

# Introduction

## ON TELLING IMPOSSIBLE STORIES

Even now, I am tempted to tell you a different story. One about a dry, windswept place called Hanford in eastern Washington State where they used to make plutonium. I would describe the way it smells there (like warm sagebrush and dust) and paint you a picture of aging reactors glinting in the sun. I would tell you that, once upon a time, this was the beating heart of American nuclear weapons production and now it is one of the most contaminated places on Earth.<sup>1</sup> Now it houses the majority of the nation's high-level nuclear waste.<sup>2</sup> Now it is engaged in one of the largest environmental cleanups in human history.<sup>3</sup>

If I told you that story, I would do my best to impress you with the scale of the problem: 56 million gallons of radioactive sludge stored in leaky underground tanks; more than seventy square miles of toxic groundwater; hundreds of contaminated buildings, including nine reactors and five chemical processing plants that dumped about 450 billion gallons of liquid waste directly into the soil.<sup>4</sup> I would mention that even the tumbleweed is radioactive there. So are the coyotes and cliff swallows and rabbits.<sup>5</sup> I would tell you that it is actually someone's job to collect contaminated rabbit droppings and dispose of them in a burial ground on-site.<sup>6</sup>

And I would emphasize the waste's unruliness: how it ignores the No Trespassing signs that mark Hanford's official edges, how it escapes on wind and water currents, stows away in dust devils and groundwater plumes.<sup>7</sup> I would tell you that those plumes flow into the wide, blue Columbia River, which arches around the site for fifty miles, and I would add that this river was once the most radioactive in the world.<sup>8</sup>

I would say all of this in order to make the case for cleanup. That is really the point of the story I am tempted to tell: first to inspire concern about Hanford and its errant wastes, then to offer a solution.

*There is a contaminated place.*

*It is hazardous to human health and the environment.*

*We need to clean it up.*

It's not a hard sell. Even if you hadn't heard of Hanford before you opened this book, you already knew the plot. Maybe you thought about Fukushima as you read. Or the *Exxon Valdez*. Maybe you pictured hazmat suits and birds sticky with oil. I admit, the temptation to tell you a story that you already know has something to do with its familiarity. There is a sure-footed confidence to shared narrative. It can be easier to tell a recognizable tale.

Plus, I've had a lot of practice—I have been telling that story for almost twenty years. First, as a young canvasser going door to door for a political campaign about Hanford's waste and then as a graduate student studying the cultural politics of its cleanup. Later, as a university professor teaching classes about environmental health, and as a member of the Hanford Advisory Board writing policy advice about remediation.<sup>9</sup> That story is woven into the fibers of my personal and professional life. I am invested in it. I care about the people and places within it. I tell it in order to advocate for a more just future.

And yet. For most of the nearly two decades that I have been telling that story, I have struggled with a sense of duplicity. It's not that the story is untrue, per se, it's just not . . . enough. It is guilty of critical omissions and, as its narrator, I am complicit in those erasures.

First, and most fundamentally, for example, Hanford will never be cleaned up, if by clean we mean free of its waste. In fact, when remediation

is officially complete many years from now, the majority of Hanford's waste will remain on-site.<sup>10</sup> There will still be plutonium in the soil and carcinogens in the groundwater. There may still be radioactive rabbits hopping around.

The word *remediation* derives from *remedy*, meaning to heal or to cure.<sup>11</sup> But the only absolute cure for Hanford's contamination is time. It will take hundreds of thousands of years for its radioactive light to go out.<sup>12</sup> You can't destroy plutonium or dilute it until it ceases to be dangerous. Even small particles of it, taking flight on the wind and landing in a lung, can cause cancer.<sup>13</sup> Cleanup does not attempt to eliminate such particles altogether, for that is not possible. Instead, it promises to monitor and contain these and other toxic materials for a "reasonable" amount of time (according to federal regulations, that period ranges from one to ten thousand years).<sup>14</sup>

Second, cleanup-as-containment does not necessarily mean building physical barriers around Hanford's waste or separating it from the environment. Although some remedies involve material interventions (i.e., removing contaminated soil from one area of the site and reburying it in another, more secure, area of the site), others employ "nonengineered instruments" known as "institutional controls."<sup>15</sup> No Trespassing signs are institutional controls. So are land use designations that determine what kinds of activities may occur on-site.<sup>16</sup> Institutional controls, in other words, often manage humans rather than waste.

Third, clean does not mean uncontaminated in U.S. environmental policy. Instead, places like Hanford are considered remediated when they can demonstrate an "acceptable risk" of exposure-related cancer among the imagined communities that may live, work, and/or spend time there in the future.<sup>17</sup> Clean, therefore, is not defined by the *absence* of waste, but by the *relationship* between waste and the body. Remediation measures and manages that relationship—titrating environmental contamination with probabilistic human activity in order to achieve legally compliant levels of disease.<sup>18</sup>

That temptingly simple version of the story I have been telling for years fails to address these conditions of possibility. Quite the opposite: it frames cleanup as a neutralizing force, implying that one day there will be an "after" to atomic violence. That story does not explain how (some)

injury and death is built into cleanup's very logic—how, from a policy perspective, safe is synonymous with reasonable harm.

This basic problem—how to talk about Hanford—has long been a source of tension in my work. As an academic, I find it useful to break the story down and consider its parts, exploring its embedded assumptions.

*There is a contaminated place.*

What do we mean by *contaminated*? How should we understand this consequential category in a world saturated with industrial carcinogens and structural inequalities that amplify their effects? What situated histories have produced both the materials themselves and their entangled forms of reckoning?

*It is hazardous to human health and the environment.*

What do we mean by *hazardous* and, for that matter, *health*, on an unevenly contaminated planet? What specific bodies, environments, and rationalities have come to define those terms, and what is it like to live their definitions?

*We need to clean it up.*

What do we mean by *cleanup*, and how is that meaning informed by our answers to the preceding questions? In other words, how does remediation reflect the powerful social relations of contamination, health, and hazard?

*Unmaking the Bomb* investigates these politics of impact and remedy in the atomic age. It explores how frames like exposure and protection, risk and cancer, reason and practicability recognize (and fail to recognize) contaminated life. And in considering how such forms of recognition have come to be, it asks how they could be otherwise.

So too, this book represents an ongoing effort to understand my own relationship with risk and remediation. In writing this introduction, for example, I went in search of the old research notebooks that I had saved from my master's thesis. The younger self I found in those pages posed

eager and impatient questions, determined to identify *the* answer to Hanford's nuclear waste problem. One set of notes from 2005 described a moment in a public meeting when I strode up to the microphone and demanded that Washington's Department of Ecology director remediate Hanford *immediately* (my notes include the phrase, "I gave him hell.").

Reading this description today makes me blush, but I am touched by it as well. One of the gifts that comes with long-term research in a particular place is that field notes and free-writes, old calendars and interview transcripts, represent more than a record of research practice and developing ideas. They also illustrate the complex processes and relations of becoming with that place through time. *Unmaking the Bomb* is informed by my efforts to grapple with Hanford's power-laden logics, my struggle to negotiate the boundaries between research and activism, and my need to reckon with the conditions of living and dying in the nuclear era. In many ways, therefore, this book tells a personal story that weaves Hanford's histories together with my own.

I have grown up with Hanford in ways that I could not have imagined when I started this project. Since that time, every member of my immediate family has gotten cancer, and both of my parents have died of it. My father was diagnosed at age fifty-five (and died the same year), soon after I began canvassing door to door about Hanford in 2004. My mother was diagnosed at sixty, while I was completing dissertation fieldwork about cleanup in 2012. I was diagnosed at thirty-three in 2014, just weeks after my mother passed away. I spent my final year of graduate school writing my dissertation and applying for professorships, in addition to completing five months of chemotherapy and two major surgeries that removed my breasts, ovaries, fallopian tubes, and a handful of lymph nodes. My sister was diagnosed at age thirty-one, a few weeks before I finished my PhD. We went to her first oncology appointment together, the morning after I graduated. She was diagnosed again four years later and successfully completed treatment for a second time, as I was finishing the first draft of this book.

I include this personal context because my family's experience with cancer has informed how I think about Hanford, the nuclear industrial complex, and the daily politics of toxicity. It matters that the research and writing for this book took place between doctor's appointments, surgeries, chemotherapy infusions, and funerals for two of the people that I loved

most. It matters that I read studies about nuclear fallout while waiting for biopsy results and that I traced the history of U.S. toxics policy while leaden with grief. It matters that my research files contain declassified maps of contamination in the communities surrounding Hanford, and that those maps include my mother's hometown.<sup>19</sup> It matters that I want to know what caused my family's cancer. And it matters that I will never be able to fully answer that question.

For although most environmental quality standards are based on statistical models of carcinogenic hazard, it is nearly impossible to identify when an individual instance of cancer results from daily life in a contaminated environment. Cancer remains the primary risk factor driving environmental legislation in the United States—it is used to establish baselines for acceptable toxicity concentrations in air, water, soil, vegetation, and bodies and to determine if those contaminants have exceeded permissible limits. More than any other, this disease has informed the categories we use to define and regulate environmental health, from air pollution in Los Angeles to nuclear waste at Hanford.<sup>20</sup> However, when cancer shape-shifts from a risk metric into a living and dying body, its origin story becomes largely unrecognizable.

Instead, individuals with cancer are left to wonder how they could possibly have gotten it. Causation is often framed as a personal failure: the unfortunate and even embarrassing result of poor diet, not enough exercise, too much stress, and so on. I remember feeling this acutely one day when a friend who had learned about my family's history said to me, "Jeez, what have you guys been doing wrong?"

As anthropologist Lochlann Jain argues, even beribboned campaigns that raise awareness and celebrate survivors often narrate cancer through individual struggle and personal accomplishment instead of potential links with environmental exposure. "Cancer becomes a passively occurring hurdle to be surmounted by resolve," they write, "rather than the direct result of a violent environment."<sup>21</sup> Ironically, efforts to mitigate such violence through regulation and remediation often reiterate this disconnect even as they seek to resolve it. This and other paradoxes integral to environmental cleanup are at the heart of this book.

As difficult as it is to admit to my younger self, I do not attempt to solve Hanford's nuclear waste problems here (at least, not in the totalizing

way I once imagined). In fact, much of my research explores the structural impossibilities of doing that very thing. Instead, I position ambiguity and contradiction as avenues for critical discussion, rather than as roadblocks to it. I suggest that uncertainty is more than an absence of knowledge, and I attend to the social relations of not knowing.<sup>22</sup> Finally, I make the case that improving the terms of cleanup means taking impossibility seriously—asking seemingly basic questions like these: How can we regulate a waste form that will long outlast the United States and its regulatory structures? Whom does reasonable exposure protect, and whom does it harm? What does it mean to safeguard individual bodies with regulations that only envision disembodied statistical aggregates? And how have politically and economically tenable solutions come to define the problems of nuclear cleanup and safety?<sup>23</sup>

When writing this book I had the opportunity to interview the former Department of Ecology director whom I “gave hell” in 2005. We had a nice conversation. He was generous and helpful, offering suggestions when I complained about the narrative challenges that Hanford presents. “Here’s what I think you should write about,” he told me. “This [nuclear cleanup] is not only a test of the United States, this is a test of our species. The genie is out of the bottle, and there’s no putting the genie back in. Well,” he paused and pointed to an old picture of Hanford on the table between us, “this is the legacy of that genie. This is a test of our society. Are we really willing to do what it takes to remedy this situation?”<sup>24</sup>

His question has stayed with me. In fact, since then I have noticed it being asked frequently, albeit in different forms. It emerges when Hanford managers describe political gridlock and budgetary constraints, and when community organizers advocate for better waste treatment protocols. Indeed, in many ways, “Are we willing to do what it takes?” is a very practical question. It invites iterations: How much money is required to make this project work? What kind of regulations would be necessary? Do “we” as individuals, nations, and communities have the resources to make cleanup happen?

However, such questions also imply that the bomb can, in fact, be unmade—that if only there were bigger budgets, better technologies, and greater public interest, this situation could be remedied. Yet these same people also recognize the regulatory impossibilities of nuclear waste. They

acknowledge that the genie has already left the bottle and there is no putting it back.<sup>25</sup>

To be clear, when I say impossible, I mean both the material challenges of Hanford's cleanup as well as the normative stories we tell about it. I mean that multimillennial waste will inevitably exceed its physical and institutional containers, and that administering eternity has unthinkable, science-fiction-like qualities.<sup>26</sup> But I also mean the powerful conditions and contexts that define unthinkability itself. I mean the social politics that designate some impacts as reasonable and others as inconceivable, allowing cleanup to distribute survival unevenly.<sup>27</sup> By impossible, therefore, I mean both the concrete and constructed realities of contaminated life and the oft-blurred boundaries between the two.

Also, when I say we need to take impossibility seriously, I am not making a case for inaction. On the contrary, I see equitable, long-term waste management as essential to a socially and environmentally just future at Hanford. Instead, I argue that improving the terms of cleanup means asking better questions. Rather than "Are we willing to do what it takes?," we should be asking: What are the politics of our actions? What are the conditions in which remediation is designed, embodied, enacted, and understood? What infrastructures give these actions power, and what does this tell us about our capacity to create positive change? For that matter, what would positive change look like? Positive for whom? Unmaking the bomb requires much broader forms of critical engagement. It insists that we reckon with the very meaning of nuclear impact while acknowledging that its unmaking will never be complete.<sup>28</sup>

One of the distinct challenges I have found in narrating Hanford is learning to think with and against its epistemic frames.<sup>29</sup> Toxicity, for example, is the product of economic, technoscientific, and regulatory practices that have made some environmental exposures perceptible and many others imperceptible in the name of industrial development.<sup>30</sup> As historian Evan Hepler-Smith argues, even the molecular structures that inform U.S. toxics policy were originally designed to facilitate industrial chemical production and its bureaucracies.<sup>31</sup>

At the same time, toxicity is also the product of community organizing and knowledge making that reimagines such logics in the service of social and environmental justice. Some of these efforts leverage the same molecular bureaucracies to resist their structural invisibilities, documenting

toxic residues that would otherwise remain unmeasured and unseen.<sup>32</sup> Others look beyond the molecular to consider how toxicity “functions as a proxy for a range of cultural, economic, or infrastructural instabilities that are, indeed, something ‘toxic’ but are far more complicated and difficult to identify.”<sup>33</sup>

Perhaps most importantly, toxicity is produced in and through the impossibility of its absence. There is no outside to industrial production and its inequitable body burdens.<sup>34</sup> Nuclear waste is thus inseparable from social formations of race, indigeneity, gender, class, disability, and others. Indeed, as historian M. Murphy writes, the body itself represents “a collective binding of profoundly uneven relations of porosity to exposure: my vulnerability to injury is entangled with your comfort. The side effect accompanies the treatment. I am kept alive even as I am being killed.”<sup>35</sup> *Unmaking the Bomb* thinks with and against cleanup as a distinct form of toxic embodiment. And in engaging the impossible stories of nuclear waste, it offers an incomplete remedy.

When I introduce Hanford as a topic in my classes, I often begin by asking students to close their eyes and picture the bomb. They sit for a few moments, noting the first image that comes to mind, and then draw it on a piece of paper. Next, I invite them to hold up their drawings, look around the room, and consider their classmates’ nuclear imaginations. Invariably, as they twist their heads and scan one another’s sketches, the space fills with soft murmuring and scattered laughter. It is the sound of dawning recognition: almost all of them have drawn the same thing.

It’s no accident, of course, that my students see mushroom clouds when I ask them to picture the bomb. Atomic weapons promise protection by threatening catastrophe, envisioning a devastation so great as to make war unthinkable. As historian Paul Edwards argues, in Cold War geopolitics, simulated disaster “became more real than the reality itself, as nuclear standoff evolved into an entirely abstract war of position. Simulations—computer models, war games, statistical analyses, discourses of nuclear strategy—had, in an important sense, more political significance than the weapons that could not be used.”<sup>36</sup>

Imagining the mushroom cloud, therefore, was essential to the bomb’s very utility. Its roiling, top-heavy form represented the ever-present potential for destruction, a haunting vision of what could be. Americans learned