

## Nuclear Waste and Society: A Historiographic Review and Analysis of Two Approaches

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This paper identifies and analyzes two approaches to the study of the history of nuclear waste in society—the “people-oriented” approach and the “policy-oriented” approach. The people-oriented approach places emphasis on marginalized people, as well as the concept of space and boundaries. In contrast, the policy-oriented approach often emphasizes legal or policy concerns at the national or international level. Several works that exhibit the key characteristics of each branch of scholarship are discussed and compared. The essay concludes by noting the unique strengths of the people-oriented approach and by commenting on this body of literature’s relevance to contemporary societal debates.

### Introduction

Since the rise of consumerism in the early 1900s, the issue of waste disposal has become increasingly urgent in many developed countries. In particular, the adequate disposal of nuclear waste has been, and remains, an incredibly challenging problem to solve. The spent fuel and other byproducts produced by nuclear reactors remains hazardous to humans for thousands of years. During the latter half of the twentieth century, citizens and governments spent an enormous amount of time, energy, and resources cleaning nuclear sites and compensating those that were harmed by radioactive waste material. Yet, it seems that a permanent solution to the radioactive waste disposal problem remains elusive.

Historians and other scholars that study nuclear waste have sought to examine the contours of nuclear waste policy and practices between the 1940s and more recent decades. Many of these studies can directly or indirectly inform ongoing policy debates. A review of the literature reveals that nuclear waste scholars have developed two different analytical approaches to the topic in recent years. This essay will conduct a historiographic analysis of several works while emphasizing the authors’ contributions to the body of literature and categorizing the work according to its approach and analytical framing.

The first approach discussed in this essay, which is referred to as the “people-oriented” approach, involves the study of specific locations, groups of people, or individuals who have been physically affected by

nuclear waste. This approach tends to place a strong emphasis on geography and boundaries. Scholars that adopt this perspective are often concerned with the lived experience of people who reside near areas of nuclear waste disposal. The second approach, which is referred to as the “policy-oriented” approach, tends to employ a larger area of focus. Generally, studies of this kind relate to legal or policy concerns at the national or international level. While such analyses may discuss the actions of individuals, these individuals are often far removed from the physical sites at which nuclear waste is stored or produced. Powerful, individual decision-makers and institutions are the primary historical actors in the narratives of policy-oriented scholars.

The key distinction between the analytical approach adopted by authors in each camp is the decision to study the “core” or the “periphery.” These terms are adapted from the “core-periphery framework,” which was developed in the 1970s. While this framework is closely associated with world-systems theory and has been used to describe the economic status of nations and geographic regions, the core-periphery model is fundamentally a network theory that describes the relationship between various nodes (Borgatti & Everett, 2000; Wallerstein, 1974, 2004). Depending on the context, a node can be an institution, individual, location, or anything else that can be “connected” to other objects or structures. Core nodes are at the center of the network, while periphery nodes are at the edges.

Policy-oriented scholars approach this topic from the perspective of the core. They study influential decision-makers and central institutions. They are often concerned with how the core makes a decision, rather than the effects of that decision. In contrast, people-oriented scholars use historical actors operating in the periphery as the primary unit of analysis. Due to these actors’ positions in the periphery, the processes that distance them from the core are central to a people-oriented interpretation. Thus, these periphery studies often focus on the spatial aspects of the issue and the marginalized nature of those interacting with nuclear waste. Some authors, like Valerie Kuletz, explicitly comment on their use of the core-periphery framework, but most do not. The clear theoretical framing of Kuletz’s book makes it an excellent starting point to begin discussing the people-oriented approach.

### People-Oriented Approach

The discourse in Valerie Kuletz’s book, *The Tainted Desert*, was undoubtedly influenced by her background as a sociologist and childhood resident of the China Lake Naval Weapons Center in California’s Mojave Desert. In her preface, Kuletz notes that she was aware of the secret, Cold War-era weapons testing that occurred at the Center, but was entirely unaware of the Indians who claimed that land as their home. Thus, her book emphasizes the hidden stories of the Indians who have been affected by nuclear testing and waste disposal. Openly acknowledging her use of

the core-periphery dichotomy, Kuletz argues that the land which these Indians occupy has become a “zone of sacrifice” for the development of American nuclear technology (Kuletz, 1998, pp. 7–8). These zones and the people in them are often rendered invisible to those living outside. In other words, scientist and government officials have designated significant portions of Indian people’s traditional homeland as a disposable territory that can house the byproducts of American nuclear operations.

According to Kuletz, the American public ignored this systematic marginalization because Indians occupied a different epistemological and ontological zone. She expertly juxtaposes these “ways of knowing” throughout the text, noting that, “For Indians, space here is organized according to these passageways, springs, valleys and mountain peaks... Euroamerican space, on the other hand, is here organized according to a series of highly rationalized, straight, gridlike boundaries imposed from above” (Kuletz, 1998, pp. 126–127). Other scholars have identified similar themes when studying the worldview of non-Western groups. For example, both Kuletz and political scientist E. Robert Statham, who studied the international nuclear waste trade in relation to Micronesian nations, have commented on the “dualistic” nature of Euroamerican ontology. This dualism refers to the belief that humanity is separate from nature—a view that is not espoused by most American Indians or native Micronesians (Statham, 1996). Kuletz also discusses the different systems of classifying cultural heritage and the conflicting cultural priorities of American scientists and Indians. These differences led to significant communication difficulties and a general marginalization of non-Western viewpoints.

To conduct her analysis, Kuletz makes extensive use of oral testimony from Indians, scientists, government officials, and others. She also uses a variety of maps and charts that allow readers to, quite literally, see the contours of nuclear waste disposal on the American landscape. In addition to the use of terminology such as “zones of sacrifice,” the extensive geographic data is a marker of Kuletz’s emphasis on spatial relations (Kuletz, 1998). Her discussion of spatiality makes visible what was previously invisible to those operating within a Euroamerican philosophical viewpoint. This emphasis on seeing what is not meant to be seen and uncovering repressed information is demonstrative of her desire to approach this topic from the perspective of the periphery. She also demonstrates the peripheral nature of her subject’s position by showing the degree to which their epistemologies have been sidelined.

Like Kuletz, ethnic studies scholar Traci Brynne Voyles chooses to investigate the impact of nuclear waste on Indian populations in her book, *Wastelanding*. The book catalogs the development of the uranium mining industry in the land surrounding the Navajo Nation, located in the American Southwest. During the uranium boom of the 1950s, many mining corporations and prospectors began operating in this territory. They employed large numbers of Indian miners in their quest for fissile

material. Over time, the radioactive waste from these mines accumulated in the environment and the bodies of locals. When these mines closed in the 1980s, the mine operators loaded the entire burden of coping with these wastes onto Indian communities. While noting that she is directly building on the framework put forward in *The Tainted Desert*, Voyles explicitly identifies this dynamic as a “clear-cut case of environmental racism” (Voyles, 2015, p. 6). In doing so, Voyles situates her work within the literature on environmental justice. To authors in this field, environmental racism is the process of systematically shifting the burden of environmental pollution and contamination onto racial minorities (Sze, 2007). In this case, the toxic wastes and byproducts from uranium mining were systematically shifted onto members of the Navajo Nation.

Through their focus on American Indians, Kuletz and Voyles touch on several other trends that have been identified by scholars in the field of Native studies. For example, both authors argue that Indian lands were chosen as zones of sacrifice because government decision-makers and the American public—two groups that generally operated within a Euroamerican framework—considered such land, and its people, to be worthless. This view is consistent with the “vanishing Indian” ideology that Philip Deloria identified as one of the key aspects of the agile and ever-changing Euroamerican interpretation of American Indians. This ideology is predicated on the notion that Indians are a disappearing and declining people. It promotes a symbolic version of “Indianness” that is detached from living Indians (Deloria, 1998). The work of Kuletz and Voyles serves as a case study of the temporal and spatial dislocation of Indians in the service of mainstream, Euroamerican ideologies and political interests.

A similar emphasis on spatiality is readily apparent in the work of other people-oriented scholars, such as Kate Brown. In *Plutopia*, Brown argues that the nuclear cities of the Soviet Union and the United States were very similar, despite being located in nations that were ideologically opposed. These superpowers created the twin cities, Richland and Ozersk, to provide utopian lives for those living within them, but did so by creating dystopian environments for the marginalized people that lived outside. Thus, Kate Brown’s study shows how actors in the core of society inscribed race and class onto the landscape. This dynamic is particularly salient in her discussion of the transient laborers who helped build Richland. She describes these laborers, who were generally from minority groups and of lower socioeconomic status, as being spatially segregated and zoned out of the comparative opulence of the nuclear city. Like Kuletz, Brown comments on the “low visibility” of these spatial arrangements (Brown, 2013, pp. 150–155).

The similarities between these two authors go further. Brown also discusses the issue of alternative epistemologies. Specifically, she writes about the informal knowledge of the everyday people who were exposed to radiation in both Russia and the United States. Brown suggests that

many people residing near Richland and the Techa River believe that radioactive waste has poisoned their community and led to generations of poor health outcomes. They hold these beliefs despite the official record and formal science showing that no significant harm has come to them. According to Brown, these insights have been “born of a long, painful examination” of “their own environments and communities up close on a daily basis” (Brown, 2013, p. 203). While the author’s ultimate conclusion—that the nuclear industry was and remains unsafe—challenges the assertions of previous scholars, such as Barton C. Hacker, her spatial argument is consistent with themes elucidated by other people-oriented writers (Hacker, 1987, 1994).<sup>1</sup>

Gabrielle Hecht applies a transnational framework to the people-oriented approach in her book *Being Nuclear*. She argues that the state of being nuclear is a political and cultural construct. Unlike the authors discussed previously, Hecht suggests that the ontological dichotomy between the core and periphery is imbued with an inherent tension. Western policymakers view uranium and radioactive products as exceptional materials that pose a threat to the international community. This viewpoint facilitates international control over nuclear technologies and practices. However, this nuclear exceptionality becomes inconvenient when applied to the marginalized African miners who extract uranium for export. If African nuclear mines are viewed as exceptional places, then post-colonial power dynamics, established notions of racial hierarchy, and cost-saving practices would have to be overturned. Hecht catalogs how Western institutions and African miners have navigated this ontological paradox. She uses the term “nuclearity” to describe the amorphous and changing boundary between “nuclear banality” and nuclear exceptionalism (Hecht, 2012). In the course of her analysis, she implicitly argues that nuclear studies in the past and present have been too focused on the core—Western nuclear technologies—and not enough on the periphery—the African mines that produce radioactive material.

While much of Hecht’s book is related to the global uranium trade—a product that has not yet become waste—the book also discusses the presence of radon in uranium mines. Since this radioactive gas is unwanted and carcinogenic, it can be conceptualized as waste or as an industrial byproduct. Consistent with themes discussed by other people-oriented scholars, Hecht’s analysis reveals that the harm done to African uranium miners by radon was systematically ignored by the scientific establishment and regulatory authorities. For example, while the French atomic energy agency (known as the CEA) conducted extensive radon exposure studies in French mines during the 1950s, they completely

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<sup>1</sup> Barton C. Hacker was a historian hired by a DOE contractor called Reynolds Electrical and Engineering Company, Inc. (REECo) in 1978. He worked on the DOE’s Dosimetry Research Project, which sought to locate and organize records related to human radiation exposure. Although he left REECo in 1986, his work there led to the development of his two voluminous manuscripts on radiological safety in the United States.

ignored exposure data collected in CEA mines in Madagascar. When individuals did raise concerns, they were often ignored or provided with excuses. The author notes that South African regulators used the “short-term employment status and high mobility” of some miners as a reason to ignore their potential exposure (Hecht, 2012, p. 194). Interestingly, Brown showed that authorities in Richland and Ozersk made similar excuses (Brown, 2013).

Later in her book, Hecht analyzes the actions of the International Commission on Radiological Protection (ICPR), which provides governments, companies, and other organizations with guidance on radiation exposure limits and safety standards. According to Hecht, the ICPR encouraged each nation to independently determine the value of human life and the number of resources that regulators and mine operators should expend on safety measures. This policy created a divide between richer and poorer nations and allowed profit-motivated corporations and government officials to exploit miners. Hecht finds that the lives of ethnically African miners were most frequently devalued and marginalized. Furthermore, health agencies and government officials excluded the health problems faced by these devalued miners from scientific studies and monitoring efforts. This state of affairs was brought about by a combination of racism, colonial mindsets, profit motives, and a failure to recognize that uranium mines are nuclear spaces (Hecht, 2012).

### Policy-Oriented Approach

While people-oriented scholars analyze nuclear waste through the lens of disenfranchisement and competing epistemologies, policy-oriented scholars emphasize the political and public elements of nuclear waste’s history. In other words, authors like Kuletz center their analysis in the periphery, but policy-oriented scholars focus on the activities of those at the core of society. The differences between the two camps go further. People-oriented scholars tend to see the history of nuclear waste as a story of the displacement of marginalized people. In contrast, policy-oriented scholars tend to see nuclear waste as a persistent and intractable problem that has frustrated policymakers, local governments, and citizens alike.

These themes are readily apparent in J. Samuel Walker’s book, *The Road to Yucca Mountain*. He traces the political debates that have plagued nuclear regulatory agencies such as the Atomic Energy Commission (AEC), the Department of Energy (DOE), and the Nuclear Regulatory Commission (NRC) since the 1940s. Due to Walker’s position as a historian for the NRC, this focus on government actors is unsurprising. His analysis of these actors shows that many policymakers initially saw nuclear waste as a “solvable problem” in the 1940s and 1950s, even if no solutions were readily apparent at the time. In the eyes of the AEC, the waste produced during this period was limited in quantity and did not pose a significant threat to public health. By the 1960s, scientists and federal regulators recognized that a comprehensive, long-term strategy for nuclear

waste disposal was necessary. Each time a solution was developed and proposed (these solutions ranged from ocean dumping, to geological disposal, to monitored retrievable surface storage), it was typically greeted with immense opposition from the general public, other parts of the government, or the scientific community. Thus, a “solvable problem” became a “huge and ever-increasing problem” (Walker, 2009, pp. 3, 45). By the 1980s, an increasingly negative public perception of nuclear waste, coupled with political and technical setbacks, turned the disposal issue into “a perplexing national problem that was too important to ignore, too controversial to compromise easily, and too complicated to settle conclusively” (Walker, 2009, p. 186).

Importantly, Walker also shows that the barriers to a solution were primarily related to public opinion and politics rather than technological capabilities. He uses congressional records, reports from governmental agencies, scientific literature, and media coverage to show how the public developed an intense fear of radioactive wastes in the 1960s, 70s, and 80s. Public concerns about nuclear fallout in the 1960s, coupled with the rise of the environmental movement, set the stage for intense public scrutiny of nuclear waste disposal practices. Media reports about the harms of nuclear waste and the prevalence of accidents involving radioactive material further inflamed the situation (Walker, 2009). Walker also discusses the discrepancies between the views of regulatory agencies and independent scientific bodies, such as the National Academy of Sciences and the US Geological Survey. He suggests that public debates between scientific experts undermined the decision-making authority of those experts. This caused the discussion to move out of the hands of specialists and into the hands of the public.<sup>2</sup>

In the United States, there has always been some form of dialectic between the government and the governed. However, the early secrecy and complexity of nuclear systems gave technical experts an unusually large degree of influence over government policy in the 1940s and 1950s. Over time, this blanket of secrecy and monopoly on nuclear decision-making decayed (Kevles, 1971; Mahaffey, 2009; Wellerstein, 2008). Thus, an understanding of the transition from expert decision-making to public decision-making is necessary to understand the history of nuclear waste.

This theme is not only central to Walker’s analysis, but also appears in the work of many other policy-oriented scholars. For example, the books *Fuel Cycle to Nowhere*, written by Richard Burleson Stewart and Jane Bloom Stewart, and *America’s Nuclear Wasteland*, written by Max S. Power, also discuss changing political dynamics and the tensions between local decision-makers and federal authorities. Both books argue that everyday American citizens, as well as the local and state governments that represent them, must work together with federal

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<sup>2</sup> In this regard, Walker’s conclusion is similar to the argument made by historian Brian Balogh in his study of commercial nuclear power regulation (Balogh, 1991).

agencies to reach a consensus about nuclear waste disposal. When federal agencies try to act unilaterally, their endeavors typically fail.

The authors of *Fuel Cycle* illustrate this dynamic most clearly when they juxtapose the creation of the Waste Isolation Pilot Plant (WIPP) nuclear repository in New Mexico with the efforts to build the Yucca Mountain Nuclear Waste Repository in Nevada. Believing that WIPP would bring economic gains, local leaders in Carlsbad, New Mexico lobbied to bring the project to their town. When planning for the project began in 1975, federal decision-makers, such as Congress and the DOE, left many of the details about the site's scope, safety standards, and administration relatively nebulous. Over time, federal authorities clarified these gray areas with the assistance of the Environmental Evaluation Group, a branch of the New Mexico Health and Environment Department that provided independent scientific expertise and technical evaluation to federal WIPP planners. Furthermore, New Mexico successfully lobbied for legislation that required federal planners to "consult and cooperate" with the state in matters related to WIPP. In contrast, Congress single-handedly chose Yucca as the site of a new waste repository in 1987. Feeling cut out of the decision-making process, concerned about harming the Las Vegas tourism industry, and resentful of the long history of nuclear testing in the state, Nevadans actively resisted the Yucca Mountain project at nearly every opportunity. This resistance resulted in numerous delays and eventually came to fruition when Obama promised to kill the project in an effort to court Nevadan primary voters in 2008 (R. B. Stewart & Stewart, 2011).

Based on their analysis of these events, the authors of *Fuel Cycle* argue that, "The failure of both the 1982 and 1987 NWPA blueprints [the federal legislation which sought to create Yucca Mountain], which ultimately relied on sheer federal power to force waste facilities on unwilling states, contrasts with the success of the far more flexible and improvisational approach that led to the successful development of WIPP with the eventual assent of New Mexico" (R. B. Stewart & Stewart, 2011, p. 230). They go on to describe the techniques used during the proposition of Yucca Mountain as top-down and authoritarian. Thus, they argue that democratic, publicly engaged, consensus-based decision-making has historically been the only successful approach to the development of nuclear waste policy.

In addition to generally agreeing with the arguments made in *Fuel Cycle* and Walker's book, *Wasteland's* author, Max S. Power, is particularly effective at showing how the debates about nuclear waste entangled science with philosophy and politics. Using case studies from the long history of nuclear waste disposal and clean-up in the United States, the author shows that American citizens have often begun to ask questions such as "how safe is 'safe,'" "how clean is 'clean,'" and "what does a 'successful' clean-up operation achieve?" (Power, 2008, pp. 10–14). According to Power, individuals and communities that perceive



an imminent threat to their own well-being can develop safety standards that are far more stringent than those provided by federal agencies. Therefore, the United States can only overcome the challenges of nuclear waste disposal through sustained citizen engagement, coupled with transparency and openness from the federal government (Power, 2008).

Some policy-oriented scholars have chosen to study nuclear waste outside of the United States. For example, Steven D. Chandler's book, *Radioactive Waste Control and Controversy*, is an extensive history of nuclear waste regulation in the United Kingdom. This work charts the relationships, transformations, and jurisdictions of various regulatory agencies as the nation sought to develop the most efficient and effective system for managing nuclear waste. The book emphasizes the regulator's struggle to adapt to changing scientific knowledge. The author also notes the regulatory changes prompted by the application of nuclear technology to endeavors other than weapon production (Chandler, 1997). Although this work is far more legal and technical than Power's analysis, the books reveal similar themes and trends. For example, both note the role of public opinion in shaping policy, although Chandler places much less emphasis on this aspect of the topic. Both discuss the tensions and jurisdictional disputes between local and national governments. Most notably, both conclude that nuclear waste policy is still an unresolved and contested issue (Chandler, 1997; Power, 2008).

While much of the literature produced by policy-oriented scholars is national in scope, such a large area of analysis is not necessary to conduct this type of history. For example, Chuck Stewart's book, *Hanford's Battle with Nuclear Waste Tank SY-101*, has a much narrower focus. Tank SY-101 served as a repository for a dangerous concoction of sodium hydroxide, nitric acid, organic complexants, and dissolved fission products between the years of 1976 and 1980. At the beginning of the book, the author does an excellent job of cataloging the changes in the plutonium extraction process and showing how those changes affected the chemical composition of the waste produced. The lack of consideration for the composition of previously produced waste resulted in SY-101 containing an unstable mixture of chemical compounds that began to react with each other. When the tank filled, it was sealed and ignored for ten years. In 1990, authorities realized that SY-101 was at risk of detonating due to a buildup of various flammable and explosive chemicals.

In his analysis of the response to this crisis, Stewart frequently notes the importance of public outcry and pressure from local and federal governments in shaping the policy of the DOE and Westinghouse Hanford Company. In the book's conclusion, the author plainly states, "When a big problem gets national notice, the technical scientific side of it becomes much less important than public perception and political power. Unless you play the game in that arena, you will fail" (C. Stewart, 2006, p. 422). These findings are very similar to those of other policy-oriented scholars. Stewart supports his claims with a variety of sources. For example, the

author frequently includes comments from the *Tri-City Herald* to give a sense of the prevailing public opinion. However, the narrative is still written from the perspective of the scientists, engineers, and policymakers involved. This viewpoint is unsurprising, considering that the author worked as a data analyst on the team that handled the SY-101 crisis.

While Stewart uses a policy-oriented approach to study nuclear waste at a very local level, Jacob Hamblin has used the techniques of transnational and diplomatic history to study this issue at the largest scale. Hamblin's book, *Poison in the Well*, discusses the practice of dumping radioactive waste into oceans. This policy was pursued by both the United States and the UK in the 1940s and early 1950s. However, by the beginning of the 1960s, the practice came under widespread international scrutiny. The USSR's search for ammunition with which to criticize its geopolitical adversaries and the growing influence of environmentalism in many Western nations fueled this scrutiny. In this international arena, countries battled fiercely to protect their own interests and promote their international agenda for nuclear waste disposal while at the same time being careful not to offend other nations or their own domestic stakeholders. The author places particular emphasis on the UK's efforts to defend the practice of ocean dumping due to the nation's heavy reliance on that disposal method. On the other hand, the United States was happy to advocate for an end to dumping because it no longer used this disposal technique by the 1970s. Echoing the conclusions reached by Walker, Hamblin writes, "The virulence of the controversy [around waste disposal] resulted from a series of political contests in which the battleground was the opinion of the lay public, at national and international levels. Waste disposal started as a challenging but apparently not insuperable technical problem, but its delayed solution made it atomic energy's Achilles' heel" (Hamblin, 2008b, pp. 4–5).

In his analysis, Hamblin identifies four key themes. Two of these themes are present in much of Hamblin's scholarship. The first is the importance of nuclear waste disposal to developments in Cold War international diplomacy. The second is the impact of nuclear waste disposal practices on broader environmental policy. He concisely summarizes these points in a 2008 article where he writes, "...pro-dumping countries faced tough decisions about how to handle their own policies and public reactions to them. Scientists and politicians in Europe, particularly Britain, struggled to find ways to continue their existing practices while encouraging the belief that these were banned, thus neutralizing the power of environmental political activism" (Hamblin, 2008a).

However, the final two themes precisely align with those developed by other policy-oriented scholars. These themes are the continual debates about the meaning of words like "safe" and "reasonable" in the context of radiation exposure, and debates between groups of scientific experts vying for authority. As noted by authors like Power and

Walker, the degree to which something is safe, or the degree to which risk is reasonable, cannot be solely determined by science. Instead, citizens and decision-makers must use science to inform the philosophical and political discussions that determine the answers to such questions. Yet, a large portion of nuclear research and radioactive waste disposal policy is about establishing tolerable limits or safe levels of exposure. This dynamic naturally leads to partisanship, where different groups strive to promote their own interpretations and interests. This conflict can escalate when scientific experts cannot come to a consensus of their own. In the case of ocean dumping, health physicists saw oceanographers as unwanted interlopers in their area of specialty. Thus, as the authors above have noted, when both scientists and the public draw battle lines, nuclear waste can quickly become an insurmountable and highly political problem.

### Conclusion

When considering the literature on the history of nuclear waste, it is important to remember that this field has only emerged in the last thirty years. Considering that many of the records related to nuclear waste and nuclear facilities were classified until the end of the Cold War, it was nearly impossible to conduct a detailed historical analysis of this issue before the 1990s. Yet, even in this short time, the field appears to have evolved. Some of the earliest pieces of scholarship in this field, such as Michele S. Gerber's *On the Home Front* and Roy E. Gephart's *Hanford: A Conversation About Nuclear Waste and Cleanup*, appear to be more concerned with issues of government secrecy than with public debate or processes of marginalization (Gephart, 2003; Gerber, 1997). Over the last fifteen years, it seems that this branch of scholarship has receded as the people-oriented and policy-oriented approaches have come to dominate the literature.

While this paper differentiates between these methods, their conclusions are not in contradiction with each other. In fact, these bodies of scholarship complement one another. By showing the political nature of debates about nuclear waste, policy-oriented scholars implicitly argue that those without political representation can have nuclear waste forced on them against their will. The people-oriented scholars study those who have been sacrificed by the political dealings and compromises discussed by policy-oriented scholars. Thus, both approaches are valuable when trying to understand the history of nuclear waste and its peculiar material nature.

The unique strengths of the people-oriented approach are worth discussing in greater detail. This branch of scholarship is particularly effective at grappling with the issue of historical agency among marginalized people. During the last thirty years, many scholars that study the history of enslaved people, women, or other groups relegated to the periphery have become more interested in understanding the resistance of these groups and cataloging the ways in which they *were* able to exert influence (Camp, 2004; Hill, 2016; Johnson, 1999). Hecht, Voyles, and

Kuletz all follow this trend and excel at identifying the contours of conflict and resistance between the core and periphery. The tendency to portray marginalized people as active historical actors despite their socioeconomic disenfranchisement is exemplified by Voyles when she discusses mainstream metanarratives of American Indian history:

Native studies scholars are all too familiar with the idea that Native communities are tragically acted upon, with no contingency for resisting the staid teleology of the injustice inhered in progress...it is too easy to presume that history will always (and here we insert the qualifier “unfortunately,” like good nostalgic imperialists) decide in favor of progress. (Voyles, 2015, p. 98)

To learn about the agency of marginalized groups, whose voices are typically absent from the archives, people-oriented scholars must find ways to compensate for the lack of textual records. One commonly used approach is to rely more heavily on oral history and interviews. Historians in other fields have successfully used oral history to fill gaps in documentary evidence and understand historical memory (Allen, 1992; Jones & Osteoid, 1989). However, human memory and perception can change over time. A person’s recollections can be reinterpreted to align with more recent lived experiences and societal discourses (Schacter, 1999). While the reliability of personal memories is sometimes questionable, sources of this kind can become a sturdy plank in an author’s argument when they are placed in conversation with other evidence.<sup>3</sup>

People-oriented scholars’ extensive use of theory also helps guide their works in the absence of extensive documentary evidence. All the people-oriented authors discussed in this essay situate their work within the analytical frameworks of post-colonial studies, environmental justice, postmodern critical theory, and nuclear colonialism.<sup>4</sup> The explicit use of such theory can make the broader moral or philosophical implications of an argument clearer. Work that is structured by theory but avoids the excessive use of theoretical jargon may appeal to lay audiences more than the highly technical and expository writing that is frequently associated with the policy-oriented approach. Brown’s work exemplifies people-oriented scholarship that is highly accessible and clearly conveys the empirical research through the lens of spatial organization and the ideological debates that framed the Cold War.

Conversely, individuals that are very familiar with the organizations and legislation surrounding nuclear waste policy may be more attracted to the work of scholars like Chandler, who does not hesitate to provide detailed descriptions of the interactions between dozens of relatively minor agencies. Such descriptions may be “dry” to lay

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<sup>3</sup> For an example of a scholar that acknowledges the flaws in human memory but still engages with personal narratives and collective historical memory, see Susan M. Reverby’s work on the Tuskegee Syphilis Study (Reverby, 2009).

<sup>4</sup> A discussion of nuclear colonialism and environmental justice can be found in the work of Danielle Endres and Winona LaDuke (Endres, 2009; LaDuke, 1999).

audiences but insightful to current policymakers. Hamblin is perhaps most successful in discussing political maneuvering and changing policy positions without potentially overwhelming non-expert readers. His work expertly comments on the themes associated with the policy-oriented approach while maintaining an accessible, narrative structure.

The issue of accessibility is especially important in this area of research because nuclear waste disposal is an ongoing societal issue. Some of the authors discussed above directly note their work's value to contemporary political discussions. Others are far less forward about the political implications of their findings. However, all these texts can contribute to current debates about nuclear waste disposal policy. An understanding of the history of nuclear waste—as well as the hazards, pitfalls, and challenges previous generations have encountered when seeking to deal with the problem—is essential for any society seeking to tackle the issue in the present.

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