion of minority residents and residents living around the site is much higher than the average of Georgia and South Carolina overall.[79] Not only is the area directly surrounding the site primarily minority-inhabited, but so are the areas around the port that the Savannah River Site used to receive shipments, as well as along the trucking routes to and from the port.[80]

These residents face significant threats from the practices of the site; a 2004 report by the Institute for Energy and Environmental Research found that the site created extensive water pollution that seriously threatens the region's vital water resources.[81] The most common pollutant from the site is tritium, a radioactive isotope that presents

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[77] "Hanford's Dirty Secret– and It's Not 56 Million Gallons of Nuclear Waste," ICAN, accessed April 21, 2022, https://www.icanw.org/hanford_s_dirty_secret_and_it_s_not_56_million_gallons_of_nuclear_waste.

[78] "Nuclear Nonproliferation Deals and Environmental Injustice in the South," Facing South, April 8, 2016, https://www.facingsouth.org/2016/04/nuclear-nonproliferation-deals-and-environmental-i.

[79] Nuclear Nonproliferation Deals, ibid.

[80] Nuclear Nonproliferation Deals, ibid.

[81] "Arjun Makhijani, Ph.D., and Michele Boyd, "Nuclear Dumps by the Riverside: Threats to the Savannah River from Radioactive Contamination at the Savannah River Site - Institute for Energy and Environmental Research," accessed April 21, 2022, https://ieer.org/resource/press-releases/nuclear-dumps-riverside-threats/.

significant risks to developing fetuses.[82] Tritium is often washed from the site during heavy rainfall into important water sources such as the Savannah River, from which residents, primarily African Americans, rely on for subsistence fishing.[83]

Present day unequal impacts on communities of color are not the only indicators of internal colonialism at play in the context of nuclear production facilities. In fact, internal colonial practices can be traced back to the establishment of the Hanford Site in 1943. Multiple communities were displaced so that the Hanford Site could be constructed. Residents were given 90 days to pack up their homes and leave. Among these residents were Native American tribes. As Atomic Heritage points out, "the Wanapum lost access to their traditional home on the Columbia River, and the tribe resettled in Priest Rapids. Access to their traditional fishing areas was at first restricted and then revoked altogether."[84] The displacement of the Wanapum highlights a particularly egregious act of internal colonialism and blatant racism, as it highlights the federal government's disregard for the sacred importance of land to Native communities, and signifies the prioritization of the military establishment over the traditional homeland of these people.

The Hanford site is not the only site mired by internal colonialism; in fact, nuclear production facilities were almost all created with these racist practices. The majority of the Manhattan Project's production facilities displaced vulnerable minority communities.

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[82] Annie Makhijani and Arjun Makhijani, "Radioactive Rivers and Rain / Retiring Reference Man (Vol. 16, No. 1) - Institute for Energy and Environmental Research," accessed April 21, 2022, https://ieer.org/article/science-for-democratic-action/volume-16-number-1/.
[83] Nuclear Nonproliferation Deals, ibid.

[84] "Hanford, WA | Atomic Heritage Foundation," accessed April 3, 2022, https://www.atomicheritage.org/tour-site/life-hanford.

Furthermore, as the Bulletin for Atomic Scientists points out, “many such US nuclear facilities, particularly those for the weapons program, were built without consent on indigenous land, displacing or poisoning those who lived in the vicinity.”[85] The practices of displacement by the nuclear establishment demonstrate the internal colonialism at play, as they highlight the government's consistent readiness to not only take advantage of communities of color but also the government’s general apathy to minority lands and communities.

Not only were nuclear production facilities created by internal colonial practices, but they were also largely *managed* by these practices. For example, the *Girls of Atomic City* book points out that the black women who worked at what would become Oak Ridge National Lab were forced to restrict social interaction with whites and even work in separate facilities.[86] The Y-12 National Security Complex, built as part of the Manhattan Project, also forced employed black women to live in racially segregated facilities on unequal pay.[87] These racist practices clearly favor white employees and subjugate employees of color, particularly Black employees, highlighting pervasive internal colonialism at work in nuclear production facilities.

Nuclear Waste

The final stage in the nuclear production cycle to be examined is the waste stage, also including storage and disposal. A report by Public Citizen identifies the relationship between race and radioactive waste, asserting that “low-income and minority

[85] Katlyn, ibid.
[86] Katlyn, ibid.
[87] Katlyn, ibid.

communities are disproportionately targeted with facilities and wastes that have significant and adverse human health and environmental effects… These communities are at a tremendous economic and political disadvantage over the decision-making process that is dominated by large, wealthy corporations and/or government agencies."[88] Public Citizen's report is critical for highlighting the internal colonialism at play in regards to nuclear waste, as it shows exploitation and racism are working across the institutions of private corporations, state governments, and federal agencies.

As with uranium mining and nuclear production facilities, Native Americans once again bear the brunt of nuclear waste consequences. This is largely due to the tribal sovereignty of Native land, which exempts their land from many environmental regulations. Tribal sovereignty therefore makes tribal lands "more attractive" as targets for facilities, and as such, the nuclear establishment has taken advantage of this, "attempting to hide from environmental regulation and widespread public opposition behind the shield of tribal sovereignty."[89] The attempt and success to evade environmental regulations on Native land demonstrates the limited respect and regard the nuclear establishment has for Native Americans; the practices of regulatory evasion and land exploitation clearly fall within the bounds of internal colonialism.

The nuclear establishment's targeting of indigenous communities for radioactive waste has ensured that multiple communities have experienced radioactive consequences. For example, radioactive waste from a plant in Oklahoma was spread on Cherokee Land

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[88] "Radioactive Racism: The History of Targeting Native American Communities with High-Level Atomic Waste Dumps," *Public Citizen*, *https://www.nirs.org/wp-content/uploads/radwaste/scullvalley/historynativecommunitiesnuclearwaste06142005.pdf*

[89] Katlyn, ibid.

for demonstration purposes; the Cherokee Nation had to sue to shut down the plant.[90] Furthermore, the Mescalero Apache, Prairie Island Mdewakanton, Minnesota Sioux, Skull valley Goshutes, Lower Brule, two Alaskan Native communities, Chickasaw, Sac and Fox, Eastern Shawnee, Quassarie, and Ponca tribes all applied to be sites for Monitored Retrievable Storage, meant to be a temporary solution to the storage of nuclear waste.[91] These examples demonstrate the pervasiveness of nuclear waste in Native communities, as the aforementioned tribes are all over the country.

Perhaps the most egregious example of nuclear waste storage is Yucca Mountain. Yucca Mountain is a mountain in Nevada, that, after years of studies, was determined to be the United States' permanent nuclear waste storage location. However, the years of site investigation failed to consider the sacred importance of Yucca Mountain to Native communities. In fact, Yucca Mountain is an "integral part of the traditional homelands of the Western Shoshone and Paiute Indians."[92] Furthermore, these Native tribes did not consent to the establishment of the Yucca Mountain waste facility; and as the Bulletin of Atomic Scientists points out, "even when consent is given, a moral hazard persists when economically disadvantaged Indigenous communities are targeted with financial incentives."[93] Therefore, even if these tribes were to consent, the consent would have been coerced, as financial incentives are a form of coercion, and the power disparity between these tribes and the United States government is too great.

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[90] "Nuclear War, ibid.
[91] Nuclear War, ibid.
[92] "Nuclear Waste Storage," Nuclear Princeton, accessed April 3, 2022, https://nuclearprinceton.princeton.edu/yucca-mountain.
[93] Katlyn, ibid.

The Native tribes' decision to withhold consent for the establishment of Yucca Mountain is more than rational, as the establishment of the waste site ensures that long-lived nuclear waste that the tribes played no part in creating, is dumped on integral, traditional land. Furthermore, the selection of Yucca Mountain as a waste site actually violates federal law, as the federal government operates a treaty-based responsibility to protect tribes from harm perpetrated by non-Native peoples and governments.[94] As Nuclear Princeton asserts, "the plan to bury waste in the area of Yucca Mountain, then, violates the treaty-based federal trust responsibility toward tribes."[95]

The selection of Yucca Mountain as the main permanent nuclear waste site highlights the extent of internal colonialism at play in the nuclear establishment. The United States government once again exploited Native land, established Yucca Mountain without consent, violating federal law, and ignored the cultural significance of the site to multiple tribes. Nuclear Princeton details how the establishment of Yucca Mountain is problematic, arguing that the "it privileges and rewards human settlements that are of high-population density, high levels of "development," and whiteness. Because this area in Nevada has a lower population density than do many other places in the United States, as well as for other reasons, they are often considered wastelands."[96] Of course, to the Native tribes that have lived on that land for thousands of years, the land is anything but a wasteland; it is full of history, cultural significance, and livelihoods. The disregard for this importance solidifies the superiority with which the nuclear establishment and United States government more broadly acts towards communities of color.

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[94] Nuclear Waste, ibid.
[95] Nuclear Waste, ibid.
[96] Nuclear Waste, ibid.

Conclusion

Ultimately, an analysis of the nuclear fuel cycle, particularly the stages of uranium mining and milling, nuclear weapons production, and nuclear waste and storage using the lenses of internal colonialism and neocolonialism proves the disproportionate impacts of the United States' nuclear establishment on minority, particularly Native American and Black, communities. The practices of the nuclear institution, including the selection of facility sites, the exploitation of reservations and the Democratic Republic of the Congo for uranium mining, the displacement of local communities, and the environmental degradation, among other practices, demonstrate an institution-wide discrimination against communities of color. Furthermore, the lack of adequate compensation and public recognition for the plights of these communities caused by the nuclear institution demonstrate broader, systemic forms of internal colonialism, including disregard and apathy for communities other than those who hold political power. The nuclear cycle must continue to be examined using racial and colonial lenses to better understand how communities of color are disproportionately affected, and what can be done to ensure they receive compensation, recognition, and the promise that these racist practices will never take place again.

Chapter 2: Neocolonialism and Nuclear Testing

Few aspects of nuclear weapons development highlight the unequal impacts of the weapon of mass destruction more than nuclear testing. Nuclear testing, a phenomenon that began in 1945 and largely ended in 1996 with the Comprehensive Test Ban Treaty, has impacted communities of color and indigenous populations at rates far higher than populations of power within the testing country.[97] The inequalities inherent in nuclear testing must be analyzed, to shed light on the oppression affected populations faced at the hands of testing countries, and to contribute to an on-going but marginalized conversation regarding the ethics of nuclear testing and nuclear weapons possession more generally. The primary lens of neocolonialism and secondary lens of internal colonialism provide a means through which the disproportionate impacts of nuclear weapons testing can be investigated. The lens of neocolonialism will be applied to this chapter's primary case study, U.S. nuclear testing in the Marshall Islands, while the lens of internal colonialism will be applied to the U.S.' domestic testing regime.

History of Nuclear Testing

Since the detonation of the first atomic bomb in 1945, eight countries have dropped a total of 2,056 nuclear bombs.[98] This number may appear shocking, as much of the world understands that only two atomic bombs have been dropped: one on August 6th, 1945 in Hiroshima and one on August 9th, 1945, in Nagasaki. While it is true that

[97] A small number of nuclear tests have been conducted since the Comprehensive Test Ban Treaty was ratified in 1996; India and Pakistan conducted tests in 1998, and North Korea conducted tests from 2006-2017.

[98] "Nuclear Testing," Atomic Archive, accessed April 21, 2022, https://www.atomicarchive.com/almanac/test-sites/index.html.

only two atomic bombs have been dropped in wartime, hundreds of thousands of people have been exposed to nuclear weapons through nuclear testing. Atmospheric tests alone have created the impact equivalent to over 29,000 Hiroshima size bombs.[99]

Nuclear tests have been conducted by the United States, France, the USSR/Russia, China, North Korea, the United Kingdom, India, and Pakistan.[100] The most prolific testing regime was the United States, having conducted 1,030 nuclear tests from 1945 to 1992. The USSR came in a fairly close second, having conducted 715 tests.[101] Most nuclear testing ceased by 1996 with the signing and ratification of the Comprehensive Test Ban Treaty (CTBT), however in 2017, North Korea, a non CTBT signatory, conducted a nuclear test. The CTBT is almost universal; 185 countries have signed the Treaty, and 170 have ratified. Yet only three nuclear-armed states have ratified it: Russia, the UK, and France. This prevents the Treaty from effectively being in force.[102]

Nuclear testing was pursued for a number of reasons. These reasons can be separated into two buckets: technical and political. First and foremost, nuclear testing provides information on how well a country's nuclear weapons arsenal works, providing

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[99] "General Overview of the Effects of Nuclear Testing: CTBTO Preparatory Commission," Comprehensive Test Ban Treaty Organization, accessed April 21, 2022, https://www.ctbto.org/nuclear-testing/the-effects-of-nuclear-testing/general-overview-of-theeffects-of-nuclear-testing/.

[100] It is worth noting here that there may have been other nuclear tests conducted besides the ones stated; there is widespread speculation that Israel and South Africa conducted a joint test in 1979, and it's possible that Israel covertly conducted underground tests.

[101] "The Nuclear Testing Tally," Arms Control Association, accessed April 21, 2022, https://www.armscontrol.org/factsheets/nucleartesttally.

[102] General Overview, ibid.

critical information for how nuclear weapons behave under varying conditions.[103] These tests, called weapons-related tests, made up the majority of nuclear tests. There are also weapons effects tests, which have the purpose of understanding how nuclear weapons affect nearby structures or organisms.[104]

Politically, nuclear tests can be used to signal military and scientific prowess. This phenomenon was especially prominent in the arms race between the U.S. and the USSR, but is also relevant for nuclear powers such as India and Pakistan. Public nuclear tests prove a country's offensive and deterrent capabilities, and allow countries to both flex military strength and secure a position as one of the world's few but mighty nuclear powers. This signaling is a vital reason countries, particularly the U.S. and the USSR, invested so heavily in their testing regimes. There was a necessity to prove to their opponent, and the international community, that they had secured a handle on the most powerful weapons in the world, and that they could effectively wield these weapons if necessary.

There are four types of nuclear test explosions: atmospheric, high-altitude, underground, and underwater. Twenty-five percent of the over 2,000 nuclear tests were exploded over the atmosphere. Atmospheric testing was banned in 1963 by the Partial Test Ban Treaty, as international concern began to peak over radioactive fallout from these types of tests. That being said, France conducted its last atmospheric test in 1974, and China conducted its last atmospheric test in 1980.

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[103] "World Overview: CTBTO Preparatory Commission," Comprehensive Test Ban Treaty Organization, accessed November 27, 2021, https://www.ctbto.org/nuclear-testing/history-of-nuclear-testing/world-overview/.
[104] World Overview, ibid.

A rarer form of testing related to atmospheric testing is high-altitude nuclear testing. The main function of these tests was to determine if nuclear weapons could feasibly be used as anti-satellite weapons or anti-ballistic missile defense.[105] High altitude nuclear testing was also banned by the 1963 Partial Test Ban Treaty as well as the 1967 Outer Space Treaty due to concerns about widespread radioactive fallout.

Like high-altitude tests, underwater testing was quite rare. The U.S. conducted multiple underwater tests in the Marshall Islands to evaluate the effects of nuclear weapons against naval vessels. Underwater nuclear testing was also banned by the Partial Test Ban Treaty, largely in part to the large amounts of radioactive water and steam these tests can produce, which contaminates nearby ships, individuals, and structures.

By far the most prolific type of testing is underground testing; these comprised 75% of all nuclear explosions. This is in large part due to the fact that all other types of testing were banned by the Partial Test Ban Treaty. Underground testing was viewed as a much safer option, as when the explosion was fully contained, fallout was almost negligible compared to atmospheric testing. However, rarely was underground testing fully contained; typically, underground nuclear tests vent to the service, producing a considerable amount of radioactive debris.[106]

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[105] World Overview, ibid.

[106] "Types of Nuclear Weapons Tests: CTBTO Preparatory Commission," Comprehensive Test Ban Treaty Organization, accessed April 21, 2022, https://www.ctbto.org/nuclear-testing/history-of-nuclear-testing/types-of-nuclear-weapons-tests/.

Harms of Nuclear Testing

The harms of nuclear tests vary by type of test conducted, but all include a variety of environmental and human costs. According to the 2000 Report of the United Nations Scientific Committee on the Effects of Atomic Radiation to the General Assembly, "The main man-made contribution to the exposure of the world's population [to radiation] has come from the testing of nuclear weapons in the atmosphere, from 1945 to 1980. Each nuclear test resulted in unrestrained release… of radioactive materials, which were… deposited everywhere on the Earth's surface."[107] Yet despite the breadth of radioactive deposits, communities near testing sites bore the brunt of testing consequences.

Perhaps the most serious health consequence of radioactive exposure is cancer. Numerous studies link nuclear weapons testing to cancer: a recent article by two nuclear chemists states that studies of biological samples have provided proof linking radionuclides produced in fallout to fallout-related cancers such as thyroid and bone cancer.[108] Furthermore, a 1991 study by the International Physicians for the Prevention of Nuclear War (IPPNW) estimated that the radiation and radioactive materials from atmospheric testing up until 2000 would cause 430,000 cancer deaths, some of which had already occurred by the time the results were published. The study predicted that roughly 2.4 million people could eventually die from cancer as a result of atmospheric testing.[109]

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[107] "Report of the United Nations Scientific Committee on the Effects of Atomic Radiation to the General Assembly" (United Nations Scientific Committee on the Effects of Atomic Radiation, n.d.), http://www.unscear.org/docs/reports/gareport.pdf.

[108] Steven Simon, Andre Bouville, Charles Land, "Fallout from Nuclear Weapons Tests and Cancer Risks," American Scientist, February 6, 2017, https://www.americanscientist.org/article/fallout-from-nuclear-weapons-tests-and-cancer-risks.

[109] Institute for Energy and Environmental Research and International Physicians for the Prevention of Nuclear War, *Radioactive Heaven and Earth: The Health and Environmental*

Cancer and disease rates tend to increase dramatically the closer one gets to a testing site; Xinjiang, the province that includes Lop Nur, where China conducted 23 nuclear testing sites, has a cancer incidence approximately 30–35% higher than the average rate across China.[110] In French Polynesia, where France conducted the vast majority of its nuclear tests, the rate of diseases and birth defects is two to 26 times higher than the French national average.[111]

The health and environmental consequences of radiation are often linked; contamination of water sources and indigenous food sources increase the likelihood of ingesting radioactive materials. Marine environments face the greatest environmental consequences of nuclear testing, seen most clearly in bioaccumulation through food chain cycles. The Bikini atoll, contaminated by American nuclear testing, is still too contaminated for its inhabitants to return. Underground tests can lead to cratering at the earth's surface and affect topography, as well as cause radioactive isotopes to leach into underground water supplies and the surrounding soil.[112]

The most serious consequence of nuclear testing is quite possibly also the hardest to measure: the loss of local heritage and subsequent effects on culture and mental health. For example, the Bikinians lost their land, their home, and have lived displaced since. The Bikinians are not alone; nuclear testing has caused the displacement of multiple indigenous populations, across all testing sites. The impact of this enforced displacement

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Effects of Nuclear Weapons Testing in, on, and above the Earth (New York, NY: The Apex Press, 1991), https://ieer.org/wp/wp-content/uploads/1991/06/RadioactiveHeavenEarth1991.pdf.

[110] Zeeya Merali, "Did China's Nuclear Tests Kill Thousands and Doom Future Generations?," Scientific American, accessed April 21, 2022, https://doi.org/10.1038/scientificamerican0709-16.

[111] INTERPRT, "Moruroa Files," accessed April 21, 2022, https://moruroa-files.org.

[112] Beyza Unal, Patricia Lewis and Sasan Aghlani, "The Humanitarian Impacts of Nuclear Testing Regional Responses and Mitigation Measures," *Chatham House*, May 2017, https://www.chathamhouse.org/sites/default/files/publications/research/2017-05-08-HINT.pdf.

is immense; it prevents "traditional ways of life and heritage from being passed on to future generations."[113] Therefore, beyond the severe consequences of physical diseases, nuclear testing also causes the erosion of culture. The impacts of this erosion on mental health are significant; survivors and future generations alike must deal with fears of consistent radiological exposure, loss of home and history, and intense stigmatization. Unfortunately, these harms induced by nuclear testing are primarily isolated to indigenous communities and communities dominated by people of color.

Inequalities Inherent in Nuclear Testing

The inequalities in nuclear testing first become apparent when looking at where nuclear tests have been conducted. Nuclear tests by the United States have been conducted on Amchitka Island, Alaska, in Nevada, New Mexico, Colorado, Mississippi, the Marshall Islands, and Johnston Island. France conducted nuclear testing in French Polynesia and in Algeria. The United Kingdom tested in Kiribati and in Australia at Maralinga, Emu Field, and Monte Bello Islands. China tested in Lop Nur, in the Xinjiang province. The Soviet Union tested primarily in Kazakhstan. The testing sites appear to be vast and diverse, and at first glance seem void of any pattern tying them together. However, as Robert Jacobs asserts in *Nuclear Conquistadors: Military Colonialism in Nuclear Test Site Selection during the Cold War*, the populations at or near testing sites invariably constituted populations ethnically, racially, or religiously different from that of the colonial power.[114] In fact, every single nuclear testing site of the first five nuclear

[113] Beyza, ibid.
[114] Robert Jacobs, "Nuclear Conquistadors: Military Colonialism in Nuclear Test Site Selection during the Cold War," *Asian Journal of Peacebuilding* 1 (November 1, 2013).

powers was on or near land dominated by minority populations, whether those be indigenous groups, colonies, or communities of color.

Decision-Making Process Regarding Nuclear Test Sites

The selection of testing sites was guided primarily by the presence or absence of co-ethnics to the ruling group. Co-ethnics are people who share the same ethnicity; populations who were tested on were often minority populations, but not always minority groups in their own countries. Therefore, the most effective way to describe the relationship between the tester and the test-ee is that nuclear-armed governments tested primarily on populations who were not co-ethnics.

According to Admiral William Blandy, who oversaw American nuclear tests, "[I]t was important that the local population be small and co-operative so that they could be moved to a new location with a minimum of trouble," (Weisgall 1994, 31).[115] In other words, populations near testing sites had to be weak in comparison to the testing power and too small to give the testing power any real political threat or pushback.

The physical location of testing sites was also vital in the decision-making process, though not as vital as testing powers have asserted. First and foremost, the majority of nuclear test sites have been "remote". However, the political power of the inhabitants of these remote areas have always been of more importance in the decision-making process than the exact location itself. This becomes obvious when comparing test site options for France.

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[115] Robert, ibid.

France began looking into establishing a nuclear testing regime in the 1950s. Algeria was the first choice, as it was a French colony at the time. However, tensions were rising between Algerians and the French, with the Algerian Independence War raging from 1954-1962. France recognized that Algeria would likely be a provisional test site, but out of desperation to secure its status as a nuclear power, went ahead to conduct 17 nuclear tests in Algeria. While conducting tests in Algeria, France began looking towards establishing a more permanent test suite. France conducted a number of studies assessing plausible sites in the Alps and Pyrenees. But ultimately, France determined that "there was no way to ensure that radioactivity from the tests would not enter the groundwater sources for French cities."[116] In 1966, France conducted its first test in French Polynesia.

The French conclusion to scrap the idea of domestic testing and instead build their testing regime in French Polynesia highlights core arguments related to the inequalities inherent in the decisions of where to conduct nuclear testing. First, the emphasis on the necessity of "remote" locations for testing is, to an extent, a facade. Of course, the geographic location of testing sites was taken into consideration by all nuclear powers, as there was a desire to limit consequences of nuclear tests. Yet the Alps or the Pyrenees were regions similar in remote nature, if not more remote population wise than the French Polynesia (the island of Tahiti alone had a population of 88,000 at the time of testing). In fact, underground testing in these regions would have likely impacted far fewer people than atmospheric testing impacted inhabitants of the Pacific. Ultimately,

[116] Jean-Marc Regnault, "France's Search for Nuclear Test Sites, 1957-1963," *The Journal of Military History* 67 (October 1, 2003): 1229–30, https://doi.org/10.1353/jmh.2003.0326.

over 110,000 people in the Pacific were exposed to radioactive fallout from French atmospheric testing.

The same outcome can be seen in testing conducted by the USSR: the Soviet government tested in Kazakhstan, near the Chinese border and on the edge of Siberia. The site was favored because it was "uninhabited," except for the fact that 20,000 people lived in villages close to the test site and over 100,000 people lived less than 90 miles downwind in the city of Semipalatinsk."[117] The Kazakh people, under the iron curtain of the USSR at the time, were dehumanized and subject to the consequences of nuclear testing; consequences that inhabitants of Moscow or St. Petersburg were never even close to facing. As Jacobs argues, choices of where to test "were not made for scientific reasons—these were political choices expressing dominance and subjugation."[118] These cases affirm the notion that the number of people impacted by nuclear testing is less important to the nuclear power than who exactly is impacted.

This implication relates directly to the second point: that the populations chosen to be subject to nuclear tests were viewed as 'lesser' by nuclear powers. For example, the UK set safe radiation limits higher for "primitive people", leading the country to detonate nuclear weapons in Australia and the Pacific.[119] The French government was unwilling to put French citizens at risk of nuclear testing, therefore viewing populations in French Polynesia and Algeria as less important than French citizens. While the government conducted extensive studies to unearth the possible impacts of domestic nuclear tests, no

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[117] Robert, 164
[118] Robert, 173
[119] Jon Mitchell and John W. Dower, *Poisoning the Pacific: The US Military's Secret Dumping of Plutonium, Chemical Weapons, and Agent Orange* (Lanham, MD: Rowman & Littlefield Publishers, 2020): 1.

such tests were conducted for the colonies. The impacts of nuclear testing on colonial populations were simply not of the same importance to the French government. Jacobs highlights this sentiment, arguing that the "populations subjected to exposure to radioactive fallout… were selected because of their subaltern status."[120] Ultimately, France had the option of outsourcing nuclear testing because of its possession of colonies.

Yet this dehumanization can be seen clearly in domestic testing as well. Lop Nur, the primary test site for China, was located in Xinjiang, a region along the eastern coast of the country. Xinjiang is not the traditional home of the Han Chinese, the dominant ethnic group in China.[121] China chose to subject the minority ethnic groups in Xinjiang to nuclear testing, as exposing the dominant Han Chinese was unimaginable. As Jacobs succinctly points out, "The French did not test nuclear weapons upwind of Paris, the Soviets did not test between Stalingrad and Moscow, and the British did not test in the Midlands. Testing happened at the extremes of empire."[122]

It becomes clear that nuclear testing relied on power disparities between the testing powers and those who were tested on. The French government was able to conduct nuclear tests in French Polynesia because of the sheer power disparity between the two countries. This power disparity is inherent in a colonial relationship, and was utilized by the French to easily set up a nuclear testing regime without significant pushback. The French head of the research commission on underground sites wrote to the Director of Military Applications that "in selecting a test site in the Pacific it was

[120] Robert, 173.
[121] Robert, 172.
[122] Robert, 173.

necessary to 'make a choice based primarily on political considerations.'"[123] Those so-called political considerations regarded the ease by which the French government could install a testing regime; if there would be significant pushback, and if populations near testing were politically powerful enough to cease operations. The French government decided that Polynesians were weak enough to not halt testing operations.[124] An imbalance of power allowed nuclear testing to take place in the manner in which it did for nearly 50 years; nuclear powers took advantage of the inability for minority populations to protest, and their often-limited political power, subjecting them to unthinkable consequences.

Clearly, the decision-making processes regarding selection of nuclear test sites was guided by inequalities between nuclear powers and nuclear testing sites. Nuclear powers took advantage of their system dominance, choosing to subject either politically weak populations far from power bases, or populations on the outskirts of their empires. Jon Mitchell, author of *Poisoning the Pacific*, affirms this point, asserting that nuclear-armed militaries conducted "reckless experiments with nuclear, biological, and chemical weapons; these tests were often held in their colonies, causing indigenous people to suffer the consequences."[125]

Furthermore, the success of the nuclear order more broadly is inextricably tied to colonialism. Gabrielle Hecht affirms this, arguing that not only did neocolonialism drive the vast inequities that undercut nuclear testing, but that without these neocolonial practices, the nuclear order would not have succeeded: "It was clear that colonialism

[123] Robert, 171.
[124] Robert, 171.
[125] Jon, 1.

remained central to the nuclear order's technological and geopolitical success. Even a short list of atomic test sites makes the point: Bikini Atoll, Semipalatinsk, Australian Aboriginal lands, the Sahara, French Polynesia."[126] Colonialism and neocolonialism allowed nuclear powers to expedite the nuclear production process by working around domestic regulations and cutting costs. Ultimately, nuclear powers knowingly exploited these lands and their people in order to establish a successful nuclear order.

Case Study: The United States

Nowhere are these inequalities more apparent than in the testing conducted by the United States. The United States operated the most prolific nuclear testing regime our world has seen, conducting over 1,000 tests across a span of nearly 50 years. These tests created such severe consequences for local environments that in some cases, dispossessed local peoples may never be able to return to their homes. [127] The U.S. is also the only country to have used nuclear weapons in war-time. Ultimately, the United States military has damaged the planet more than any other nation's military.[128] Therefore, it represents the ideal case to better understand the inequalities inherent in nuclear testing. In order to fully analyze the U.S. nuclear testing regime, it is imperative the periods before, during, and after the testing are unpacked.

[126] Robert, 171.
[127] Jon, 2.
[128] Jon, 2.

Marshall Islands

Before the Testing

The United States' bombing of Hiroshima and Nagasaki marked a distinct turning point in the nature of warfare; it proved that the atomic bomb could be utilized in conflict. Although the bombing proved newfound capabilities for the U.S. military, much of the possible uses and nature of nuclear weapons was unknown. Furthermore, testing signaled to the USSR the U.S.' resolve and growing offensive capabilities. In the fall of 1945, mere months after the bombings in Japan, the United States began preparing its testing regime. The first step was to identify a testing location.

In line with trends identified in other testing regimes, critical characteristics of the testing location regarded its proximity to major U.S. cities and the political weakness of populations near the site. A U.S. military official testified to Congress stating that the testing location "had to be away from population centers of the US … and yet in an area controlled by the US."[129] To the military officials in charge of choosing a testing location, the Marshall Islands perfectly fit the bill.

The Marshall Islands have been occupied for thousands of years by native Micronesians.[130] The Marshallese have faced colonial rule for the past four centuries, at times under rule of Spain, Germany, Japan, and the United States. The United States asserted ownership after it defeated Japan on the Marshallese Kwajalein and Enewetak

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[129] Jane Dibblin, *Day of Two Suns. US Nuclear Testing and the Pacific Islanders.* (Virago Press., 1988), 30.

[130] Micronesia is a region that encompasses nearly 2100 islands, including the Marshall Islands. Micronesians are people who have lived in this region for thousands of years; Marshallese refers to people who are from the Marshall Islands specifically.

atolls in 1944, turning the atolls into military bases.[131] From 1944-1954, the United States essentially operated as a colonial power, with ownership of the Marshall Islands.[132] The United States took advantage of this colonial relationship, conducting the most severe atmospheric nuclear tests in this time period.

In 1954, the United Nations defined the United States relationship with the Marshall Islands under its "Trusteeship System", which essentially legally entrusted the welfare and development of the Marshall Islands to the US.[133] Under this system, the United States continued to exploit the Marshall Islands via nuclear tests, despite being the sole entity responsible for the Marshall Islands' welfare. The militarized exploitation went beyond nuclear testing; for example, the United States forced hundreds of Marshallese out of their homes and moved them to a labor camp to construct a military base.[134]

The Marshall Islands declared independence in 1979, after which the United States continued to occupy the country for four years. Ultimately, in 1983, the Marshall Islands signed the Compact with the United States, which allowed the Marshall Islands to operate as an independent, sovereign nation but with deeper economic ties and cooperation with the United States than standard alliances.[135]

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[131] "Marshall Islands," Atomic Heritage Foundation, accessed April 21, 2022, https://www.atomicheritage.org/location/marshall-islands.
[132] "Trust Issues: Militarization, Destruction, and the Search for a Remedy in the Marshall Islands," Columbia Human Rights Law Review, accessed April 21, 2022, https://hrlr.law.columbia.edu/hrlr-online/trust-issues-militarization-destruction-and-the-search-for-a-remedy-in-the-marshall-islands/.
[133] Trust, ibid.
[134] Trust, ibid.
[135] Trust, ibid.

Mitchell highlights the factors that made the Marshall Islands the ideal location for U.S. atomic tests: "Their isolation allowed secrecy, and scientists hoped the Pacific Ocean would absorb radiation with minimal harm. Moreover, their population was relatively small."[136] The population was relatively small compared to U.S. population centers, but tens of thousands of native Marshallese inhabited the islands and faced the consequences of testing. Furthermore, although the number of inhabitants was considered by the United States, quotes from top officials highlight the dehumanization of these populations within the U.S. government. Henry Kissinger, a key figure in the U.S. military, is quoted to have said "there are only ninety thousand people out there. Who gives a damn?" regarding the Marshallese.[137]

Again, the number of people affected by nuclear testing seemed to be less important to the United States government than who exactly was affected. The U.S. Navy argued that Bikini Atoll, the main atoll within the Marshall Islands chosen to be tested on, "may accurately be described as one of the most remote places of the earth."[138] However, in private discussions, the main supervisor of the tests Admiral William Blandy explained that the key factor regarding the choice to test on the Bikini atoll was that the population could be easily moved with little trouble.[139] Blandy's statement, representative of the U.S. government's sentiments towards testing, affirms the notion that politically weak populations were the decisive factor in determining where to test. The Marshallese, operating in a neo-colonial relationship with the United States, faced an impossible fight.

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[136] Jon, 41.
[137] Jon, 41.
[138] Robert, 158.
[139] Robert, 158.

The U.S. military exploited this relationship most obviously in their manipulation of the residents of the Bikini atoll.

The Bikinians are an intensely devout Christian population, after facing centuries of missionaries visiting their island. The U.S. Navy took advantage of this piety when they informed the Bikinians of the plan to conduct nuclear tests on their home:

> According to an official U.S. Navy account, Wyatt "compared the Bikinians to the children of Israel whom the Lord saved from their enemy and led unto the Promised Land. He told them of the bomb that men in America had made and the destruction it had wrought upon the enemy" (Richard 1957, 510). Wyatt explained that the United States was now intent on testing this new weapon so that they could "put an end to war," and that Bikini Atoll was the very best place in the world to test this weapon.[140]

Commodore Wyatt, the U.S. appointed military governor of the Marshall Islands, framed the U.S.'s decision test on the Bikini Atoll as a choice Bikinians could affirm– a choice to follow God's plan. However, as Jacobs asserts, "it was clear that the choice must align with the dictates of the new military occupiers of the islands," making it not much of a choice for the Bikinians at all. Additionally, the 'choice' was made under the guise of emotional manipulation, further stripping Bikinians of the ability to consent to nuclear testing. Wyatt's actions on the Bikini atoll, no doubt highlighting the sentiments guiding the greater United States military, aptly demonstrate the highly exploitative nature of the U.S. testing regime in the Pacific.

The U.S. military was able to exploit the Bikinians so easily because it had established a neo-colonial relationship, in which the U.S. came into the Pacific as a "savior", and called on local populations to serve 'God's greater purpose' all for the

[140] Robert, 158.

benefit of the U.S. nuclear program. The United States preyed on the economic and military weakness of the Marshallese, which was the result of centuries of external subjugation. This weakness made the Bikinians, and Marshallese more broadly, the prime target of nuclear testing, as in the eyes of the U.S. military, it made them gullible, malleable, and expendable. The United States established a pseudo-colony in the Marshall Islands, carried out by Commodore Wyatt, the U.S. appointed military governor. This authority, coupled with the sheer power disparity between the U.S. and the Marshallese, allowed the U.S. to do what it wanted with the Marshall Islands.

The preparations taken by the U.S. military to ready the testing regime were entirely exploitative, which further affirms the neo-colonial relationship at hand. After 'agreeing' to leave their island under the false pretenses that they could soon return, the Bikinians were transported by the military to the atoll of Rongerik. Yet the land of Rongerik was smaller than the Bikini atoll, and the land offered much less sustenance; it was less fertile and the fish in the atoll's lagoon were poisonous.[141] The Bikinians lost the self-sufficiency they had worked so hard for on their home atoll; soon, they began to starve. Residents of Enewetak Atoll, another atoll the United States decided to uproot for nuclear testing, faced similar consequences. Mitchell confirms this, stating: residents of Enewetak Atoll were "relocated by Americans, who understood nothing about their dietary or cultural needs, to islands where self-sufficiency was impossible."[142] The upheaval and subsequent treatment of the atoll residents demonstrates the complete

[141] Jon, 42.
[142] Jon, 42.

dehumanization and lack of effort to understand the afflicted populations by the United States.

This dehumanization, driven by the U.S. military, was perpetuated by domestic media as well. A 1946 New York Times Magazine article wrote, "as for Juda [leader of Bikini atoll] and his people, now living on Rongerik Atoll, they probably will be repatriated if they insist on it, though United States military authorities can't see why they should want to: Bikini and Rongerik look as alike as two Idaho potatoes."[143] Of course, to the eyes of Americans who viewed the atolls solely as land to exploit, the atolls in the region all served the same purpose: either land to test on or land to plop uprooted populations on. And of course, to the eyes of the populations who lived for thousands of years on these atolls, the land could not be more different. This was land their ancestors were buried on; land they formed deep social, physical, and emotional connections to– land they learned to survive and thrive on. It was their home, until the U.S. ensured the atolls could never be returned to.

Testing Period (1946-1962)

The United States conducted its first test in the Pacific on July 1st, 1946. Test Able was the first of 67 tests on the Bikini and Eniwetok atolls. Every single one of the 67 tests were atmospheric; the type of testing with consequences so significant it was banned in 1963. Eighteen of the tests were thermonuclear, yielding devastating results for the afflicted atolls.

[143] Jonathan M. Weisgall, "The Nuclear Nomads of Bikini," *Foreign Policy*, no. 39 (1980): 74–98, https://doi.org/10.2307/1148413.

The largest and most significant of these tests was the Castle Bravo test. Castle Bravo was a thermonuclear weapon, the most destructive known form of an atomic weapon. Thermonuclear weapons use both nuclear fission and fusion, yielding explosions in the megatons. The energy released by this fusion reaches temperatures in the same range as the center of the sun.[144] For comparison, the bombs used to devastate Hiroshima and Nagasaki were fission bombs, with explosive yields of 15 and 20 kilotons of TNT respectively. Castle Bravo reached 15 *mega*tons, making it more than 1,000 times more powerful than the bomb used in Hiroshima.[145]

The Bravo Test was the first test of a thermonuclear weapon by the United States; therefore, the effects of the new nuclear weapon were largely underestimated. In fact, the yield of the Bravo test was more than twice as big as had been predicted.[146]

These underestimations characterize much of the consequences of nuclear testing faced by populations in the Pacific; these underestimations, while bearing deadly consequences for the afflicted, were allowed because they were not afflicting the populations of those in power. The Bravo test was so significant that it made the term "fallout" common knowledge; as Jacobs points out, the term was nearly impossible to find in public literature before the test.[147] The fallout was immense; so immense that it blanketed a large area of the Pacific Ocean, including many populated islands and

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[144] "How Nuclear Weapons Work," Union of Concerned Scientists, accessed April 21, 2022, https://www.ucsusa.org/resources/how-nuclear-weapons-work.
[145] "1 March 1954 - Castle Bravo: CTBTO Preparatory Commission," Comprehensive Test Ban Treaty Organization, accessed April 21, 2022, https://www.ctbto.org/specials/testing-times/1-march-1954-castle-bravo.
[146] "Operation Castle," Nuclear Weapons Archive, accessed April 21, 2022, https://nuclearweaponarchive.org/Usa/Tests/Castle.html.
[147] Robert, 162.

atolls.[148] Traces of radioactive material were found in India, the United States, and Europe. Although the fallout from the Castle Bravo test impacted millions of people across the world, the most significant consequences were felt by inhabitants of nearby islands.

The United States military did little to limit the consequences; for example, the military deliberately placed nearby island Rongelap out of the "designated danger zone" for the test, despite the test being the largest ever conducted and therefore capable of unprecedented yields.[149] Due to this oversight, the residents of Rongelap were gravely exposed: "four cm of radioactive coral powder fell; thinking it was snow, children played with it. The dust burned islander's feet and made them vomit; their fingernails and hair fell out, as they experienced exposure of approximately 175 rads, compared to a recommended annual level of 0.5 rads."[150] The military did not evacuate inhabitants of Rongelap until two days after exposure; two days too late.

This oversight and subsequent treatment of local residents further demonstrates the neo-colonialist undertones of the American nuclear testing regime. The American military exploited land with little to no care for local residents. The total combined yield of the 67 nuclear tests conducted in the Marshall Islands was 108 megatons; or the equivalent of an average of 1.6 Hiroshima bombs per day for 12 years.[151] This appalling figure becomes even more disheartening when compared to the combined total yield of Nevada tests, which amounts to 1.05 megatons.

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[148] Robert, 162.
[149] Robert, 162.
[150] Jon, 45.
[151] Jon, 47.

It is clear that the United States subjected the Marshall Islands to nuclear tests unfathomable on U.S. soil. The neo-colonial relationship between the United States and the Marshall Islands allowed the U.S. to conduct such blatantly discriminatory acts; the power disparity ensured that the Marshallese could not effectively fight back against the American testing regime. In particular, the lack of Marshallese political power ensured that the U.S. had practically free rein in nuclear testing compared to domestic testing. The United States exploited this weakness for its own benefit; to solidify its power status against the USSR and ultimately to become the 21st century's great power.

After Testing (1967 to Present)

The consequences of nuclear testing, still felt to this day, and continued lack of compensation for victims of testing further solidify the notion that the American nuclear testing regime in the Pacific represents a neo-colonial relationship.

The consequences of America's twelve years of nuclear testing in the Marshall Islands were, and are, significant; so significant that the region remains permanently altered. The health consequences are severe, with local children developing leukemia a few years after exposure from the blasts; in the Marshall Islands, child leukemia rates reached eighteen times the national average, and the overall cancer risk of those exposed was 40 to 50 percent higher than normal.[152] Rongelap, the island critically exposed to the Castle Bravo test, has an "extreme" cancer rate according to the American Cancer Society.[153]

[152] Jon, 36.
[153] Jon, 48.

The extreme cancer rates, which are between three to forty times higher than in the United States, demonstrate an appalling mistreatment of Marshallese at the hands of Americans. Yet the health consequences of U.S. testing don't stop at cancer; according to Mitchell, "Between 1954 and 1958, an estimated one-third of the babies born by women contaminated with fallout died in the womb; between 1969 and 1973, the number was still one in five."[154] Once again, the island of Rongelap faced the most extensive health consequences; of nineteen children evaluated, seventeen had developed thyroid abnormalities following the Bravo test.[155]

The environmental consequences of nuclear testing are equally devastating; the region has been permanently disfigured, destroying three of the 25 islets in Bikini Atoll and rendering 57% of Enewetak's original area uninhabitable.[156] Radiation permeated all aspects of the local environments, from the soil to the sea, rendering food sources largely damaged.

The American military did little to examine how the contamination levels following the testing regime would continue to impact local populations. In fact, the U.S. insisted that the Bikini atoll was habitable in 1972, allowing residents to return. However, in the following years serious contamination was discovered in critical food and water sources. Residents had unknowingly been exposed to severe radiation during their time back on the atoll. In 1978, residents of Bikini atoll left their home once again, facing levels of contamination too serious to overcome.[157]

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[154] Jon, 49.
[155] Jon, 48.
[156] Jon, 47.
[157] Operation, ibid.

The experience of Bikiniains points to possibly the most insidious consequences faced by victims of nuclear testing in the Pacific: the loss of home. Residents of Bikini atoll and other nearby islands lost their homes, which contained their livelihoods, memories, and traditions, at the hands of the United States. The U.S. government did nothing to help; in fact, Bikinians sent multiple appeals for assistance after having to leave their atoll a second time, but the U.S. gave them nothing. The islanders instead had to turn to the charity Greenpeace, which was able to relocate the population to the nearby island of Mejato.[158] This lack of acknowledgement and assistance signifies the dehumanization of the Marshallese that characterizes the entire United States testing regime in the Pacific.

The Marshallese did not carry enough political power for the United States to care about paying the consequences of nuclear testing; instead, the great power has been able to continue as a respected leading democracy while the Marshallese face astronomical cancer rates and disfigured homes. The power dynamic that characterizes the United States' and Marshall Islands' relationship creates this unfortunate truth; America was able to use its military might and international prowess to treat the Marshall Islands as a colony, exploit the region for its benefit, and then leave the Marshallese to pick up the pieces. The inequities involved in nuclear testing, and more particularly, the sheer mistreatment of the Marshallese for the advancement of the American nuclear program, become even more apparent when examining domestic U.S. nuclear testing.

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[158] "Rongelap: The Exodus Project," *Greenpeace USA* (blog), accessed April 21, 2022, https://www.greenpeace.org/usa/victories/rongelap-the-exodus-project/.

Nevada

Before the Testing

The Nevada Test Site (NTS) was established in 1950, and was intended to be a site where the military could conduct quick tests with small scale nuclear bombs.[159] The United States' explicit policy for testing at the NTS was to only test lower yield fission weapons, compared to the higher yield thermonuclear weapons tested in the Marshall Islands.[160] Jacobs calls this disparity in weapons tested a "colonial prioritization."[161] Residents down-wind of the NTS, despite being designated "a low-use segment of the population", still had the political power that comes with being American, "and as such were higher on the colonial totem pole than were the Marshallese."[162] A 1953 publication by the Atomic Energy Commission explicitly demonstrates the colonial totem pole that guided the U.S. nuclear program: "since the larger test detonations could not be held within the United States with the requisite degree of safety, construction of firing areas and supporting facilities at the Pacific Proving Ground at Eniwetok proceeded."[163] The weapons were of course no safer when tested in the Pacific, but they weren't impacting Americans, so the higher yield testing was deemed acceptable.

That being said, the choice of the Nevada Test Site as the primary domestic testing site also carries neo-colonialist implications in its own right. The U.S. government

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[159] "Nevada Test Site," Atomic Heritage Foundation, accessed April 21, 2022, https://www.atomicheritage.org/location/nevada-test-site.
[160] S. Glasstone and P. J. Dolan, "The Effects of Nuclear Weapons. Third Edition" (Department of Defense, Washington, D.C. (USA); Department of Energy, Washington, D.C. (USA), January 1, 1977), https://doi.org/10.2172/6852629.
[161] Robert, 166.
[162] Robert, 166.
[163] Robert, 166.

considered a number of sites across the country, with three key criteria in mind: desolate, flat, and far from large population centers. The last criterion was largely disregarded in the choice of the Nevada Test Site, a site only 65 miles north of Las Vegas. The area downwind from the NTS itself was also populated, although the government originally described the area as "virtually uninhabited."[164] The two primary communities in the downwind of the site were Mormons and Native Americans. At the time of choosing the site in 1950, both of these populations held very little political power, and were looked down upon by the U.S. government because of religious or cultural differences. Gallagher confirms the government's sentiments at the time, referring to a declassified report that called the communities a "a low-use segment of the population."[165]

These "low-use" segments of the population were primarily Native communities, including the Western Shoshone nation. Again, one can observe the process of rating communities in terms of importance that occurs when choosing a test site. The US government deemed the population center of Las Vegas, which was south of the NTS, more important than the thousands of Native Americans and Mormons east of the site, seen in the explicit policy by the AEC to test at the site only when winds were blowing east.[166]

During the Testing

Testing at the Nevada Test Site officially began on January 27, 1951, with the detonation of the bomb Shot Able. Shot Able was the first of 1,021 nuclear tests that

[164] Robert, 165.
[165] Robert, 166.

[166] Robert, 166.

occurred over a span of 40 years at the Nevada Test Site. While the site was designed primarily to test small scale nuclear bombs, a number of largescale atmospheric tests took place in the early years of the site, impacting communities downwind of the site heavily. Atmospheric tests conducted at the ATS averaged a yield of 8.6 kilotons, with wide-ranging fallout containing radionuclides and gasses.

Perhaps the most infamous test conducted at the NTS was the Storax Sedan test; the test caused more radioactive fallout than any other domestic nuclear test, releasing roughly 880,000 curies of Iodine 131 into the atmosphere.[167] Fallout from the test covered multiple states, with significant radioactivity levels detected in parts of Iowa, Nebraska, South Dakota and Illinois, therefore exposing millions of Americans to radioactive fallout.[168] After atmospheric testing was banned, the majority of tests at the NTS were moved underground, with ultimately 921 tests conducted underground until 1992.[169]

It is imperative to note whose land the majority of the tests took place on. The Western Shoshone nation spans from just west of Las Vegas, Nevada to Snake River in Idaho, meaning their land was directly tested on by the United States. Ultimately, the Western Shoshone's lands have been used for over nine hundred nuclear detonations, making it the most bombed nation on earth.[170]

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[167] "The United States' Nuclear Testing Programme: CTBTO Preparatory Commission," Comprehensive Test Ban Treaty Organization, accessed April 21, 2022, https://www.ctbto.org/nuclear-testing/the-effects-of-nuclear-testing/the-united-states-nuclear-testing-programme/.
[168] The United States', ibid.
[169] Nevada, ibid.
[170] "Nuclear Colonialism," Environment & Society Portal, May 21, 2014, https://www.environmentandsociety.org/exhibitions/risk-and-militarization/nuclear-colonialism.

After the Tests

The AEC policy to direct down winds east meant that the Native American communities and Mormon communities bore the brunt of the consequences of testing. These consequences weren't well known until the 1982 publication of *Killing Our Own: The Disaster of America's Experience with Atomic Radiation* by Harvey Wasserman and Norman Solomon. This book was the first compilation of the effects of US government-caused radiation on American residents and citizens.

Two years later, a U.S. District Court Judge ruled that above-ground nuclear tests in the 1950s had caused ten people to die of cancer via exposure to radioactive fallout, and that the government was guilty of negligence because of the way it had conducted the tests.[171] More widespread consequences of radioactive fallout produced by NTS tests were published in 1997 by the National Cancer Institute, which found that any "person living in the United States since 1951 had been exposed to some radioactive fallout."[172] The study also found that fallout from the tests could eventually cause between 11,000 and 212,000 thyroid cancers via milk contamination.[173]

The communities exposed to fallout from the NTS and the individuals that comprise them are now called "Downwinders." These include communities in Nevada, Oregon, Washington, Utah, and Idaho. St. George, Utah was heavily affected by the fallout, with cancer rates in the area increasing from 1950 to 1980.[174]

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[171] The United States', ibid.
[172]"Estimated Exposures and Thyroid Doses Received by the American People from Iodine-13 in Fallout Following Nevada Atmospheric Nuclear Bomb Tests" (National Cancer Institute, October 1997), https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/i131-report-and-appendix.
[173] Estimated Exposures, ibid.
[174] Nevada, ibid.

The Western Shoshone nation in particular took the brunt force of the consequences, as it was their land the majority of these tests took place on. Furthermore, because of the intimate and symbiotic relationship the Shoshone nation has with their land, they received significant exposure through consuming contaminated wildlife, water, and milk. Additionally, their land was significantly altered– the explosions and subsequent fallout killed vital aspects of the ecosystem such as delicate flora and fauna. These extreme levels of contamination are linked to severe inequities in risk of exposure between Americans and Native Americans: "For Native American adults, the risk of exposure has been shown to be 15 times greater than for other Americans, for young people that increases to 30 times and for babies in utero to two years of age it can be as much as 50 times greater."[175]

Compensation for domestic "Downwinders" has been more significant than for victims of nuclear testing in the Marshall Islands, but nonetheless remains inadequate. Following a series of lawsuits asserting US federal negligence in its testing regime, Congress passed the Radiation Exposure Compensation Act (RECA) in 1990. The Act provides compensation to individuals who "developed serious illnesses after presumed exposure to radiation released during the atmospheric nuclear tests or after employment in the uranium industry."[176] Downwinders of the Nevada Test Site are eligible to receive a one-time lump sum of $50,000.

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[175] Ian Zabarte,, "A Message from the Most Bombed Nation on Earth," Al Jazeera, accessed April 21, 2022, https://www.aljazeera.com/opinions/2020/8/29/a-message-from-the-most-bombed-nation-on-earth.

[176] "Radiation Exposure Compensation Act," Department of Justice, October 20, 2014, https://www.justice.gov/civil/common/reca.

Figure 1: RECA Covered Areas[177]

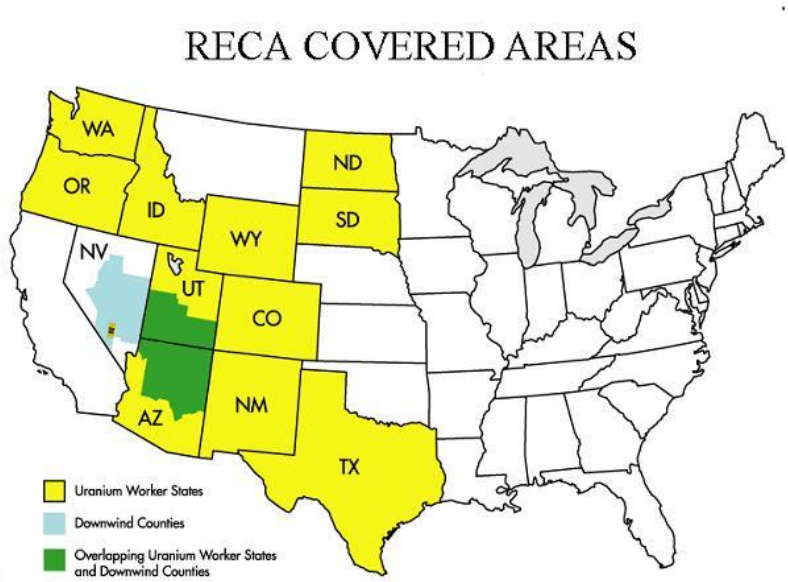

Figure 1 shows the areas covered by RECA and what compensation files match what area. As the map demonstrates, RECA only considers downwind counties in parts of Nevada, Utah, and Arizona, despite fallout severely impacting communities in Northern Utah, Idaho, and Montana. Therefore, the actual number of victims from nuclear fallout is severely disproportionate to the amount of people that can file claims for compensation. Furthermore, RECA is set to expire in July 2022, meaning thousands of people affected by nuclear testing, primarily indigenous communities and people of color, will not receive compensation.[178] These communities are left to pick up the pieces, severely underfunded and disproportionately affected by the environmental, emotional, and physical costs of nuclear testing.

[177] Radiation, ibid.
[178] "Radiation Exposure Compensation," Beyond the Bomb: A Grassroots Movement to Stop Nuclear War, accessed April 21, 2022, https://beyondthebomb.org/campaigns/radiation-exposure-compensation/.

Conclusion

The United States' testing regimes in the Marshall Islands and Nevada clearly demonstrate a neo-colonial relationship, with the US government viewing the Marshallese, Native Americans, and Mormons as lower on the human totem pole than white, Christian Americans. These populations were subjected to contamination and destruction of environments largely due to the fact that they were viewed as 'lesser' than the populations who held political power in the United States. This phenomenon can be applied to every testing regime; China tested in the land occupied by minority ethnic Muslim groups, the USSR tested primarily in Kazakhstan, and the French tested in its colony of French Polynesia. The inequities in nuclear testing, illuminated by the lens of neo-colonialism, draw attention to the inequities in nuclear security more broadly. The next chapter will use the lens of feminism to demonstrate gender inequities in nuclear testing.

Chapter 3: Feminism and Nuclear Weapons

Introduction

It would be impossible to answer the question, does the weapon of mass destruction impact masses equally, without giving priority in analysis to the gender that makes up half of the world population. It is necessary to place women at the center of analysis to truly unpack and begin to understand the disproportionate impacts of the nuclear weapon. The feminist lens allows us to do just that– it is only by placing women at the forefront of this investigation that we can see how women are excluded in every step of nuclear security, from design to creation to detonation, and yet bear the brunt of the consequences of the weapon. It is important before this conversation commences to recognize that gender is socially constructed, and operates on a spectrum. For purposes of this analysis, I will focus on the feminine construct.

Nuclear security is an inherently masculine field; it is a field created by and for men– by vast teams of male scientists and policy-makers, for wars and power pursuits started by men. Feminist scholars have argued that "states' foreign policy choices are guided by their identities, which are based on association with characteristics attached to masculinity, manliness, and heterosexism."[179] Theories regarding the formation of the state are notably unsexed, focusing on the rights of 'citizens'. That being said, the state is an inherently patriarchal concept, as it was formed by men for the advancement of men; it is characterized by the exclusion of women.[180] In the formation of states, and therefore

[179] Laura Sjoberg, "Introduction to Security Studies: Feminist Contributions," *Security Studies* 18, no. 2 (June 12, 2009): 183–213, https://doi.org/10.1080/09636410902900129.
[180] Sjoberg, ibid.

individual state identities, masculine characteristics were not only prioritized, but viewed as the only options for which a state should associate. Characteristics of strength, honor, sovereignty, and hard power are all imbued with an attachment to masculinity. These masculine attachments inevitably guide state decision making processes; as states are built with the foundation of masculinity as the norm and the ideal, foreign policy decisions are made in the pursuit of masculine ideals. A cycle is thereby created in which the state favors masculinity, and so masculine leaders thrive, cementing the state as a masculine concept.

Thus, there are layers to the exclusion of women from nuclear security; not only have women been largely excluded from the scientific innovations and advancements within nuclear security, they have also been excluded from the decision-making processes driving all developments within the field, including decisions regarding testing and use. This exclusion is insidious for a number of reasons; beyond the obvious point that blatant exclusion is unproductive and unacceptable, the exclusion of women from each step of nuclear security has ensured that women disproportionately feel the impacts of nuclear weapons, a fact exemplified in the disproportionate impacts of radiation on women. These weapons were not made with women in mind.

Literature Review

A key, under-utilized lens in the field of security and sub-field of nuclear security is the feminist lens. Jill Steans, a leading scholar in feminist IR theory, explains that using a feminist lens is to "focus on gender as a particular kind of power relation, or to trace out

ways in which gender is central to understanding international processes."[181] Sjoberg builds on Steans' explanation of the feminist lens, asserting that the field of international relations, "feminist theories begin with a different perspective and lead to further rethinking. They distinguish 'reality' from the world as *men* know it."[182]

Feminist IR theory can trace its roots to constructivism, a foundational theory based on the assumption that social entities are constructed by, and carry the characteristics of, the internal and external social structures they operate in.[183] The core element of feminist IR theory is the centering of gender as the key category of analysis; this means characterizing it as both a constructor and something that in constructed within the field of international relations.[184] Gender can therefore both influence and be influenced by the social structures that make up the international system. This nuanced relationship is critical to answering the research question, as we must use it to understand how gender impacts the nuclear weapons and how it operates within the nuclear web. Feminist IR theory therefore allows us to de-emphasize traditional state actors and instead place gender at the forefront of analysis. This centering is key to analyzing this chapter's research question; without centering gender and women's perspectives/experiences, we would miss critical findings regarding the nature and consequences of nuclear weapons.

Sjoberg describes three main ways in which gender matters in the theory and practice of international relations: to conceptually understand international security, to

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[181] Sjoberg, ibid.
[182] Sjoberg, ibid.
[183] Lauren Wilcox, "Gendering the Cult of the Offensive," *Security Studies* 18, no. 2 (June 12, 2009): 214–40, https://doi.org/10.1080/09636410902900152.
[184] Sjoberg, ibid.

analyze causes and predict outcomes, and to identify solutions that promote positive changes.[185] The first practical application relies on the fact that gender not only defines but is defined by actors' understandings of their security, and their understandings of those "left out of security analyses."[186] This first analysis has useful applications to the question at hand, as it can be used to highlight the exclusion of women from nuclear security, and beyond that, assert that women's role in nuclear security is defined primarily *through* their exclusion. The continued exclusion of women from nuclear security ensures that the field remains masculine, and ensures that the experiences, physical and emotional attributes, and opinions of women are not considered in all processes guiding nuclear security.

Therefore, the use of the feminist lens can greatly enhance the field of nuclear security, as it shines necessary light on under-developed discussions and draws our attention to impacts previously overlooked. Laura Sjoberg cements this point, arguing that "gender is conceptually, empirically, and normatively essential to studying international security… accurate, rigorous, and ethical scholarship cannot be produced without taking account of women's presence in or the gendering of world politics."[187] Sjoberg's assertion demonstrates how the use of the feminist lens in this chapter's analysis will contribute to the field of nuclear security; without the feminist lens, the question at hand could not be accurately answered, as it would not effectively account for women's presence or lack thereof in the nuclear web. Feminism allows the centering of gender, an imperative piece of analysis that has been sidelined in traditional scholarship.

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[185] Sjoberg, Ibid.
[186] Sjoberg, Ibid.
[187] Sjoberg, ibid.

In fact, failing to recognize the impacts of gender as an independent variable and gender as a constructed dependent variable, makes international relations scholarship less accurate and reliable, as it ignores important causal mechanisms.[188] Therefore, the use of the feminist lens strengthens the conceptual and empirical validity of this chapter's analysis.

Perhaps the most important theme in feminist security studies in relation to the research question is what Sjoberg calls "the understanding of the gendered nature of values prized in the realm of international security."[189] Sjoberg explains:

> "If 'masculinism is the ideology that justifies and naturalizes gender hierarchy… then the values socially associated with femininity and masculinity are awarded unequal weight in a competitive social order, perpetuating inequality in perceived gender difference. Social processes select for values and behaviors that can be associated with an idealized, or hegemonic, masculinity… This cycle is self-sustaining—so long as masculinity appears as a unitary concept, dichotomous thinking about gender continues to pervade social life. This dichotomous thinking about gender influences how scholars and policy makers frame and interpret issues of international security.

Sjoberg's analysis gets to the heart of what this chapter is attempting to argue; masculine values and ideologies dominate the field of nuclear security, in part because they are idealized in war-making and the nature of the offense, and in part because femininity is devalued in relation to nuclear weapons; at most a weakness, and most commonly, simply irrelevant.

Lauren Wilcox in "Gendering the 'Cult of the Offensive'" uses the feminist IR theory laid out by Sjoberg above to analyze the dominance of the offense, arguing that

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[188] Sjoberg, ibid.
[189] Sjoberg, Ibid.

gender may be an explanatory factor for the cult of the offensive.[190] Wilcox's analysis has a number of practical applications to women in nuclear security; like Sjoberg, Wilcox suggests using the feminist lens in three possible areas for investigation regarding states' misperception of the offense, arguing that the "perceptions and uses of technologies are dependent upon gendered ideologies."[191] Wilcox goes on to explain what these gendered perceptions and uses of technology practically mean: "Science and technology are considered inherently masculine as they are associated with the masculine values of domination, control, and objectivity. The harder the technology, the more masculine it is."[192] These 'hard', masculine forms of technology characterize offensive capabilities, signifying a connection between gender and war-making, particularly wars involving the possession of nuclear weapons. Masculine values are idealized in war-making because these are precisely the values that are associated with war; war is constructed by masculine social structures, carried out by technology imbued with masculine characteristics. Masculine values are not only preferred in war-making but expected. Conversely, feminine values are discounted and excluded.

Wilcox's connection between 'hard' technology and masculine values is essential to an analysis of gender and nuclear weapons, as no technology– no weapon, is conventionally 'harder' than nuclear weapons. Furthermore, in many ways, no weapon is more scientific; the nuclear weapon relies on centuries of scientific experimentation proving the explosive power of nuclear fission and the destructive capability of radioactive nuclides. Each detonation of a nuclear bomb is the most powerful example of

[190] Wilcox, ibid.
[191] Wilcox, Ibid.
[192] Wilcox, Ibid.

physics at play. The possession of nuclear weapons, while primarily weapons of deterrence rather than offensive weapons, are steeped in masculine characteristics of domination and undiluted strength.[193]

Carol Cohn and Sara Ruddick build upon the gendered perceptions of nuclear weapons specifically in their article "A Feminist Ethical Perspective on Weapons of Mass Destruction," and set the stage for answering the question at hand using the feminist lens. They argue that "when asked to think about weapons of mass destruction, we strive to consider the totality of the web of social, economic, political, and environmental relationships within which weapons of mass destruction are developed, deployed, used and disposed of – all the while starting from the perspective of women's lives."[194] Cohn and Ruddick's analysis first and foremost reaffirms the central tenet of feminist IR theory– that analysis starts from the perspective of women, and maintains this perspective at the heart of discussion. Furthermore, they assert that it is only by applying this web's totality to this chapter's analysis that we can begin to understand the gender inequities inherent in nuclear security. We must effectively analyze the role women have played, or rather, *not* played in all stages of nuclear weapons: development, deployment, use, and beyond to answer this chapter's research question.

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[193] Of course, nuclear weapons can and have been used as offensive weapons, as was the case with the atomic bombing of Hiroshima and Nagasaki in 1945.

[194] Carol Cohn and Sara Ruddick, "A Feminist Ethical Perspective on Weapons of Mass Destruction," July 19, 2004, https://doi.org/10.1017/CBO9780511606861.023.

Analysis

Women Excluded from Field of Nuclear Security

The feminist lens allows us to better understand and examine the hyper-masculinity that characterizes U.S. national security: "the public image of national security professionals remains highly-masculinized to this day, with dramatic under-representation of female professionals, to say nothing of women's perspectives, in media narratives and scholarly publications, at top think tanks, and in the ranks of university chairs."[195] National security has been built upon a sort of erasure of 'feminine' ideals or perspectives, as women are crucially under-represented, and those who do make it into the space are expected to adhere to a hyper-masculinized system.

The field of nuclear security in particular is, and has been, male-dominated. A report by the World Institute for Nuclear Security asserts that women comprise 20% of the nuclear workforce, a number that is even smaller within the nuclear security workforce.[196] This skewed representation of gender inevitably impacts the theories and ideals guiding nuclear security; if only men are contributing to both academic and scientific discussions in the field, not only will women inherently be excluded but nuclear security will continue to be made by and for men.

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[195] Heather Hurlburt, Elizabeth Weingarten, Alexandra Stark, Elena Souris, "The 'Consensual Straitjacket': Four Decades of Women in Nuclear Security," New America, accessed March 31, 2022, http://newamerica.org/political-reform/reports/the-consensual-straitjacket-four-decades-of-women-in-nuclear-security/.

[196] "Gender and Nuclear Security: Challenges and Opportunities" (World Institute for Nuclear Security, July 2019), https://www.wins.org/wp-content/uploads/2020/12/Gender-and-Nuclear-Security_Pg33.pdf.

This gendered bias in nuclear security theory is most explicit when looking at the most prominent nuclear theorists: all men. Furthermore, deterrence theory, the guiding principle of nuclear security, is an inherently masculinized theory. The Centre for Feminist Foreign Policy builds on this argument, stating that:

> "there is an underlying masculinist perspective to American-style deterrence that makes it increasingly fragile in the modern day. Psychologists now understand that the "fight or flight" instinct when faced with threat is actually largely a male threat response. Deterrence in the US tradition, we assert, has been conceived in such "fight or flight" terms: in a sense, deterrence is the international equivalent of a "haka" dance, which is traditionally performed only by males. This entails looking very fierce, weapons in hand, prepared to meet any challenge in order to deter potential adversaries from attacking. Post-deterrence in this approach looks more like the "flight" alternative."[197]

Deterrence theory has dominated the nuclear powers' psyches and actions. It proves how powerful theory can be, and the policy implications it can have. Furthermore, it raises alarms regarding other prominent theories in the field of nuclear security; if the most significant theory in nuclear security– the theory that guides much of the field's discussion– is inherently masculine, one could assume that that the field of nuclear security scholarship more broadly is largely masculinized.

A Fuller Project survey confirms this, showing that "of 20 recent articles that include the word "nuclear" in the *New York Times*, only 8 percent of all the people mentioned as sources or subjects were women."[198] According to the Harvard Belfer Center for Science and International Affairs, "only about one-third of professionals in the

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[197] "Feminist Foreign Policy and Deterrence," CFFP, accessed March 31, 2022, https://centreforfeministforeignpolicy.org/journal/feministforeignpolicyanddeterrence.
[198] Xanthe Scharff, "Only Women Can Stop the Apocalypse," *Foreign Policy* (blog), accessed March 31, 2022, https://foreignpolicy.com/2019/04/15/only-women-can-stop-the-apocalypse/.

WMD policy and research field are women. The gap is far wider for women of color."[199] This representation is the highest it's ever been, highlighting an encouraging trend that is unfortunately less than impactful to the discussion at hand. This is because all of the foundational literature in nuclear scholarship was written during the Cold War, a time where female representation was significantly lower. Furthermore, today's scholarship is still in conversation with that literature. The most prominent theorists in nuclear security, whose theories have shaped decades of decision-making, are Kenneth Waltz, Thomas Schelling, and Bernard Brodie. Although prominent scholars such as Nina Tannenwald have authored critical works in the field, nuclear security remains dominated by masculinized theories of deterrence and brinkmanship. Furthermore, women remain underrepresented in nuclear security, even among junior scholars. Although there are women who write on feminism and nuclear weapons, there are only a handful of female senior scholars in the field.

Women Excluded from Design

Nuclear weapons' ideation and design is in many ways characterized by the exclusion of women. This exclusion can trace its roots to the foundation of nuclear science; in fact, the discovery of nuclear fission, the phenomenon that makes nuclear weapons possible, was made primarily by two men and one woman– only the men won the Nobel Prize in Chemistry. Lise Meitner, an Austrian physicist, began research on nuclear fission in 1926. She and her nephew Otto Frisch were the first to articulate how

[199] "Pipelines and Ceilings: The Gender Gap in Nuclear Policy," Belfer Center for Science and International Affairs, accessed March 31, 2022, https://www.belfercenter.org/event/pipelines-and-ceilings-gender-gap-nuclear-policy.

the process of nuclear fission occurs, but their work was interrupted when Meitner, a Jew, had to leave all of her possessions in Austria and sneak into Sweden. Otto Hahn was able to isolate the evidence for nuclear fission, and ended up receiving the Nobel Prize for this work.[200] He never acknowledged Meitner's contributions, despite her laying the theoretical groundwork for the phenomenon and her being the first to acknowledge the explosive potential of the fission process. Interestingly, despite being the person to discover nuclear fission's weapon capabilities, Meitner refused to assist in the development of a nuclear weapon, stating: "I will have nothing to do with a bomb!"[201]

The blatant exclusion of women from the discovery of nuclear fission set the stage for the limited involvement of women in nuclear ideation and design. Women, in both scientific and administrative roles, were minimally involved, and those who were involved were typically overshadowed or isolated from key decision-making processes. This isolation is described by chemist Lilli Honig, who worked for Los Alamos National Laboratory in 1944 conducting plutonium research: "I worked in a cubbyhole … I was really just cut off from everything else. I don't know if that was because we were women or because we were doing work that we had to be segregated, but I suspect the former because it wasn't the only place that it happened to me."[202] Darleane Hoffman faced even more egregious treatment at Los Alamos: "In 1952, Hoffman arrived at Los Alamos Scientific Laboratory to take over the nuclear chemistry section. On arrival, the human resources department refused her entry: "There must be some mistake," she was told.

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[200] "Lise Meitner," Atomic Heritage Foundation, accessed March 31, 2022, https://www.atomicheritage.org/profile/lise-meitner.
[201] Lise, ibid.
[202] "A Short History of Women at Los Alamos," Los Alamos National Laboratory, accessed April 21, 2022, https://www.lanl.gov/discover/science-briefs/2018/March/0322-history-of-women.php.

"We don't hire women in that division."[203] In fact, at the time, women made up just 11% of the total workforce of the Manhattan Project, in primarily administrative/secretarial roles.[204]

This statistic can be viewed through the analysis of Wilcox in "Gendering the Cult of the Offensive": as mentioned above, according to Wilcox, science is considered to be an inherently masculine field, given the values of domination and control that are associated with it. The Manhattan Project was ultimately a science project with a policy objective; therefore, the project was inherently masculine.

Women Excluded from Decision-Making

At this point, it should not come as a surprise that women have been largely excluded from decision-making processes regarding nuclear weapons. There were no women in decision-making roles during the Manhattan Project, nor during the decision to bomb Hiroshima and Nagasaki. This exclusion is confounded by two factors analyzed above; the exclusion of women from scientific discoveries regarding nuclear weapons, and the exclusion of women from the field of security more broadly. This exclusion pushed women to the fringe of nuclear security, creating a number of barriers to overcome in order to reach decision-making roles. Representation in these key roles grew marginally and slowly after WWII. Figure 1 demonstrates the proportion of female representation in U.S. nuclear decision-making from 1970-2019.

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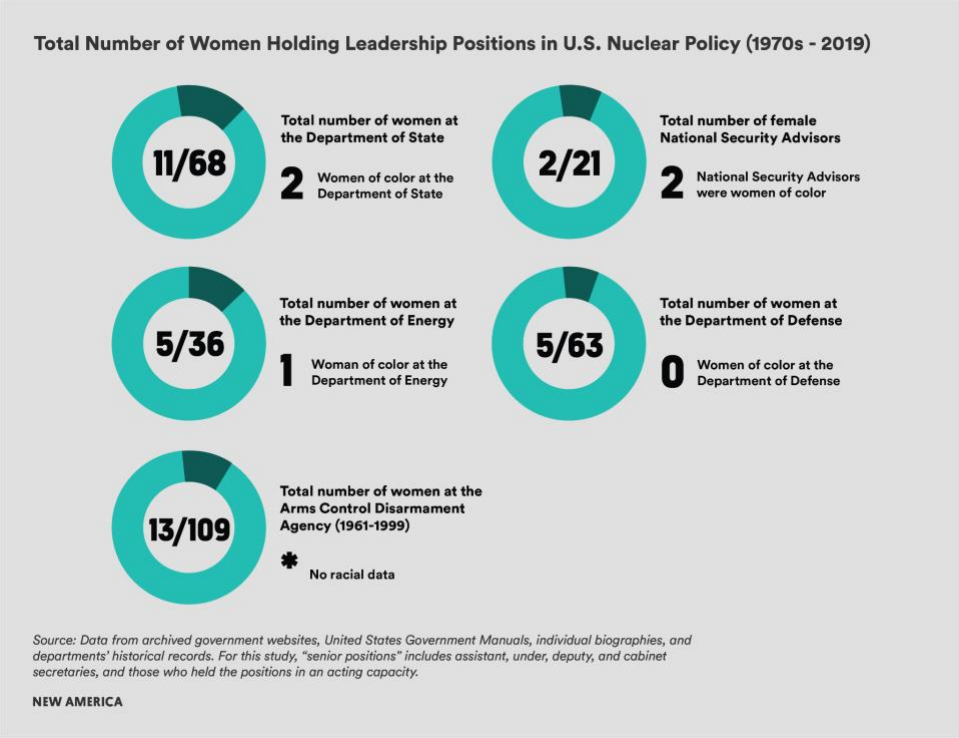
[203] Albert Ghiorso, Darleane C. Hoffman, and Glenn T. Seaborg, *Transuranium People, The: The Inside Story* (London : River Edge, NJ: Imperial College Press, 2000).
[204] Albert, ibid.

Figure 1: Total Number of Women Holding Leadership Positions in U.S. Nuclear Policy[205]



As Figure 1 demonstrates, the proportion of women holding leadership positions in U.S. nuclear policy is minimal, and becomes even more marginal for women of color. For the past 40 years of US nuclear policy, a total of 36 women out of 297 have been represented in decision-making positions. Only four out of 297 were women of color. In many ways, the exclusion of women from these positions is less than surprising, given their minimal representation at the low and middle levels of nuclear security. However, the exclusion is perhaps more frightening at this level, as it ensures that nuclear security decisions that affect entire populations, are made by men primarily for men.

[205] Heather, ibid.

This exclusion is not limited to the United States; for example, in India, another nuclear power, "proportional representation of women in various decision-making positions at higher levels in politics, diplomacy, military affairs, science, and technology remains low, and most of these positions remain male-dominated."[206]

Furthermore, breakdown of gender representation in policy roles has been shown to critically impact foreign policy outcomes. Significant research has been conducted to demonstrate the effects of gender on peace/conflict-making; this research has relevant applications to nuclear security decision-making in particular. First and foremost, as discussed in the literature review in regards to the "Cult of the Offensive", views of military offense are theorized to be inherently masculine, steeped in the masculine ideologies of dominance and control. War, particularly nuclear warfare, is not only viewed as masculine but placed on a pedestal by men.[207]

Sagan expands on this in "The Spread of Nuclear Weapons: A Debate Renewed", arguing that these military offensive ideologies inhibit the reliability of deterrence, as military behaviors are "predisposed towards favoring measures of preventive war."[208] Deterrence is the primary phenomenon in place to prevent the use of nuclear weapons; any inhibitors of the reliance of deterrence raise alarms for the security of the international system. A study by the Royal Society builds upon Sagan's argument, showing that: "men in simulated wargames scenarios are more likely to demonstrate

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[206] Arpita Datta, Dr Alpana Goel, and Ashok Jain, "Women in Nuclear Science & Technology in India: Challenges & Opportunities," *International Journal of Nuclear Security* 7, no. 2 (January 1, 2022), https://doi.org/10.7290/ijns075fhw.
[207] Carol Cohn, "Sex and Death in the Rational World of Defense Intellectuals," *Signs* 12, no. 4 (1987): 687–718.
[208] Kenneth Waltz and Scott Sagan, The Spread of Nuclear Weapons: A Debate Renewed (W.W. Norton & Company, 2003), 54.

overconfidence than women, pointing to the benefits of ensuring women are fully represented in high-level policy roles. The same study showed that overconfidence in high-stakes conflict scenarios is more likely to lead to a decision to attack a perceived enemy."[209] These results have significant consequences for nuclear war, implying that men are more disposed towards choosing to use nuclear weapons than women. This implication signifies the necessity to prevent further female exclusion from the nuclear web, as the field is literally less secure in its current hyper-masculine state.

Furthermore, research has proven that "conflicts are 35 percent more likely to be resolved and remain peaceful for 15 years if women are involved."[210] The involvement of women in maintaining peace confirms the necessity to include women in nuclear security decision-making, as women could not only mitigate the present masculine disposition towards nuclear use, but create conditions more conducive to peace, preventing the use of nuclear weapons to ever even come into question. Ultimately, these statistics combined highlight the bias towards the conflict that the current and past nuclear leadership skews towards, and signifies the necessity to include women in the decision-making process to ensure holistic and effective policy.

Case Study: Disproportionate Impacts of Nuclear Weapons on Women's Health

Exclusion from every stage of the process of nuclear weapons has meant that women's perspectives, and livelihoods, were never a considered piece of the nuclear puzzle. This lack of consideration ensured that the impacts of nuclear weapons on women

[209] Xanthe, ibid.
[210] "Women and War: Securing a More Peaceful Future," Wilson Center, accessed March 31, 2022, https://www.wilsoncenter.org/event/women-and-war-securing-more-peaceful-future.

were unknown until years after nuclear testing and the detonations in Hiroshima and Nagasaki. An ICAN report states that "official evaluations have not considered gender- and age- sensitive impacts, meaning that the harm of ionizing radiation has been systematically under-estimated and under-reported."[211] Despite this under-reporting, the disproportionate effects of radiation on women have been chronicled, and require an investigation in order to better understand the unequal effects of nuclear weapons.

Effects of Radiation

Case Study of Hiroshima and Nagasaki

The effects of radiation cause both physical and emotional harm to women at higher rates than men. In no case is this clearer than in the case of the atomic bombings of Hiroshima and Nagasaki. All victims faced significant consequences, including cancer, birth deformities, damaged tissue, and severe social stigmatization. Yet women bore these physical and societal consequences at higher rates than men, most significantly in cancer. In fact, women in the two bombed cities were nearly two times more likely than their male counterparts to develop and die from solid cancer due to ionizing radiation exposure.[212] The cancers are almost always gender-specific, including thyroid and breast

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[211] Ray Acheson, "The Nuclear Ban and the Patriarchy: A Feminist Analysis of Opposition to Prohibiting Nuclear Weapons," *Critical Studies on Security* 7, no. 1 (January 2, 2019): 78–82, https://doi.org/10.1080/21624887.2018.1468127.

[212] "Gender and Nuclear Weapons" (ICAN, February 2020), https://d3n8a8pro7vhmx.cloudfront.net/ican/pages/1526/attachments/original/1583450155/Briefing_Paper__Gender_and_Nuclear_Weapons_February_2020-2.pdf?1583450155.

cancer. Radiation exposure dramatically increases the rates of developing these gendered cancers, making radiation inherently more physically damaging to women.[213]

Radiation from the blasts also significantly affected female fertility and perinatal health. Women who demonstrated signs of radiation sickness after exposure to the blasts experienced a significant increase in perinatal loss and birth abnormalities; the "incidence of miscarriage, stillbirth and death during infancy was 43 percent, seven times the incidence in a control group who were considered to have received no radiation."[214]

These physical consequences demonstrate perhaps the most insidious consequence of excluding women from the nuclear process, particularly the design and testing of the bomb. Because women's experiences weren't considered when creating the atomic bomb, their bodies were never the referent in testing. In fact, radiation exposure tests were based on the "Reference Man", a man of the ethnicity, age, and lifestyle that matched the military establishment of the 20th century.[215] Rather than testing radiation on various subsets of the population to understand varied susceptibility, measures of radiation effects were studied primarily against this 'Reference Man' or a similar 'population average'.[216] A man was selected as the reference for two primary reasons: first, women were, and are, not considered in security discussions; weapons and war are for men, made by men, so the impact on women was never the priority. Furthermore,

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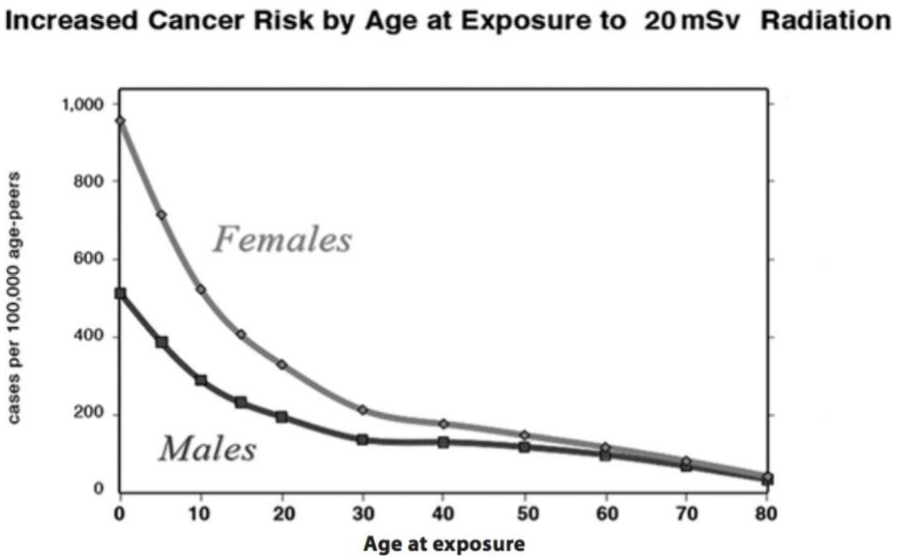
[213]" Gendered Impacts" (United Nations Institute for Disarmament Research), accessed April 14, 2022, https://www.unidir.org/files/publications/pdfs/gendered-impacts-en-620.pdf.
[214] "How Radiation Affects Pregnant Women and Children," Children of the Atomic Bomb, accessed March 31, 2022, https://www.aasc.ucla.edu/cab/200708230012.html.
[215] United Nations Office for Disarmament Affairs, *Civil Society Engagement in Disarmament Processes: The Case for a Nuclear Weapons Ban*, vol. 2016 (United Nations, 2016), https://www.un.org/disarmament/publications/civilsociety/volume-2016/.
[216] Nadia Narendran, Lidia Luzhna, and Olga Kovalchuk, "Sex Difference of Radiation Response in Occupational and Accidental Exposure," *Frontiers in Genetics* 10 (2019), https://www.frontiersin.org/article/10.3389/fgene.2019.00260.

man is in the reference in almost all social structures; because men are the primary authority figures and decision-makers in the structures that define norms and rules, the system is designed to fit men.

Reference Man was used for regulations and nuclear licensing decisions made by the U.S. Nuclear Regulatory Commission.[217] This biased referent ensured that the minimal radiation exposure standards affected women, particularly young girls, at much harsher rates than men and boys. Age plays as significant a role as gender; as such, young girls faced the most significant physical consequences of radiation in Hiroshima and Nagasaki. In fact, in a report for the United Nations, Mary Olsen asserts that for victims of Hiroshima and Nagasaki, "cancer rates in the cohort of females who were exposed when they were aged birth-to-5, are almost 10 times higher than the rate of cancer in the cohort of males who were 30 years old, the age of the Reference Man, in August 1945."[218] The National Academy of Sciences confirms this phenomenon in Figure 2.

[217] Mary Olson, "Disproportionate Impact of Radiation and Radiation Regulation," *Interdisciplinary Science Reviews* 44, no. 2 (April 3, 2019): 131–39, https://doi.org/10.1080/03080188.2019.1603864.
[218] United Nations Office, ibid.

Figure 2: Age at Exposure vs. Cancer Rates[219]



Data Source: U.S. National Academy of Sciences BEIR VII Phase 2 Risk Model

That being said, the consequences of Hiroshima and Nagasaki were not limited to physical impacts. Survivors of the cities' bombings have also faced radiation-related social stigma. Hibakusha, a term used to describe the survivors, were "deemed 'contaminated', and were treated with fear and suspicion by some others in Japanese society."[220] A United Nations Institute for Disarmament Research article asserts that although these stigmas are experienced by both male and female 'hibakusha', "the images and beliefs related to female bodies seem to contribute to the intensified discrimination experienced by women in respect of marriage or reproduction. It is often the case that women, rather than men, are those blamed for sterility or abnormality in offspring."[221] Therefore, female victims of Hiroshima and Nagasaki, particularly victims

[219] United Nations Office, ibid.
[220] Gendered Impacts, ibid.
[221] Gendered Impacts, ibid.

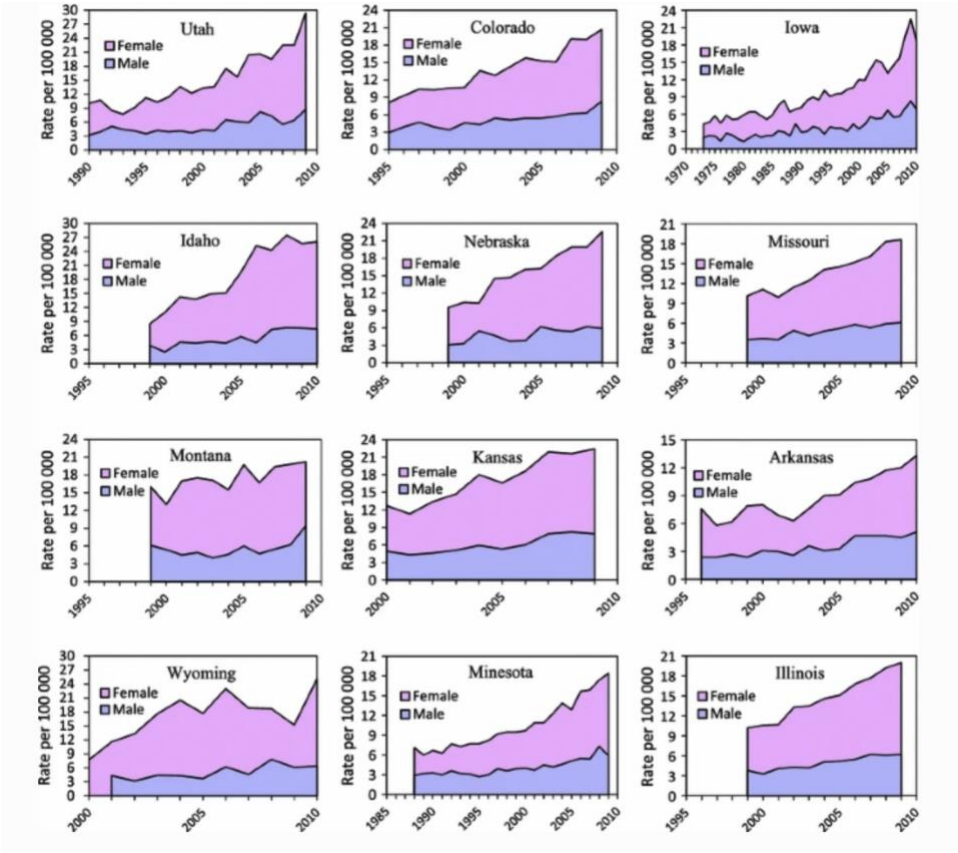
whose fertility was impacted by radiation exposure, were often socially isolated, stigmatized, and even publicly humiliated for physical impacts that they both could not control and bore at unequal rates.

Case Study of the United States

Unfortunately, this phenomenon is not isolated to the victims of Hiroshima and Nagasaki. Evidence of gendered radiation impacts also abounds in the United States, particular in communities downwind of testing sites. For example, between 1970 and 1982, "reproductive or gonadal cancer in New Mexico Native American children and teenagers was eight-fold greater than in non-Native Americans."[222] New Mexico Native Americans were impacted heavily by radioactive fallout from domestic nuclear testing, signifying a credible link between radiation exposure and increased cancer rates. Figure 3 demonstrates the incidence of thyroid cancer in downwind states by gender, clearly showing the higher rates that women across every state face.

[222] Mary, ibid.

Figure 3: Incidence of Thyroid Cancer by Gender[223]



It is possible that the refusal to study impacts of nuclear weapons on women in the United States is even more insidious than previously discussed; according to Cynthia Folkers, early on in the timeline of atomic weapons, nuclear scientists were aware that women, particularly pregnant women and young girls, may be more susceptible to "radiation than the healthy adult male workers regularly studied."[224] Yet this knowledge was swept under the rug, and those who attempted to publicize it were "berated publicly and invisibilized along with the researchers."[225] These findings suggest that the inequities

[223] Remus Prăvălie, "Nuclear Weapons Tests and Environmental Consequences: A Global Perspective," *AMBIO* 43, no. 6 (October 1, 2014): 729–44, https://doi.org/10.1007/s13280-014-0491-1.
[224] Mary, ibid.
[225] Gayle Greene, *The Woman Who Knew Too Much: Alice Stewart and the Secrets of Radiation*, Reprint edition (University of Michigan Press, 2001).

within nuclear security that women face run deeper than exclusion and the consequences of this exclusion; in the case of radiation effects, the harmful effects on women's bodies were known *and* accepted by decision makers. Therefore, this case study not only points out the literal inequity in how women's bodies are impacted by radiation, but the blatant 'lessening' of women's health by their policymakers. This lessening is congruent with a patriarchal system, in which decisions are made to benefit those like the decision-maker. As Folker points out, this is yet another instance of nuclear proponents "willing to sacrifice bodies, health, life, or individual rights for the promise of nuclear technology."[226] Of course, these sacrifices are almost never born by those like the nuclear proponents.

Patterns Worldwide

The patterns of disproportionate physical and emotional impacts can be applied worldwide. In 1986, the nuclear power plant in Chernobyl, Ukraine experienced significant explosions, causing severe amounts of radioactive material to contaminate the surrounding area. It has been proven that in and around Chernobyl, "girls are considerably more likely than boys to develop thyroid cancer from nuclear fallout."[227] This phenomenon was observed particularly in Belarus, which faced significant radiation exposure from the Chernobyl accident. It was concluded that the increase in thyroid cancer incidence rate in Belarus for "children under ten years old at diagnosis was substantially higher for female children than for male children."[228]

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[226] Mary, ibid.
[227] Gendered Impacts, ibid.
[228] Gendered Impacts, ibid.

The patterns of adverse perinatal health, including miscarriages, birth defects, and still births can also be applied generally to female radiation victims. In the Marshall Islands, heavily impacted by nuclear testing, "it became common for women to give birth to "jellyfish babies"—babies born without bones and with transparent skin."[229] In fact, birth defects were so common in the Marshall Islands after nuclear testing that multiple names were used to describe them, 'jellyfish babies' included.

As was the case in Hiroshima and Nagasaki, women across the world also appear to suffer disproportionately from emotional and psychological impacts. According to the UNIDIR report, "after the Chernobyl nuclear accident fallout, women in most European countries reported more stress than men, and women were shown to have taken protective measures more often."[230] Closer to Chernobyl, mothers in the city of Gomel, which was approximately 110 kilometers north of the accident site, experienced higher rates of mental health problems.[231]

These observations are in line with broader studies regarding the impact of war and conflict on women. Carol Cohn and Sara Ruddick summarize the feminist interpretation of conflict beautifully:

> Practically, feminists see war as neither beginning with the first gunfire, nor ending when the treaties are signed. Before the first gunfire is the research, development and deployment of weapons; the maintaining of standing armies; the cultural glorification of the power of armed force; and the social construction of masculinities and femininities which support a militarized state. When the organized violence of war is over, what remains is a ripped

[229] Matthew Gault, "Climate Change Is Breaking Open America's Nuclear Tomb," *Vice* (blog), November 11, 2019, https://www.vice.com/en/article/3kxmav/climate-change-is-breaking-open-americas-nuclear-tomb.
[230] Gault, ibid.
[231] Gault, ibid.

> social fabric: the devastation of the physical, economic and social infrastructure through which people provision themselves and their families; the havoc wrought in the lives and psyches of combatants, noncombatants, and children who have grown up in war; the surfeit of arms on the streets, and of ex-soldiers trained to kill; citizens who have been schooled and practiced in the methods of violence, but not in nonviolent methods of dealing with conflict; "nature" poisoned, burned, made ugly and useless.[232]

Cohn and Ruddick's article aptly summarizes many of the themes that have already been discussed in this paper, including the necessity to look at every stage of the nuclear web to truly understand the disproportionate impacts of nuclear weapons. Because women are expected to be the nurturers and caretakers of society, nuclear accidents and nuclear attacks alike place the emotional burden on women to pick up the pieces of society; to provide emotional support for their spouses and children, to continue to procreate to produce future citizens, and to hold the home together so that men can return to the economy. This emotional burden is placed on women all while they are dealing with the disproportionate physical impacts of radiation, creating a vicious cycle in which women continue to experience the impacts of nuclear weapons much more harshly than men.

Women's Involvement in Nonproliferation and Disarmament Movements

While the exclusion of women from almost every aspect of the nuclear web has been detailed at this point, there is one critical place that women have found a significant role: nonproliferation movements. Given women's disproportionate shouldering of the

[232] Cohn and Ruddick, ibid.

physical and emotional consequences of nuclear weapons, it makes intuitive sense that women and feminist movements have vigorously pursued nonproliferation.

Women have been involved in the disarmament conversation since nuclear weapons were created; in fact, in the early 1900s nearly 1200 women called for international disarmament.[233] In 1961, nearly 50,000 women marched for Women Strike for Peace, an instrumental move in pushing the United States and the Soviet Union into pursuing the nuclear test-ban treaty in 1963.[234] The vital movement was organized by Dagmar Wilson, who said of the protests: "You know how men are. They talk in abstractions and the technicalities of the bomb, almost as if this were all a game of chess. Well, it isn't. There are times, it seems to me, when the only thing to do is let out a loud scream.... Just women raising a hue and cry against nuclear weapons for all of them to cut it out."[235] Wilson's sentiments reflect Cohn and Ruddick's assessment of the emotional and physical burdens shouldered at every stage of nuclear conflict by women; to the men making decisions about nuclear weapons, it can become something of a game. Having to bear so many of the consequences, women are not afforded that same luxury.

Furthermore, more and more women are coming to the disarmament policy table. The 2017 Treaty on the Prohibition of Nuclear Weapons (TPNW) was led primarily by female diplomats and female members of society. The TPNW is significant, as it is the first international treaty to attempt to ban the possession and development of nuclear

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[233] Mara Zarka, "The Role of Women in Non-Proliferation and Disarmament Advocacy," Vienna Center for Disarmament and Non-Proliferation, May 5, 2021, https://vcdnp.org/the-role-of-women-in-non-proliferation-and-disarmament-advocacy/.
[234] Wilson, Elaine., "Dagmar Wilson Obituary: Dagmar Wilson, Who Organized 50,000 Women to Protest against Nuclear Weapons, Dies at 94," Los Angeles Times, accessed April 21, 2022, https://www.latimes.com/local/obituaries/la-me-dagmar-wilson-20110130-story.html.
[235] Wilson, ibid.

weapons. Although a majority of the world's nations have ratified the TPNW, it carries little practical weight, as no nuclear power has signed or ratified it. Nonetheless, the TPNW remains a vital piece of the present and future of nonproliferation, and is working to shift the norms surrounding nuclear weapons in the international system. Nomsa Ndongwe, a research associate at the James Martin Center for Nonproliferation Studies, said that the critical involvement of women in the creation of the TPNW "showed what can be done in a field that is considered predominantly male."[236] That being said, while the proportion of women participating in disarmament diplomacy have steadily increased in recent years, women remain under-represented, particularly in high-level roles.[237]

A 2019 UNIDIR Report found that "in arms control, non-proliferation and disarmament forums, heads of delegations are mostly men," and "the proportion of women tends to decline as the importance of the position increases, while the proportion of men grows linearly as one moves from regular diplomatic personnel to United Nations ambassadors, to foreign ministers and, lastly, to heads of State or Government."[238] This finding affirms previous analysis that women are underrepresented in leadership roles within nuclear security; beyond that, it affirms that even in the realm of nuclear security that women are *most* involved in, they are still represented at significantly lower rates

[236] Mitchell, Stephanie, "Closing the Gender Gap in the Field of Nuclear Security," *Harvard Gazette* (blog), November 3, 2021, https://news.harvard.edu/gazette/story/2021/11/closing-the-gender-gap-in-the-field-of-nuclear-security/.
[237] Renata Hessmann Dalaqua and Kjølv Egeland, "Gender Balance in Arms Control, Non-Proliferation and Disarmament Diplomacy," *UNIDIR*, n.d., 42.
[238] Renata, ibid.

than men. In fact, women comprise just 32 percent of participants in disarmament-related meetings over the past 40 years.[239]

Furthermore, even the involvement of women in the disarmament committee appears to be gendered. The UNIDIR report elaborates on this, asserting that "while the First Committee (on disarmament and international security) has the lowest proportion of women (33 per cent in 2017), the Third Committee (on social, humanitarian and cultural issues) has the highest proportion of women (49 per cent in 2017)."[240] This gender breakdown within committee cements the notions associated with femininity vs. masculinity; disarmament and security are viewed as more technical and therefore more masculine, whereas humanitarian and social issues are viewed as "softer", and more feminine.[241]

These associations make analyses of women's involvement in disarmament more complicated from a feminist lens; if we view disarmament and nonproliferation as the most "feminine" aspect of nuclear security, we are then reinforcing "the idea that the policy space was exclusively masculine" and playing into the idea that peace studies is inherently feminine.[242] It is entirely possible that women are not naturally any more "anti-nuclear weapons" than men, but have instead been forced into a stance of opposition given their exclusion from the space.

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[239] Renata Dwan, "Women in Arms Control: Time for a Gender Turn?," Arms Control Association, accessed April 21, 2022, https://www.armscontrol.org/act/2019-10/features/women-arms-control-time-gender-turn.
[240] Renata, ibid.
[241] J. Ann Tickner, *Gendering World Politics: Issues and Approaches in the Post-Cold War Era* (Columbia University Press, 2001).
[242] Tickner, ibid.

While the increased involvement of women in nonproliferation and disarmament movements is encouraging, the conversation regarding their involvement must remain nuanced. There must be a simultaneous recognition that women remain under-represented in even this sphere, may likely be represented at higher rates in this sphere *because* of their exclusion in others, and that increased inclusion in other elements of nuclear security is necessary to ensure that nuclear security is as holistic and as effective as it can be.

Conclusion

Ultimately, women's involvement in the web that comprises nuclear weapons, including creation, design, detonation, use, and disarmament, is most aptly characterized by their exclusion. Women were largely excluded from the creation of the nuclear bomb, including the scientific experiments that preceded it, as well as nuclear testing and post WWII nuclear science. Furthermore, women have been almost wholly excluded from nuclear security, with low but increasing numbers in nuclear scholarship and minimal representation in decision-making roles. This exclusion, coupled with general patriarchal conditions that subvert the importance of women's health, has ensured that the disproportionate effects of radiation on women's bodies was under-studied and under-prioritized. Women bear the physical effects of radiation at much higher rates than men, and this disproportionate impact is felt even more by young girls. Women also carry immense social and emotional burdens from radiation, including social stigmatization, trauma, and more. Women are most represented in the nonproliferation and disarmament space, but still make up a minority proportion of representatives.

Nuclear weapons are an inherently masculinized weapon; they are associated with masculine ideals, have been propped up and supported by male leaders, and opposition to nuclear weapons is viewed as necessarily feminine. The use of the feminist lens in this analysis allowed us to place women at the center of a conversation they are too often excluded from; it is only from this centering that we were truly able to understand the gender inequities that arise in nuclear security and the realm of nuclear weapons more broadly. Gender recognition and representation is an imperative piece to the nuclear puzzle, as it would ensure that the perspectives of all who are affected by nuclear weapons, particularly those who are affected *more* by nuclear weapons, are taken into consideration when crafting the future of policy and the weapons themselves.

Conclusion

This thesis concludes that the ultimate weapon of mass destruction does not impact masses equally. Three theoretical lenses were employed to reach this conclusion, including internal colonialism, neocolonialism, and feminism. The use of these lenses strengthened the empirical validity of each chapter's analysis by centering previously sidelined voices, while providing a useful foundation through which to view discussions of inequity. Furthermore, the theoretical lenses allowed the nuclear web to be examined in its totality; rather than simply focusing on the impacts of the two war-time detonations of nuclear weapons, the impacts of the nuclear web from production to scholarship were investigated.

The use of internal colonialism as a theoretical lens in Chapter 1 allowed for the experiences of communities of color to be brought to the forefront in an investigation of the impacts of the nuclear production process. In order to properly examine the consequences of the nuclear production process, three key aspects of the beginning, middle, and end of the process were analyzed: uranium mining and milling, nuclear production facilities, and nuclear waste storage.

The uranium mining and milling sub-section focused on mining practices in the Navajo Nation and in the Democratic Republic of the Congo (Belgian Congo at the time). The lenses of internal colonialism and neocolonialism respectively were employed, and highlighted the blatant exploitation and disproportionate consequences of mining carried by people of color at the hands of the United States government. Navajo people have a percentage of uranium in the urine that is more than five times higher than that of the US population as a whole; furthermore, the rates for stomach cancer are fifteen to 200 times

higher for Navajos than average. Not only did the United States government create these consequences via direct exploitation of land and labor, it has also refused to provide adequate compensation and cleanup for the abandoned mines.

The production and maintenance of nuclear weapons was similarly characterized by disproportionate impacts on communities of color. Multiple nuclear production facilities were created by displacing communities of color; the Hanford Site in Washington was located on the Wanapum tribe's traditional home– the Wanapum were given 90 days to pack up and leave for the site to be built. More recently, nuclear production facilities, located primarily near minority populations, have created significant contamination. For example, the Savannah River Site, a nuclear facility used to refine nuclear materials, has created immense contamination in the local water sources, which the surrounding primarily African American communities rely upon for sustenance.

The final stage of nuclear production examined, nuclear waste and storage, cements the disproportionate impacts on communities of color. Low-income minority communities are targeted with waste facilities, exploited by government agencies and private corporations with more economic power than them. Like uranium mining and milling, Native Americans bear the brunt of the consequences of nuclear waste in the United States. Native land operates under tribal sovereignty, which exempts it from many environmental regulations and therefore makes it attractive as targets for environmentally damaging facilities. The U.S. government's exploitation of tribal sovereignty is a blatant display of internal colonialism that continues to negatively impact Native communities today. In fact, the largest nuclear waste storage facility in the United States is in Yucca

Mountain, a culturally significant environmental landmark to multiple Native tribes in the region.

Ultimately, Chapter 1 concludes that the nuclear production process clearly disproportionately impacts communities of color, particularly Native American communities, and that this disproportionate impact is created by an internal colonial relationship through which the United States government exploits communities of color.

Chapter 2 relies primarily on the lens of neocolonialism, but also employs the lens of internal colonialism, to investigate the impacts of nuclear testing. These lenses were used to analyze two primary case studies: U.S. nuclear testing in the Marshall Islands and U.S. nuclear testing in Nevada. The case study of nuclear testing in the Marshall Islands clearly demonstrates a neo-colonial relationship, in which the Marshall Islands' land was exploited and the Marshallese were forced to bear significant environmental and physical consequences of the U.S. testing regime. The United States government abused its Trusteeship relationship with the Marshall Islands, using the land and its people as a guinea pig for the country's nuclear program. Ultimately, the U.S. tested the equivalent of 1.6 Hiroshima bombs per day for 12 years in the Marshall Islands. These tests resulted in cancer risks 40 to 50 percent higher than normal among the Marshallese, an estimated one in three stillborn births to women exposed to radioactive fallout caused by testing, and permanent environmental contamination on multiple atolls in the region. The Marshallese were forced to carry the burdens of nuclear testing that the United States was not willing to subject itself to.

The blatant exploitation of the Marshall Islands became even more apparent when comparing the case study to testing in Nevada; the United States refused to domestically

test the high yield weapons tested in the Marshall Islands, and instead set the yield limit to only small-scale nuclear bombs. That being said, undercurrents of internal colonialism dictated United States domestic testing practices as well. The communities downwind of the Nevada Test Site, and therefore who bore the greatest impacts, were Native American and Mormon communities, both communities that held little political agency at the time. The United States government was willing to subject these people to contamination it was unwilling to widely subject white, Christian Americans to. Due to this colonial prioritization by the United States government, people of color, primarily the Marshallese and the Native Americans, disproportionately faced the consequences of nuclear testing.

Both Chapters 1 and 2 highlight that the impacts of nuclear weapons are felt primarily by communities who are different in identity and power status than the ruling political class; nuclear powers exploit these differences to advance their nuclear regimes with minimal personal repercussions.

Chapter 3 reaches similar conclusions, but focuses on gender rather than race as the center of analysis. Chapter 3 employs the lens of feminism to examine the impacts nuclear weapons have had, and continue to have, on women. The chapter is organized into multiple subsections that detail women's exclusion from each stage of the nuclear web, focusing on nuclear scholarship, nuclear weapons creation and design, nuclear decision-making, and nuclear disarmament. I argue that the nuclear web is inherently masculine, prizing masculine values and excluding feminine ones. The chapter then uses the case study of radiation effects on women to detail the consequences of this exclusion, concluding that women are physically and mentally disproportionately impacted by nuclear weapons. For example, women exposed to radioactive fallout in Hiroshima and

Nagasaki were two times more likely to develop and die from cancer. Furthermore, the incidence of thyroid cancer in U.S. downwind communities is significantly higher for women than men.

Detailing the blatant exclusion of women from each stage of the nuclear web is necessary, as it not only demonstrates the patriarchal norms underscoring nuclear weapons, but makes the case that because of their ultimate exclusion from all aspects of the nuclear web, women face disproportionate consequences of the weapon. The nuclear weapon was not made with women in mind; female perspectives and experiences were sidelined in the decision-making processes regarding regulations and use.

The conclusions of each chapter lead to the ultimate conclusion that nuclear weapons do not impact masses equally; in fact, they disproportionately impact people of color and women. This conclusion creates several implications for nuclear powers; first and foremost, it brings into question the general ethicality of nuclear programs. If nuclear programs disproportionately impact certain populations, is it morally sound for them to remain? Furthermore, the implication that nuclear weapons disproportionately impact communities of color and women *because* nuclear powers operate under misogynistic and colonial norms is significant and requires further discussion. Significant literature has been dedicated to the racist and patriarchal practices of the international system's great powers; further research could explore remedies for these practices as they relate to nuclear weapons more specifically.

Additionally, this thesis centered primarily on the effects of the United States' nuclear web. More research must be done to examine if all nuclear powers are afflicted by similar outcomes, and if these impacts differ by country.

Finally, the conclusions of this thesis highlight the necessity for recognition and compensation for the victims of nuclear weapons. The disproportionate impacts shouldered by Native Americans, African Americans, Marshallese, Congolese, and women more broadly will never be remedied. Many of these people have lost or faced significantly altered sacred homelands; they have reduced life expectancy and greater incidence of birth abnormalities; they carry generational traumas and live in permanently contaminated environments. However, greater recognition by the public and policymakers alike of the harms caused by the United States government could catalyze necessary nuclear weapons reform and more adequate compensation for victims.

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