

THE UNIVERSITY OF CHICAGO

DOMESTICATING UNCERTAINTY: THE NUCLEAR AFTERLIVES OF THREE MILE  
ISLAND

A DISSERTATION SUBMITTED TO  
THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES  
IN CANDIDACY FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

DEPARTMENT OF COMPARATIVE HUMAN DEVELOPMENT

BY

STEPHANIE L. PALAZZO

CHICAGO, ILLINOIS

JUNE 2023

Copyright © 2023 by Stephanie L. Palazzo

All Rights Reserved.

## Table of Contents

<i>List of Images</i> .....	iv
<i>List of Figures</i> .....	v
<i>Acknowledgements</i> .....	vi
<i>Notes on Terms and Quotations:</i> .....	ix
INTRODUCTION: ISLANDS, CLOSURES, AND CONTAINMENT .....	1
<b>PART I: HOST COMMUNITY</b>	
CHAPTER 1: FUTURE PROMISED.....	44
<i>Interlude: Under the Willow</i> .....	90
CHAPTER 2: FANTASIES OF SAFETY .....	94
<b>PART II: TMI BODIES</b>	
<i>Interlude: Boundaries on the Homestead</i> .....	134
CHAPTER 3: OCCUPATIONAL INTIMACY.....	139
<i>Interlude: 4 a.m.</i> .....	171
CHAPTER 4: EMBODYING DOSE .....	174
<i>Interlude: Nava To'i Jiya</i> .....	210
CHAPTER 5: MUTATED FUTURES .....	212
EPILOGUE: BEYOND CLOSURE.....	250
<i>References</i> .....	263

## List of Images

Image 1: Downstream from Three Mile Island.....	1
Image 2: Three Mile Island in 1964.....	7
Image 3: Two people enjoying lunch by the Susquehanna River.....	9
Image 4: Three Mile Island surrounded by cornfields.....	9
Image 5: “TMI Stories” clipping from Middletown's local newspaper .....	17
Image 6: The main intersection of the town Goldsboro. ....	18
Image 7: Former TMI Visitor's Center. ....	46
Image 8: A PEMA evacuation center at Hershey Stadium. ....	69
Image 9: NRC Decommissioning Program Brochure. ....	80
Image 10: Mary and George's willow tree.....	91
Image 11: The rear view from George and Mary’s barn. ....	92
Image 12: The Middletown Public Library.. ....	97
Image 13: A park in Middletown.....	103
Image 14: A former Middletown mansion.....	105
Image 15: Exelon Emergency Planning Safety Brochure.....	110
Image 16: Map of the flood zones.. ....	119
Image 17: The children’s section at the Middletown Public Library. ....	129
Image 18: Front- and backside of the simulated uranium pellet card.....	164
Image 19: Completed Card for the Baby Teeth Survey.....	231
Image 20: Two children who donated to the Baby Teeth Survey.....	232
Image 21: The cover of May 1979 <i>LIFE</i> Magazine. ....	256

## List of Figures

Figure 1: Strontium-90 levels in baby teeth from 1951 to 1954.....	233
--	-----

## **Acknowledgements**

This dissertation is the result of four years of working, thinking, and living alongside Three Mile Island Nuclear Power Plant. First and foremost, I would like to express my deep appreciation to my interlocutors, particularly those in central Pennsylvania. While I will not mention their names to maintain their confidentiality, I am deeply grateful for their generosity, care, and patience over the years.

This project has been enriched theoretically and methodologically by the support and input of my committee chair, Eugene Raikhel, and committee: Kate Brown, Michele Friedner, Joseph Masco, and Hilary Strang. Eugene graciously took me on as a student at a moment when I very much doubted my dream of getting a PhD and created a wonderful community through his lab, workshop, and classes that restored my faith in myself and this endeavor. Kate has been my wonderful “outside reader,” that I put in quotes here because there’s very little “outside” that describes her contributions to this work; her empathetic writing, rigorous pursuit of answers, and generous mentorship have been an ever-present source of inspiration throughout this project. Michele has always kept me accountable to my ethnographic material, providing incisive feedback and comments; I always left our meetings inspired, energized, and capable. Joe has been central to conceptualizing the theoretical framework for this project; his writing, workshop, and classes have provided a constant source of inspiration and a new way of thinking about the world through ethnography. Hilary has kept me centered on the questions and politics that made me pursue this field site in the first place, and our conversations over the years have inspired many of the overarching arguments of this manuscript.

This research was generously funded by the Wenner Gren Foundation.

Many people have discussed this project with and offered crucial feedback at its various stages, including Chloe Ahmann, Sean Brotherton, Summerson Carr, Aaron Datesman, Judith Farquhar, Scott Kemp, Mary X. Mitchell, James Strick, and Natasha Zaretsky.

My intrepid undergraduate mentor, Misty Bastian, opened my eyes to the world of anthropology while I was set on studying psychology and philosophy. Her red pen taught me how to write, and her intellect has a way of expanding the world. She has provided feedback on this project in its various stages, warm mentorship, and plenty of breakfast dates.

My dear friend, Peggy O'Donnell Heffington, read drafts of chapters, grants, fieldnotes, and everything in between. And although she has always treated me more like a peer, she has been a role model for me in her writing, thinking, and living.

This dissertation benefitted tremendously from the collegiality and friendship of my peers, who have read drafts, offered feedback, and provided much needed support and laughter through this process: Andrea Ford, Rachel Howard, Briel Kobak, Hiroko Kumaki, Paula Martin, Megan MacGregor, Judith Stapleton, Shruti Vaidya, and Emily Wilson. In the final year of writing, Talia Gordon held me accountable in our monthly meetings and their incisive intellect and eye for syntax have consistently elevated my writing and thinking.

Finally, a warm thanks to Janice Pavel for her generosity and support in managing the logistics of the dissertation.

As someone who wrote about home from home, I have been exceedingly lucky in the people who make up that feeling. Tommy Bergstrom has offered an abundance of laughter, encouragement, celebration, commiseration, and friendship and given me the faith in myself to “just do it.” My parents, Rick and Lynne Palazzo, have supported me in every step of this process and the journey to get here. More than anyone else, my mom has faithfully and eagerly

read every chapter draft, talked at length about this work with me, and cheered me along as my biggest fan. My sometimes-anxious, always loving dog, Alli, has taught me to slow down and see the world and is perhaps the best couch-coworker I could ask for. My wonderful husband Tom, there are no words for the support, joy, and love you offer each day. Thank you for building me a desk, reading little bits of paragraphs and chapters, listening to me ruminate aloud about this manuscript's key problematics, giving me space to sink into my writing holes, and making the many cappuccinos that fueled this dissertation. To the soon-to-be fourth member of our little family, thank you for giving me the courage to finish.

## Notes on Terms and Quotations:

Throughout the dissertation, I use the term “accident” to describe the sequence of mechanical and human errors that resulted in the loss of coolant at Three Mile Island Nuclear Power Plant (TMI) on March 28, 1979. I do so namely because this is how my interlocutors, as well as local and national sources, refer to it. It is also sometimes referred to as a “partial meltdown” by nuclear experts. It was rarely ever referred to as a disaster in the ways that people often use to describe Chernobyl or Fukushima, for example.

“Accident” is a contentious term and one I did not settle on lightly. Referring to the sequence of failures that occurred on March 28, 1979 as an accident risks obscuring the very real ways that TMI has caused harm and, therefore, precluding the industry or the NRC from blame. Former head of the Union of Concerned Scientists, Daniel Ford argues that “Given the regulatory lapses leading up to the accident, and the extensive warnings about the plant’s safety weaknesses that had long been available to federal officials, there is some question whether the event at Three Mile Island should, in a strict sense, be called an ‘accident’” (1982b, 15). Ford is challenging the use of the conventional understanding of the term accident as unintended harm by pointing to the active negligence pervading the industry at the time. While this is partially true, I also believe that “accident” as a bounded event downplays the ongoing impact of TMI historically, socially, and materially on the local area. With those caveats in mind, I have chosen to use “accident” as an emic term.

Throughout the manuscript, I use italics to indicate non-audio recorded speech and quotations to indicate audio recorded speech. Other times, I use italics without a speaker to refer to a collective statement that was said often by many interlocutors (Stewart 1996). I do not intend for this to be confusing to readers, but as a way of representing my interlocutors

accurately. Although I always took fieldnotes as soon after a meeting or occurrence as possible, I wanted a way to distinguish this form of recording speech from more literal forms of audio- (and sometimes video-) recordings of more structured interviews.

## Introduction: Islands, Closures, and Containment



*Image 1: Downstream from Three Mile Island on the day it began its decommissioning. Photo taken by author.*

### An Island

No one really knows how many islands the 450-mile-long Susquehanna River cradles. They grow, and they disappear. One north of Harrisburg grew from one acre to twenty over the course of a century. Others fall victim to the floods and erosion that sweep their banks giving the river its brown hue and characteristically muddy water.<sup>1</sup> Traveling from New York to Maryland, the river is ancient but ever-changing. It is geologically considered one of the oldest in the world,

---

<sup>1</sup> The name Susquehanna is thought to come from the Lenape (Delaware) word *siskëwahane* meaning "Muddy River."

predating the Appalachian Mountains and even, according to some geologists, the Nile, Colorado, and Ganges Rivers. Today, the islands play a critical role in catching sediment from upstream before it runs into the Chesapeake Bay, the largest estuary in the US and the source of drinking water for 18 million people (Stranahan 1993).

Perhaps the best known island dotting the Susquehanna is Three Mile Island Nuclear Power Plant (TMI). In 1966, MetEd announced the building of Three Mile Island in Middletown, Pennsylvania as part of the nationwide investment in President Eisenhower's "Atoms for Peace" program that domesticated the wartime nuclear technology to power the future. Residents largely welcomed the plant at the time as a source of employment, tax revenue, low-cost electricity, and clean energy. The nuclear industry's domestication, however, was challenged on March 28, 1979, when TMI's Unit 2 reactor suffered a catastrophic loss of coolant, resulting in America's most publicized nuclear accident. Through a series of mechanical and human errors, the plant's pilot relief valve had been open for hours before the control room could correctly diagnose the problem; in that time, precious cooling water had boiled and escaped as steam, leaving the reactor dangerously exposed.

Stories and photographs spread of evacuation, mutated cows, dead birds, tree blights, as well as increased incidents of thyroid cancers and symptoms, such as metallic taste and skin burns, and prompted a whirl of panic that the radiation exposure was neither insignificant nor fleeting, despite government reports that the dosage was equivalent to a chest X-ray (NRC TMI Backgrounder; Goldhaber et al. 1983). The plant's partial nuclear meltdown and its aftermath catalyzed local and national change. On the local level, it spurred a suspicion of government information, prodded self-described "reluctant activists" to mobilize grassroots antinuclear efforts in their small, conservative towns, and politicized everyday life (Zaretsky 2018). On the

national level, it exposed fault lines in the “atoms for peace” program and led to new federal safety regulations and the creation of independent nuclear regulatory bodies. Forty years later, the conventional understanding of the accident in the Susquehanna Valley and US broadly is that it was successfully contained (J. S. Walker 2005).

On September 20, 2019, TMI Unit 1 began its sixty-year decommissioning. Through a process known as SAFSTOR (SAFE STORAGE), spent fuel—used uranium 235—will move from forty feet deep pools to dry storage casks, until finally being transported to a low-level waste site. Decommissioning, like the efforts after the accident, hinges on strategies of containment. When the process is complete, the Nuclear Regulatory Commission (NRC) promises that the land will return to its natural, pristine state—free of the iconic midcentury infrastructure and radioactive waste. If “Atoms for Peace” promised the future, the US’s project to decommission roughly twenty plants over the course of the next half century promises a return to a past unadulterated by scientific progress’s failures. Yet as a process that outlives its stakeholders and attempts to contain radioactive materials that produce isotopes with half-lives of hundreds to thousands of years, decommissioning raises the question of whether TMI can ever really close and what such a closure looks like.

Nuclear technology is built on the paradox of its own containment—the belief that the inherently unstable chemical reaction that generated blasts that were seen and felt from miles away and produced fallout that spread across the globe could be harnessed not only for war, but also for peace. *Domesticating Uncertainty*, in part, follows attempts to “contain” TMI, the affects that containment generates, and the ways in which nuclear technology fundamentally resists it. Containment took numerous forms: The material infrastructure meant to contain radiation; industry and government narratives promoting nuclear energy as a fully domesticated technology

divested of the violence of its wartime ancestor; the public health studies and statistics published after the accident that foreclosed the possibility of radiogenic injury; the promise of the plant's closing itself as a realistic goal; and, even, residents' attempts to bracket TMI's possible harm to the past or offer an optimistic retelling of it in the face of an uncertain future. The TMI accident showcased on a national and local scale the fallacy of containment; "yet even as fiction," historian Kate Brown reminds readers, "borders have their uses" (2013, 337). Containment makes people feel safe, even as an illusion.

The Susquehanna River wraps around the plant and acts as a natural coolant, and it makes visible the paradoxes of containment that my interlocutors encounter. Like the dangers of the river itself, people did not talk about TMI too often after the accident. Although the accident raised concerns about TMI, for most of my interlocutors the plant quickly *faded into the background*. In their claims that the accident had been contained, the industry and the government recuperated TMI as a safe neighbor for residents to continue living alongside (see J. S. Walker 2005). While for some people who I discuss in this dissertation the accident became a life- and body-altering event that transformed their relationship to the government, the industry, and the Susquehanna Valley, for most people the lack of epidemiological evidence meant that it became easier to dismiss the whole incident in confusion.

Yet even if some of my interlocutors claimed that *they never really thought about TMI*, it still occupied a particular place in the social imaginary of the Susquehanna Valley. Some residents would complain about the water. *Not even my cat will drink it*, one of the Middletown Public Library regulars told me, *so I figured why would I?* Another interlocutor, Jeannie, who you meet in Chapter 2, stopped swimming in the river and creeks after her goldfish died when she refilled its tank the week of the accident. Like other industrial sites, TMI's cooling source,

the Susquehanna River, became a quiet matter of concern regarding whether the plant's harmful materials could be contained to that three-mile swath of land in the middle of the river. And indeed, the day after the accident, MetEd received permission from the NRC to quietly dump 400,000 gallons of "slightly radioactive water" into the Susquehanna River (Kemeny Commission, 114-115). But if the river makes visible the anxieties around TMI, it also highlights the suspension of fears and an underlying fascination with the storied plant. People drive their boats up to get a better look at the plant, or simply to fish alongside it. At the recreational river access, I would see people swimming and wading along the rocky shore with the plant just a few meters away. TMI had created an interstitial space between the ordinary and the unthinkable, between the familiar and the strange.

This ethnography is concerned with this interstitial space, in which neat and tidy boundaries collapse and the ways in which people come to feel at home with the strange-making power of nuclear technology. While one way to write about TMI would be to show the cleavage between the pro- and anti-nuclear camps that emerged after the accident in a predominantly religiously, politically, and culturally conservative area (Hutner 2022; Mitchell 2021), here I highlight instead that for most people living alongside an infamous and now decommissioning nuclear power plant, the experience is not so categorical nor straightforward. Focusing on just the accident or just decommissioning risks reducing the plant's complicated history to a series of "events" in ways that reproduce logics of containment and obscure the plant's ongoing material and social impact on the area.

TMI was not the first nor the last nuclear site that utilized the muddy waters of the Susquehanna to cool its uranium fuel. In 1947, a New Jersey-based company manufactured radium in the north branch of the river near Bloomsburg, upstream from TMI. The company

poured its radioactive waste into a dry well on site with steel culvert pipes pierced into the riverbank that poured this waste into the Susquehanna River itself (Stranahan 1993). A decade or so later, construction began in earnest on TMI, as well as Peach Bottom Atomic Power Station and the Susquehanna Steam Electric Station. In total, these plants house seven reactors, half of them currently in operation. Only the Mississippi River has more nuclear power plants, and it is five times longer (Stranahan 1993).

TMI's name is one part location, one part myth. Some residents say its name is because it is three miles from Middletown's center. Others say that it is three miles from Harrisburg International Airport, which has nine gates and a Starbucks, and where Air Force One occasionally practices emergency landings. A local historian, Louis Waddell, has claimed it was christened when a 1963 government aerial survey incorrectly measured the 2.2-mile-long swath of land (Brubaker 2019). Before it was named and determined an ideal site for a nuclear power plant, it was part of a 4,000-acre estate inherited by Hannah Cookson from her late father in 1760. A native of Lancaster County, Cookson lent out the land and its banks to be farmed and fished. York Haven Water and Power Company—later known as MetEd—purchased the island along with several others in 1904 (*The Sunday News* 1968). But before the island had become something to be bought and sold, the Susquehannock tribe used it as a resting point between the east and west bank of the river (Stranahan 1993). When the company began construction on the plant in 1966, it was a well-known site for residents to canoe out to find arrowheads, pottery shards, and other artifacts.



Image 2: Three Mile Island in 1964 before the construction of the plant. Photo courtesy of Middletown Public Library.

Met-Ed adapted the island's newly christened name for their power plant, and fittingly for an industry touting its containment of notoriously diffuse radioactive materials, the name itself acts as a container—as if the plant only existed within that three-mile stretch of land. Yet, as the fluid boundary of the Susquehanna River itself embodies, TMI's material and psychosocial reach extends beyond these neat boundaries and leaks into the bodies, landscapes, and imaginaries making up the Susquehanna Valley.

The river is the lifeblood of the area, and I start with it to explain my fieldsite because, as a central landmark and source of life, industry, and recreation, it has historically drawn people to the area. People boat and fish on its waters, which support the iconic rolling farmland immediately neighboring the plant and farther downstream in Lancaster County, the state's leading agricultural source. Historically, the river drew German and Scotch-Irish settlers to the area in the 18<sup>th</sup> Century, who chose to settle on its banks and farm the rich soil it supported. In

the 19<sup>th</sup> and 20<sup>th</sup> century the river attracted industries from steel to coal to nuclear to waste management that not only relied on its waters for energy production, but in acts of dumping, heating, and polluting, have changed them. Today, the river's water temperatures have risen, changing its marine life habitat (Mangan 2012).

The Susquehanna is also, in part, what drew me back to the area. I grew up in a farming-centered small town five miles from its banks and just over ten miles from TMI—just far enough that my family never received the TMI emergency evacuation information packets or the potassium iodine tablets that my interlocutors threw out, kept buried in the bottom of junk drawers, or taped inside their kitchen cabinets. As a PhD student, I learned of TMI's decommissioning in 2019, and the river's volatility only amplified for me the area's vulnerabilities and entanglements. Although friends would take boats out to swim and fish, I grew up learning that the river was dangerous. Its muddy waters were polluted and dirty, but also unpredictable. People drowned in its undercurrents. And it was notoriously prone to flooding, leaving the toxic waste sites dotting and bordering its shores vulnerable to its changing water levels. Why weren't people more concerned that this volatile river—that provides drinking water to millions of residents along its banks in New York, Pennsylvania, and Maryland—is also home to one of America's most infamous nuclear power plants quietly undergoing its 60-year decommissioning? How is a commitment to containment maintained in a world of multivariant, diffuse, and ongoing risk? What myths, ideologies, or cultural narratives do presumptions of containment rely upon for its possibility in the social imaginary? What does containment preempt attention away from, and what affects does it generate?



*Image 3: Two people enjoying lunch at one of the recreational river parks. Photo taken by author.*



*Image 4: A photo of Three Mile Island surrounded by cornfields. Photo taken by author.*

TMI's towers fade into the background of an otherwise remarkably ordinary and rural area. Its residents are predominantly white, middle- and working-class and have lived here for most of their lives, or left only briefly. The majority of people have high school or associate's degrees and hold jobs in manufacturing and medical or government administration (US Census 2017). On Sundays, a large proportion of them go to one of the dozens of churches in the area. Just a mile down the road from the plant, there is a farm stand, a few churches, a public golf course, and, just past the plant's access bridge, recreational river access. A small cluster of thirty-five ranch-style houses sits directly across the street, all built in the mid-1970s to provide plant employees easy access to work. Farther upstream, Middletown's center boasts Penn State University's satellite campus, partially built on the site of steel magnates' torn down mansions. Its main streets are dotted with colonial- and Victorian-style houses, boxy municipal buildings, the public library, bars and restaurants, and one coffee shop, The Nuclear Bean. Another social scientist researcher who I talked to during my fieldwork was stunned and horrified that the town would name their only coffee shop after the legacy of TMI. She told me she once confronted the barista and demanded to know who chose the name. But I always felt like the Nuclear Bean, where I conducted some interviews for this project, encapsulated the ambivalent and multivalent nature of how some people understand and experience living in the shadow of the most infamous plant in the country.

Through this lens of my interlocutors' everyday and the ordinary as a site of cultural politics (Das 2007; Stewart 1996; Lambek 2010; Wool 2015), *Domesticating Uncertainty* analyzes the rise and fall of the promise of the US nuclear industry as it is typified through the life cycle of Three Mile Island Nuclear Power Plant. I document how residents hosting the midcentury future-building projects of the US nuclear industry attempt to live safely, even

optimistically, alongside it in its present aftermath. Rather than interpreting decommissioning or the 1979 accident as bounded events, I track the “afterlives” of TMI, its ongoing material and affective impact on everyday life even as the plant begins its deconstruction. More than a formal act of unbuilding then, my research understands nuclear decommissioning as a social process with national, environmental, and bodily consequences that generate seemingly contradictory affective attachments to industries that harm. More specifically, I argue that it is not only through modes of containment that people come to feel safe living in the shadow of an infamous nuclear power plant. It is also through the inherently boundary-transgressive process of domestication that enables people to *feel at home* with nuclear power’s strange-making qualities in ways that preempt attention away from the technology’s instability and uncertainty. The technoscientific process of domestication envisions a world of neat and tidy binaries—war versus peace, the bomb versus the peaceful atom, the home versus the plant, the domestic versus the foreign, the local versus the global. But this process of domestication—transforming a weapon of war into a civilian energy source to power the white, middle-class home—showcases not only the illusion of these boundaries but also Americans’ preoccupation with clinging to them.

### **Decommissioning and the Chronicity of Crisis**

For the last forty years, at four o’clock in the morning on March 28, local activists and residents gather at the plant entrance to perform a vigil commemorating the accident. It was only in 2020, a few weeks after the national state of emergency was declared due to the Covid epidemic, that the tradition started to wane. Some years there would be a crowd of fifty or more people and reporters, especially the years following the accident and around anniversaries; other years, it would be the same small group, the four women who joined together to form the local

activist group Concerned Women and Mothers of Middletown in 1979 and another local activist. The vigil was a place to gather as a community to silently reflect on the fear and uncertainty they faced in 1979.

Throughout the 24 months I spent living in Central Pennsylvania and conducting fieldwork from 2019 to 2021, I observed how TMI only emerged as a matter of concern for my interlocutors when it was visible as an “event,” with a clear beginning and end, in ways that obscured how living near a nuclear power plant can habituate uncertainty and generate ongoing social, environmental, and biological effects. For example, when Exelon announced that it would begin decommissioning Unit 1 the area saw, as one reporter described it, *a surprising crusade to save TMI*. Exelon employees and TMI-proponents gathered on the steps of the Capitol in Harrisburg, spoke at local NRC and Exelon hearings, and wrote letters to the editors of local newspapers lamenting the loss of a carbon-free energy source that provided hundreds of jobs. For these people, TMI still had a role to play in the nation’s future, and they had been robbed of it. For others, TMI’s most salient frame was that of the past: The news of decommissioning provided a platform to work through the unacknowledged harm that they felt the 1979 accident had engendered and reignited their suspicion of government and industrial representatives. This flurry of attention was short-lived. When the plant finally did begin its decommissioning on September 20, 2019, its massive cooling towers and sprawling midcentury buildings slowly receded into the background. Concerns about TMI quickly became eclipsed by Covid and the growing cleavages in the US political system. In the midst of these chronic uncertainties,

decommissioning for my interlocutors seemed like a closed rather than ongoing subject, a period rather than an ellipsis.<sup>2</sup>

It is easy to dismiss a plant closure as a bounded event, and therefore the end of potential harm. However, decommissioning is an ongoing technical as well as social, economic, and environmental process that renders the area even more vulnerable as one hundred metric tons of nuclear waste are stored on an island in the flooding-prone Susquehanna River and overseen by a skeleton crew. As over twenty plants across the country are set to decommission over the next half-century, the US is no closer to long-term waste storage solutions beyond four low-level waste sites in Texas, South Carolina, Utah, and Washington.<sup>3</sup>

The tendency for TMI to only appear for most of my interlocutors in a register crisis is not surprising. Crisis is especially adept at marshalling fears and anxieties about the future in the space of the present. As a result, nuclear accidents, the loss of jobs through decommissioning, the lack of testing kits during a global pandemic all become frames through which ongoing harm and chronic risk are refracted. Joseph Masco has argued that nuclear danger has come to structure the idea of catastrophe in the US, or what he describes as “the shock of a total ending” (Masco 2021). In fact, the very ways in which the nuclear bomb numbed Americans and ushered

---

<sup>2</sup> That is, many of interlocutors understood decommissioning as a plant closure that was immediate rather than ongoing and, therefore, the end of threat. The news quickly became dominated by Covid and the upcoming 2020 presidential election, and updates on decommissioning were rare (only a few news articles here and there). Hence, decommissioning was not a major matter of concern when I was conducting fieldwork. While part of this lack of visibility is due to lack of public information (that was available but not liberally circulated), I am also tempted to think about people’s lack of concern with decommissioning in terms of the overall desensitization, numbness, and exhaustion Americans were feeling in the wake of rising Covid mortality counts, mass shootings, and racial violence in 2020. Decommissioning is not the same in its immediacy (rather it poses ongoing risk), but with numerous “crises” unfolding along lines of systemic failures and structural inequities, Americans bracketed both fast and slow violence by becoming numb to it.

<sup>3</sup> As of 2020, these low-level waste sites already house 1,008,857 cubic feet of waste with an activity of 40,000 curies.

in an “apocalyptic sensibility” also, Masco argues, privileges catastrophic future events over the structural conditions giving rise to the slow, everyday violence of global capitalism, petrochemical industrialism, and environmental decline. Like Masco, other anthropologists have argued, crisis narratives frame an “event” with a clear beginning and end that obscures the diffuse spatiality and latent temporalities of ongoing, chronic harm that can be difficult to track. Theorizations of latency (Murphy 2013), fallout (Masco 2015), and runaway change (Petryna 2018) point to the temporal gaps in knowledge-making when past violence of industrialism, capitalism, and militarism come to bear as vulnerabilities and uncertainties of the present.

To attend to these temporal gaps, science studies scholars have productively approached industrial disaster not so much as a bounded event, but an unfolding social, technical, and historical process. Robert Nixon calls for an attention to “slow violence,” one “that occurs gradually and out of sight,” is “open ended,” and along lines of structural inequities (Nixon 2013, 2, 6). Tracking forms of harm that are unseen and uncounted, science studies scholars have theorized both the acute unfolding of industrial disasters, such as Bhopal (Fortun 2001) and Chernobyl (Petryna 2013; K. Brown 2019), as well as the chronic low-dose exposure at abandoned nuclear sites (K. Brown 2013), Louisiana’s “cancer alley” (Allen 2003; Singer 2011), and farming pesticides (Nash 2006).<sup>4</sup> Challenging the “eventfulness” of disasters, this scholarship highlights how slow violence exceeds spatial and temporal boundaries and fuses the local with the global, necessitating both methodological and theoretical innovations to capture disasters as “emergent effects of crosscutting forces” (Fortun 2001: 14).

---

<sup>4</sup> While crisis and disaster carry distinct genealogies, both concepts refer to a rupture of normal modes of human and environmental life (Barrios 2017). Early work argued such ruptures carried a “revelatory” quality, laying bare the fault lines of political, economic, and social arrangements (Sahlins 1972, Solway 1994, Oliver-Smith 1996).

In the context of TMI's decommissioning, timescales of panic coincide with chronic uncertainty. Therefore, rather than understanding chronicity and crisis as mutually exclusive, this project investigates the modes of life and sociality that emerge in the chronicity of crisis, as an increasingly shared condition of human life that decommissioning makes highly visible in which crisis is ongoing, not easily solved, and ordinary. The chronicity of crisis speaks not only to the deterioration of bodies and environments through the slow violence of petrochemical capitalism, but also the uncertainty, anxieties, and fears that are generated in the aftermath of futures promised that fail to arrive. Scholars have used the concept of "precarity" to refer to the post-Fordist affects made present in suffering which is chronic and slow, rather than immediate or "crisis-laden" (Butler 2004; L. Berlant 2007; Muehlebach and Shoshan 2012; Stewart 2012; Allison 2013; Stevenson 2014; Tsing 2015; Weston 2016; Wool and Livingston 2017). In the historical present in which crises pile one on top of the other, Lauren Berlant understands crisis as embedded in the ordinary. In what they call "crisis ordinariness," the extraordinary "always turns out to be an amplification of something in the works, a labile boundary at best, not a slammed door of departure" (2011, 10). Seen through the lens of crisis ordinariness, nuclear industrial accidents and decades-long plant closures go hand-in-hand with fraying blueprints of the good life as postwar optimism and promises of technoscientific progress become ever less tenable but the affective attachments towards these modes of life remain. In response to uncertainty, critical geographer Nancy Ettliger argues people work towards creating "illusions of certainty" that often "misrepresent complex realities and act on those misrepresentations, in turn re-creating precarity" (Ettliger 2007, 320). Practices and appeals to safety and containment not only allegedly bound off the toxic effects of radioactive waste, but also act as a discursive, epistemic, and social infrastructure to shape a "local moral world" in which participants work out

nuclear threats on a local rather than global scale to protect the integrity of everyday life and the familiar landscapes of their hometowns, often in ways that elide broader systems of global capitalism (Kleinman 2010). Containment, therefore, is not simply a material strategy to deal with nuclear materials and waste, but an affect-generating lived infrastructure that draws on larger cultural narratives, ideologies, and fantasies.

One consequence of the cultural work of containment in conditions of crisis ordinariness is that in the everyday, TMI rarely came up. If I explicitly asked or conversation made its way to my research, people were mostly eager to tell me their “TMI stories,” where they were, what they were doing, what they did during the accident and how, eventually, life returned to normal. Other times, TMI stories were less choate, a collection of coincidences or signs. After I had already turned off the recording at the end of an interview, people would tell me to look up the cancer rates in the area. The area’s thyroid cancer rates have tripled since the 1980s, outpacing national averages (Bann et al. 2014; Goldenberg et al. 2017), a statistic many residents and local researchers attribute to the ongoing effects of TMI’s accident. *People said it was Agent Orange, one person said, but the women weren’t over in Vietnam.*



Image 5: A clipping from Middletown's local newspaper, asking residents for their TMI stories in the March 27, 2019 issue.

It is precisely the lack of epidemiological evidence as to the effects of the accident that gives TMI a kind of mythic quality in the eyes of residents. Every ten years, local news stations, podcasts, and filmmakers release documentaries or gather these TMI stories. Social memory of TMI also comes up less directly in rumors, and jokes, as well as anxieties and nostalgia for the good times. On the other hand, people trace their mysterious and chronic conditions, such as thyroid cancer or autoimmune disease, and their nagging symptoms of metallic taste, headaches, and hair loss to TMI (A. M. Smith 1989; Aamodt 2009; S Wing et al. 1997). Building on America's "nuclear fetish" (Masco 2006), stories of the accident both name a fear and a fascination of the technology that induced it, and they fit into the narrative of an "event" with a discrete beginning and end. However, decommissioning resists this sort of narrative arc; as a process that outlives the actors engaged with it, it is both future-oriented and the aftermath of an industry. This project follows the pasts and futures articulated in this storytelling—these local

narratives tracing change in bodies, environments, and infrastructures through time—and how they work into larger narratives of American independence, meliorism, and optimism and, in turn, expose their fault lines.

## Domestication



*Image 6: The main intersection of the town Goldsboro, located on the west side of the river, with TMI's cooling towers in the background. Photo taken by author.*

In 1953, President Eisenhower's "atoms for peace" transformed the nuclear industry from a global weapon of war to a domesticated source of energy (Ford 1982) and catalyzed one of the largest infrastructural undertakings in the country's history. Yet this infrastructure did not start entirely anew—it built on the national and global material and affective networks of the Cold War. The production of the nuclear bomb established labs, fuel enrichment sites, testing grounds,

and even interstate highways. The global and domestic plutonium and uranium economies released radioactive isotopes into the atmosphere and according to some environmental historians (Lewis and Maslin 2015), catalyzed what atmospheric chemist Paul Crutzen and geologist Eugene Stoermer coined the Anthropocene (Crutzen and Stoermer 2000). Nuclear tests not only initiated large-scale physical environmental changes, but new ways of imagining, measuring, and perceiving the world at a planetary scale and a politics grappling with the possibility of extinction that intensified in the Cold War era (Masco 2006). These very real, very material changes altered bodies and environments across the planet. War was woven into Americans' everyday life. Currently, over one third of Americans live within 50 miles of a nuclear power plant (Stromberg 2014).

If the bomb ushered in new ways of reckoning with space and time and new orientations to the everyday, the nuclear power plant localized this technology with a global geopolitical reach to the confines of one's hometown, workplace, or home. My interlocutors lived with TMI *in their backyards*. They could see it from their kitchen sinks, they pulled out of their driveways and drove their cars across the access bridge to the plant, and they saw the steam pooling out from the cooling towers each day on the horizon until 2019. In Central Pennsylvania, the ordinariness of nuclear power meant that even when nuclear politics do emerge, such as after a near nuclear meltdown or around decommissioning, they are worked out in the local. Hence, there was rarely talk about the nuclear harm precipitated in other places around the country, such as Hanford or the American Southwest, or the accidents at Chernobyl and Fukushima. While the 1979 accident mobilized mistrust in the government for some residents and galvanized them to become self-described "reluctant activists," it also furthered, for others, a commitment to nuclear technology and faith in American expertise to narrowly avoid a near nuclear disaster. Yet many

of my interlocutors claimed they did not have many opinions on nuclear power, nor did they identify as pro- or anti-nuclear. All these reactions to the accident illustrate the local nature of nuclear technology: When it threatens one's hometown or family, politically passive people will activate in locally specific ways. When it provides jobs, people will work at an accident-prone plant and feel safe. When it makes up the material and cultural landscape of one's everyday, it simply "fades into the background," as one interlocutor described to me, even after an accident and throughout a 60-year decommissioning. What does it mean for a storied nuclear power plant to fade into the background of my interlocutors' everyday; what apparatuses and cultural narratives make this possible?

To answer these questions, I approach nuclear power's domestication not only as a technical process that transformed a wartime technology into a source of energy, but as a political, cultural, and affective process that depoliticized, sanitized, and localized the technology, so much so that my interlocutors would come to feel *at home* with it. Through this process of domestication, even the enormous material infrastructure of Three Mile Island, and its historical, present, and future risks, fade into the background. As I hope will become clear in the coming pages of this manuscript, domestication relies on numerous industry and governmental strategies of containment to render the technology as safe, even familiar: From public tours of the plant (Chapter 1) to post-accident health studies that attributed the area's rise of cancer to stress rather than radiation (Chapter 4). But it also relies on my primarily white interlocutors' belief in a safe future, in which uncertain harm can be contained to the past, prevented from reoccurring, and hence fade from the public imaginary as a matter of concern.

Cultural and media studies scholar Roger Silverstone pioneered the theorization of the term "domestication" to describe the process in which technology becomes embedded in

everyday life. Together with Eric Hirsch, Silverstone maps domestication as occurring in discrete phases as the technology moves from the household to structure daily routine and ultimately shape relationships. It is a process that describes an interaction between both the technology and the user, in which each holds the potential to be transformed through the process. Originally, this process was seen as originating predominantly in the “moral economy of the household” as a site of consumption (Silverstone, Hirsch, and Morley 1992). In later years, scholars argued that processes of domestication take place outside of the home in spaces of work and leisure (Lie and Sørensen 1996).

Technoscience borrowed the term domestication from biology, and this origin is where the term picks up its original descriptive power in the context of nuclear technology. Early biological theorists described domestication as taming a wild, inherently unstable plant or animal species to make it conducive to human household needs. The process was namely achieved by removing it from its natural environment, placing it in the controlled conditions of captivity, and manipulating its breeding. In the process of artificial selection that Darwin called “one grand experiment” in evolution, the species were transformed, both temperamentally and physiologically, and as later genetic research would reveal, phenotypically.<sup>5</sup> The domesticated species when brought under the artful control of artificial selection was qualitatively different from its parent species (Ahmad et al. 2020).

That such a term would come to stand in for how scientists described the technical process of nuclear technology is significant and not accidental. In the triumphalist scientific narrative of domestication, nuclear fission’s inherently unstable atomic process—the very

---

<sup>5</sup> Darwin’s interest in domestication led him to publish an almost encyclopedic account of the process at the time. The sheer number of pages and information reflect not only a scientist’s fascination with a biological process, but also a cultural preoccupation with controlling and harnessing nature to meet man’s needs (Collingwood, R.G. 1945).

instability that was exploited to produce the enormous, world-ending and -making explosions of the atomic bombs—is brought under the calm, rational control of the scientist working to harness this energy to power homes, hospitals, and industries across the globe. It is a story of scientific know-how and progress that smooths out nature’s unruly edges to generate a smooth, sleek vision of the future. Of course, such a vision is predicated on the colonialist and masculinist assumption that humans can control nature, as well as their desire to do so. Additionally, domestication implies that somehow the bomb and the nuclear power plant are entirely different things, just as the parent and the domesticated species. In this sense, domestication not only marks a process of bringing something into the home, but transforming it in such a way that purifies it of the violence and harm wrought by its ancestor. It is a useful term of containment, and something that in taking domestication up as an analytic, this manuscript attempts to trouble.

The Latin root *domesticus* means belonging to the house, but it is crucial to remember that nuclear technology may power and even transform the home, but it does not start there. It wove its way from the labs of Los Alamos to the riverbanks of the Susquehanna to power the white, middle-class home in a culturally specific way. Hence, my own theorization of domestication takes up Silverstone and his colleagues’ emphasis on the co-relation between technology and its users in everyday life but takes seriously the recent turn in anthropology to the ordinary as a site of cultural politics. That is, I want to describe the domestication of nuclear technology not only as a material process but as something that generates affects, sensibilities, and embodiments in and around one’s home and hometown. The following pages describe that process as one in which numerous forces—government, industry, and more local—work to elide nuclear power’s dangers and rebrand the technology as *safe* through sheer optimism and confidence in American know-how. In doing so, these efforts also purified nuclear technology of

the violence it inflicted on white and non-white groups alike in its production, testing, and development. As Chapter 1 demonstrates, the optimism and over-confidence that categorized the gestation of the US nuclear industry in the midcentury preempted attention away from safety concerns and the very serious harm the technology had precipitated in the past and could wreak in the future.

The national security and cultural ideologies that animated the Cold War era, and by extension nuclear technology, were built on strict binaries between capitalism and communism, home and foreign, war and peace in what historian Natasha Zaretsky calls the “culture of dissociation” (Zaretsky 2018). Nuclear power’s domestication fit well into this culture of dissociation, and the peaceful atom was able to divest itself of the violence of the nuclear bomb, ideologically if not actually, to slip discreetly into its new civilian role. Indeed, Kate Brown points to the limits of such strict boundaries in her historical analysis of the aspirational, middle-class atomic villages built around the American Hanford and Soviet Union Maiak plutonium plants (2013). Despite the Cold War era’s emphasis on the deep divide between capitalism and communism, Brown showcases how in the context of these “plutopias,” the two governing and cultural ideologies shared a penchant for bracketing the slow violence and harm of nuclear technology to champion it, and more subtly, to make the residents and workers inside these villages feel safe, *feel at home*. As the workers and residents living alongside these plants grew weak, frail, and sick, government sources in both the US and the Soviet Union obscured information in the name of national security and promoted middle-class consumerism in the name of nationalism eliding the slow-motion disasters, environmental pollution, and radiogenic injury that plutonium production wrought.

With this history of occlusion in mind, in emphasizing domestication as a social and affective process, I also want to draw attention to its material dimensions. Beyond the large, midcentury infrastructures dotting rivers across the country, nuclear technology has transformed bodies, landscapes, and atmospheres, starting with atomic weapon testing in the 1950s and continuing with our contemporary low-dose, chronic exposures of living alongside nuclear power. As a result, domestication is not only a sociocultural and affective process through which one comes to feel at home with nuclear technology, but also the very material and biological ways in which radioactive isotopes have transformed our atmospheres, environments, and bodies. These radioactive isotopes that linger for hours or decades depending on their half-life have also come to be at home in and around us.<sup>6</sup>

In the pages that follow, I understand domestication as a material, affective, and social process that relies on the technoscientific fantasy of strict boundaries but is, in fact, an inherently boundary-transgressive process. That is, on one hand, domestication is a process that has been engineered by technoscience (in the form of government and industry) for people to inhabit the dangers of nuclear technology without questioning or worrying about them. On the other, these carefully crafted boundaries are always and already coming undone in ways that generate contradictory affective attachments to industries that harm. Domestication blends war with life, home and industry, technology and environment. Nuclear power plants that promised a safe energy source have accidents. People develop thyroid cancer. And river temperatures rise. Thus, I find it a productive concept to think with the ambivalent ways in which my interlocutors inhabit nuclear worlds. Rather than a study on nuclear decommissioning—which is the context rather

---

<sup>6</sup> Following queer theorist Mel Chen, we might think of domestication as a process that not only reflects the agency of humans in irrevocably changing our environments and ushering in what some geologists have called the Anthropocene, but also the agency of inanimate objects like radioactive isotopes, splitting atoms, nuclear cooling towers, and highways built for nuclear bomb evacuations.

than the object of this project—I take up domestication to investigate how people in a religiously, politically, and culturally conservative, predominantly white area understand the fallout of the nuclear industry’s midcentury promise to power a better future and why and how some Americans continue to cling to the fantasies of containment even as it is coming undone around them.<sup>7</sup>

### **Home as Method**

In my own work, I found that the result of this stealthy process of domestication is that it makes it paradoxically hard to talk about nuclear power in registers that extend beyond dichotomies of pro- and anti-nuclear. That is, it allowed TMI to fade into the background of everyday life and made it difficult to get at this effect ethnographically. I quickly discovered once in the field, however, that understanding how TMI could fade into the background of everyday life opened up into a series of ethnographic questions around containment, both in a material and social sense. How are the radioactive materials of the shuttering plant stored, managed, and transported? How do these processes lead people to feel safe, or not? How has TMI already impacted the bodies and environments of the people and towns lining the

---

<sup>7</sup> In doing so, my theoretical approach is heavily inflected by the commitment in feminist anthropology and STS to trouble boundaries. I take up this work in how I approach nuclear technology as something inherently boundary-transgressive, something that resists containment. At the height of second-wave feminism, feminist scholars were crucial to exposing the illusion of the private/public divide (see Warner 2014 for a comprehensive literature review). More recently, queer and feminist STS scholarship has been instrumental in retheorizing the relationship between nature and culture to articulate the ways in which the material and the social are correlational and coterminous through theorizations of cyborgs (Haraway 1985), entanglements (Mol 2002), intra-actions (Barad 2003), and the bio-social (C. Roberts 2007). In doing so, this scholarship encourages us to rethink the binaries that populate Euro-American visions of the world.

Susquehanna River? What sort of future did TMI promise, and when it failed to arrive what affective attachments to this future linger in the everyday?

Pursuing answers to these questions about containment and domestication took my fieldwork through winding paths in and around the home. I talked with people in their living rooms, at their kitchen tables, and on their front porches. From my own home, I conducted Zoom interviews, in which I talked with people sitting on their couches with pets walking by and children interrupting. But perhaps most importantly, I conducted fieldwork in the area I am from, and it was precisely this process of domestication that resonated with my own experience growing up near the plant.

I was not alive at the time of the accident, and I only remember thinking about TMI twice in my childhood. The first time, in elementary school, I went to play at a friend's house in Middletown. She lived on a big, family farm with the cooling towers looming over it. I don't remember the cooling towers, but my mother does. And she remembers feeling shocked, and a slight unease, as she drove me up the long farm lane to drop me off. TMI was my friend's backyard. The proximity shocked my mom. But we never thought or talked about it after that, despite living just a few miles farther away than my friend. I was often told throughout fieldwork that I should talk to people closer to the plant, friends of friends *who could see it from their windows*. This well-meaning advice from people who although could not see the plant from their homes, lived just a few miles from it reflected a common sense understanding that concern with a threat correlates with proximity to it. Yet Ulrich Beck points out that resistance to understanding a threat grows with proximity (Beck 1992). My childhood friends' parents politely declined my requests to interview them or visit their farm again for this project. They claimed they did not have strong feelings about TMI and doubted they would be of any help; despite my

efforts to explain that was precisely the perspective I was most interested in, they maintained their steady refusal. In the pages that follow, you will find this logic repeated as those interlocutors who live closest to the plant are the first to champion its safety or dismiss it as ordinary, even benign.

The second time is a harder story to tell. I was in high school, carpooling to a Christian school thirty minutes away from my home. One mother drove a Prius, quite the statement in 2006 and 2007 in a politically and culturally conservative area. She was the only mom who worked and was always late, an annoyance for the other parents (mostly mothers) who would drop us off at the pick-up spot. Her daughter was in my year and had a hard time making friends due to an intellectual disability. At school that first year, rumors circulated that her disability was due to her mom working at TMI when the accident happened. In actuality, as I learned from interviewing the mother (the only pre-Covid interview I did), she was an assignment editor earning a mere \$3 an hour for the local news station that first reported on the accident. From broadcasting journalism, she transitioned to state government in various roles, working under Senator John Heinz and Governor Dick Thornburgh, following his term as Pennsylvania State Governor during the TMI accident. I tell this story here not to reproduce the harm such rumors cause, but because it illustrates important aspects about my fieldsite and how TMI operates within it. The rumors not only blamed the plant, but my classmate's mother. That is, it not only highlights how TMI operates in the register of rumors as a sinister, uncertain source of harm, but also the conservative suspicion of a working mother. The rumor hit on inchoate fears, as well as cultural anxieties around liberal politics, reproduction, and intergenerational harm (explored more in Chapter 5).

The covert ways that TMI operated meant that much of my research focused not only on interviews that asked interlocutors to explicitly reflect on the accident, decommissioning, and the plant, but also attending to the implicit, background role TMI played in everyday life. I thought the latter of this work would make up much of my ethnographic data gleaned from rich, nuanced participant observation. As a newly minted PhD candidate, I eagerly began my research on March 1, 2020. Two weeks later, the national state of emergency was declared, and quarantine was enforced to combat the global spread of Covid-19.

The pandemic has unavoidably inflected my research—methodologically and conceptually. Methodologically, it meant that much of my method relied on interviews, either over Zoom or in-person and socially distanced, that lasted between one to three hours. In total, I conducted forty-two interviews: fourteen with residents, nine with plant workers, six with nuclear experts, five with activists, and eight with members of TMI Survivors, a private Facebook group comprised of people who believe that their chronic conditions were caused by TMI.<sup>8</sup> I was able to conduct participant observation in my everyday activities (i.e. running to the store, walking my dog, etc.), through volunteering at the Middletown Public Library for fifteen months over the course of fieldwork, and attending the in-person decommissioning hearings and 40<sup>th</sup> anniversary events prior to Covid during my preliminary fieldwork. Yet Covid also afforded time and access, and when I was not interviewing or volunteering, I analyzed local and national news sources, Zoomed into church services and town meetings, and remotely audited a nuclear energy course at MIT to gain a much needed background in nuclear technology.<sup>9</sup> I also quickly

---

<sup>8</sup> This count is based on interviews rather than interlocutors, and it does not include follow-up interviews. Several of these interviews had more than one person present, such as a husband or wife or other family member. One interview with the NRC (categorized as a “nuclear expert”) included five NRC employees involved with TMI Unit 1’s decommissioning).

<sup>9</sup> I am indebted to Kate Brown, my generous outside reader, for making this opportunity possible and to Scott Kemp for having me as a remote student.

found out that a number of my older informants who lived alone enjoyed long telephone conversations, which often worked as a sort of substitute for more informal conversations I was expecting to have in the field.<sup>10</sup> In lieu of the physical archives at Dickinson College (which I was able to visit once before lockdown), I came to rely on the archival collections at the Middletown Public Library, shelved in a forgotten, damp corner of the basement and very rich. Additionally, I worked through the online archives of the NRC, local activist group TMI Alert, and digitized local newspapers. Finally, I joined the private Facebook group, “TMI Survivors,” an active Facebook group of over 4,000 members with ailments (cancers, autoimmune diseases, etc.) they link to TMI. As a member, I read and engaged with the threads and recruited people for interviews. Because radiation-induced illness is notoriously difficult to prove, collecting residents’ “illness narratives” provided concrete objects to analyze the ongoing impact of the TMI accident and decommissioning (Kleinman 1988).

Conceptually, Covid meant that TMI only further receded into the background of my interlocutors’ everyday concerns. However, the pandemic amplified many of the objects I was originally interested in tracking: perceptions of safety and risk, the concerns around how to negotiate invisible threats, affects that circulate in chronic crisis, ambivalence of living with chronic exposure, and modes of life that emerge in a “risk society” (Beck 1992). As a result, I was often able to get at these objects through angles beyond TMI and track how various types of risks—toxins, viruses, and extremist politics—were negotiated, embraced, prioritized, or ignored. The focus that this project takes on the home, is also in part, borne out of the very real conditions of a global pandemic, in which many of interlocutors were not only spending more

---

<sup>10</sup> I did try a few experimental methods of having some informants keep memo journals of their days in lockdown, but I had a hard time convincing others (especially my informants 60+) to do so.

time at home (from residents to NRC officials and nuclear experts), but also more concerned with the boundaries of it—who and what got in, and who and what stayed out.

Like my interlocutors, I also had to negotiate this ever-changing field of multivariant risk, and Covid often exposed my vulnerabilities as an ethnographer (perhaps in ways more salient than moving back to live near a decommissioning nuclear power plant). Like people across the country, I had to navigate the social politics of masking. In central Pennsylvania, like places across the globe, the mask became more than a public health measure; it became a political symbol. I spoke with people who were being very cautious and only wanted to meet over Zoom or the phone (such as those with health conditions they connected to TMI) and those who were decidedly *over masking* and its allegedly liberal alarmism. As a result, while I was often able to sit outside and/or interview people with a mask at a social distance, there were other times that I write about where I am in situations in which I don't know how to respond, caught in between the need to protect myself and to bridge gaps between myself and my interlocutors. And indeed, at times, the mask seemed a material symbol of those boundaries that separated me from my often politically, religiously, and culturally conservative interlocutors and that along with markers ranging from my education, class, and gender to my hybrid car and lack of church affiliation seemed to deepen ideological lines. Yet as a white, cisgendered woman from the area and raised with my small town's manners to be polite and agreeable, my presence also did not obviously disrupt these conservative spaces and, in the process, highlighted for me my own silent complicity in the systems my research was attempting to critique. I try to write about this positionality with honesty to showcase my own vulnerability, entanglements, and ambivalence navigating fieldwork during Covid in a site of both conservatism and uncertain radiogenic harm,

as well as conversations in which I stay silent, ask the wrong questions, and leave feeling uncomfortable, unsettled, and even guilty.

Like my interlocutors, I lived alongside the industrial and agricultural toxins that drift downwind and downstream of the Susquehanna, creating a shared set of vulnerabilities and embodiments. Some of my interlocutors never acknowledged cumulative exposures this way, but for others with cancers and disorders they believed were caused by the TMI accident, this reality was something they were painfully aware of. In 2015, I was diagnosed with Hashimoto's thyroiditis, an autoimmune disorder in which the immune system targets the healthy tissue of the thyroid, without a prior family history. Many people in the area had hypoactive thyroids or had had their thyroids removed due to cancer and, like me, required regular bloodwork and endocrinology appointments, and we waited an hour every day to eat breakfast so our levothyroxine, a synthetic hormone replacing what our thyroids failed to make, had adequate time to absorb. Sharing both a sense of place and a bodily experience afforded me access (including to "TMI Survivors," which asks screening questions before members can join). But I also felt guilty that I did not hold the same conviction that TMI was solely to blame like some of my interlocutors insisted, who in turn entrusted me with their stories. Instead, in the already altered world of late industrialism and capitalism in which numerous toxic exposures bombard the body (Murphy 2017a), I did not see the utility in isolating one source of harm as the cause. Yet by the time I finished fieldwork, I was convinced that the accident and nuclear technology was responsible for decades of unacknowledged harm to my interlocutors in central Pennsylvania and across the globe.

Taking a nuclear power plant as an object of research did present some challenges with access. Throughout my two years of fieldwork, I never was able to gain access to the power plant

itself. Yet, as I hope will become clear, the story I want to tell is not dependent on physically experiencing the plant but instead tracking its material and psychosocial reach. Radionuclides and concerns around them are not confined to the plant itself, and this project traced them through a deep, focused community engagement.

Being from the area afforded me access to networks I am not sure that another researcher could have reached. Whereas previous work has concentrated on the activism around TMI (Zaretsky 2018; Hutner 2022; Mitchell 2021), this project instead concentrates on how the plant functions in the everyday. How could a storied nuclear power plant fade into the background of everyday life? What modes of life emerge while living in the wake of and alongside nuclear threat? Answering these questions required me to investigate how the strange-making power of nuclear technology becomes ordinary beyond simply rehashing the dichotomy between the optimistic, over-confident industry narratives of nuclear promise and its dark, apocalyptic potential. This objective meant that I often talked with people who told me they *never really thought about TMI* or *didn't really have an opinion on nuclear power*. To tap into this perspective, it was convenient to have another entry beyond researcher. Interviews were also times to catch up with old classmates, neighbors, or family friends in ways that led to more candid conversation around not only nuclear power, but also Covid, the 2020 election, anti-Black racism, and the various political issues emerging throughout my fieldwork. Gaining access to workers, in particular, was not an easy task, and many times I was rebuffed by employees skeptical of having their words taken out of context or somehow having them make their way back to Exelon executives. But I grew up in the area I studied, and some of the people whose stories and perspectives animate the following chapters were friends of family or previously known to me. I was able to analyze how the plant and the home collide because I was invited

into my interlocutors' homes during a global pandemic, in large part due to the fact that I was already known to them.

Covid created a “patchwork ethnography,” an “acknowledgement that recombinations of ‘home’ and ‘field’ have now become necessities,” that reflects well the politics of this project (Günel, Varma, and Watanabe 2020). My fieldwork was far from the uninterrupted, deep immersive experience that characterized early ways of doing “correct” anthropology that feminist and decolonial scholars are showcasing rely on the ableist, sexist, and classist assumption of the healthy white male ethnographer unencumbered by an unruly body, family responsibilities, or work obligations. Instead, between my own health and public safety mandates, it was a series of stops and starts, anxieties, vulnerabilities, and entanglements. This non-linear rhythm is not a constraint of fieldwork but instead a broader reflection of the project’s aims to think with nuclear technology to trouble divides between home and work, the foreign and the domestic, safety and risk—to think beyond teleological timelines and the myths of containment and closure that underpin not only nuclear power, but also anthropology.

How do you write an ethnography that troubles closure as a realistic technical goal for nuclear unbuilding and a useful analytic? Ethnography itself can act as a mode of containment, in which the anthropologist goes to the field for a predetermined length of time, leaves, and writes something that even with the best efforts distills ongoing historical and cultural processes down into a self-contained manuscript. The result is an illusion of both a beginning and an ending. My interlocutors will continue to live alongside TMI long after I am done writing, and TMI will continue its decommissioning process perhaps beyond my lifetime. Throughout this manuscript, I resist the temptation to offer neat and tidy conclusions and rely more on showing rather than

telling.<sup>11</sup> Instead, I embrace the incoherence of my interlocutors' behaviors, discourses, and accounts. This dissertation is the result of working with interlocutors from across the pro- and anti-nuclear spectrum, with many falling in between and grappling with the uncertainty of just how much of an effect TMI has had and would have on their hometowns. Working within the knowledge gaps that result from a radiation's diffuse and latent effects on the body and TMI's history with its host community meant I had to reckon with various competing accounts at once. Oftentimes, my interlocutors would tell me things that directly contradicted government reports (most particularly around the health effects of the accident described in more detail in Chapters 4 and 5) or aspects about small town living that seemed fantastical (such as the insistence on Middletown's color-blindness in the 60s and 70s in Chapter 2). Rather than dismiss any one source as an unreliable narrator or evaluate one person's claim to truth over another, I cross-checked sources, cast a wide archival and ethnographic net, and contextualize competing knowledge claims through a deep ethnographic engagement with the cultural and historical setting giving rise to them.<sup>12</sup> Particularly around nuclear sites in which everyday life is made strange, it can be difficult to disentangle fact from fiction. This dissertation offers the social facts of TMI and ways in which the social world it has helped to create, sustain, and threaten is lived,

---

<sup>11</sup> As a result, the manuscript is intentionally structured and written to move towards more analytically-driven chapters, while the earlier chapters establish the national and local milieus, narratives, and ideologies my interlocutors move within.

<sup>12</sup> In grappling with the seemingly fantastical claims of her interlocutors around Richland and Ozersk, Brown offers that "most unreliable narrators are worth a good listen because there are some accounts most people don't believe, not because they are not true but because, as with the mythical prophet Cassandra, society is resistant to them" (2013, 315). When she would cross-check these sources, she found the account of these seemingly unreliable narrators were almost always supported by the archives. The unreliable narrator then is not simple an outlier to be dismissed but a unique counternarrative that may elucidate not only what happened, but also what that society holds most dear and, in turn, is most resistant to giving up.

and in the process, I hope to shed new light on the scale of the 1979 accident, the stakes of nuclear decommissioning projects, and the cycles of optimism and betrayal in between.

### **Nuclear Afterlives**

In the public hearings that the NRC hosted to provide the public with information on Three Mile Island's decommissioning, the absence of TMI's material infrastructure became the ultimate symbol of closure. Once the steel, concrete, and radioactive waste are carted offsite, the Island would somehow return to a pristine, natural state—so safe, they assured those of us in the audience, that a park or elementary school could be built on the unseen ruins of nuclear promise. As I conducted fieldwork and learned more about the technical process of decommissioning, the 1979 accident, the diffuse and latent effects of fallout from decades of nuclear testing, and the ambivalent and heated ways that my interlocutors live alongside a storied nuclear power plant, I became increasingly convinced that TMI's closure was an ever-receding horizon.

Nuclear technology was a beacon of modernity in the 20<sup>th</sup> Century, powering the way to the nation's future. Today, the NRC and the industry continue to tout this futurist bend; however, when I entered the field, there was no talk of creating futures, safe or otherwise, among the residents and employees themselves. Scholarship on international nuclear sites demonstrates how the nuclear industry is closely bound up in national identity and visions of modernity (Hecht 2009; Schmid 2015; Kuchinskaya 2014; Zaretsky 2018). Yet in America, particularly around TMI—where memory of the accident combines with the present reality of its closing—nuclear power no longer signals the promise of modernization but its failure and a desperate need for a more sustainable future, at the level of the planet, the nation, and small towns.

There are roughly 20 American nuclear power plants set to close over the course of the next half century, and the US has over 85,000 metric tons of nuclear waste from commercial nuclear power reactors alone, the highest amount of any country in the world (Jacoby 2020; “Nuclear Waste Disposal” 2022; “Backgrounder on Decommissioning Nuclear Power Plants” 2022).<sup>13</sup> These efforts are underway without long-term waste solutions or strict policies to safeguard decommissioning plants and will occur under timelines that will outlive stakeholders. The insecurity of this future that nuclear technology has created is coupled with its long-term effects generated in its production and testing. In 2001, a report conducted by the Department of Health and Human Services, Centers for Disease Control, and National Cancer Institute estimated that anyone living in the US since 1951 has been exposed to radioactive fallout, and that the aboveground testing in the US alone during this time caused 11,000 cancer deaths and between 11,300- 212,000 thyroid cancer cases among US citizens. While this report showcased fallout as a general human condition (Masco 2006), it did not document the ways in which its effects are unevenly distributed among non-white groups in the American Southwest and the Pacific atolls who unwillingly hosted and disproportionately suffered from the US nuclear weapons testing program. Around TMI, the accident continues to be linked to a rise in cancers, autoimmune diseases, and infertility. Nuclear technology populates our bodies, atmospheres, and environments, as well as the American belief in optimism, progress, and a safe future. Against this backdrop of ongoing harm and optimistic attachment, the question is not *can* TMI successfully decommission, but how is it possible to imagine that TMI, or any nuclear site, ever

---

<sup>13</sup> This tally of nuclear waste does not include the 90 million gallons of radioactive waste generated from the US weapons program.

really can. That is, why and how do people cling to closure and containment in the face of an uncertain future?

Closure is a particular vision of the future that is predicated on the possibility of a safe future, as well as a retelling of the past, in which previous harm is bracketed from reoccurring and uncertainty is forestalled. As a result, containment and closure are a conservative frameworks that not only suspend fears, uncertainty, and anxiety but often fail to address the structural conditions giving rise to them. A preoccupation with crisis, according to Masco, indexes a failure to imagine alternative, more collective visions of the future that rely on structural change (2021). My interlocutors would likely not support the sort of collective future that Masco has in mind (one built on radically reckoning with and restructuring the ways in which global capitalism precipitates inequity and precarity). Yet, as an anthropologist, I feel compelled to document people's cruel optimistic attachments to industries and institutions that harm, even as I think and work from a place of attempting to imagine and work towards an otherwise.

When I shifted my focus from decommissioning as a closure to yet the most recent stage of TMI's historical and ongoing relationship with its host community, I started to pay attention to the ways in which its impact on the everyday is not dependent on its material infrastructure. TMI lives on in the bodies and environments of the Susquehanna Valley as radioactive isotopes woven into flesh, ground, and water. It also lives on in the public imaginary as a source of fear, fascination, and economic and scientific promise. In analyzing the aftermath of an industry that promised the future and the affective attachments to such a future that remain in its wake, I have thus found it useful to think about TMI in terms of its "afterlives." These are the very material, real ways that TMI and the promise of the US nuclear industry live on as remnants and remains

in the bodies, affects, and visions of the future of my interlocutors. It is a term that speaks to the ongoing temporal nature of the plant's material, social, and affective reach into the near and distant future, as well as the structural and historic shifts that create the uncertainty of the present for my interlocutors. It is a term that works to against the spatial politics and temporal logics of containment to instead shine light on the plant's chronic impact and ongoing harm.<sup>14</sup>

The parts of this manuscript are organized in terms of scale, moving from national narratives of promise to the erosion of the good life in Middletown to the bodies around the plant. Part I, "Host Community," brings readers into TMI's global, national, and local milieus and how the global geopolitics of nuclear power as well as the plant's closing are experienced in the local. It examines how the nuclear industry's afterlives materialize in national narratives that championed nuclear technology as a beacon of modernity and technological progress only to face its present aging infrastructure (Chapter 1) to the more local forms of an industry-promised good life for a small town currently confronting industrial abandonment and socioeconomic decline (Chapter 2). Part II, "TMI Bodies," analyzes how these afterlives populate the bodies of my interlocutors as a prominent site of TMI's chronic impact. These afterlives generate ongoing bodily experiences at work and at home (Chapter 3) that reckon with the uncertain effects of the accident (Chapter 4) and how these come to bear on the future (Chapter 5). Through these different scalar analyses, I trouble expectations of containment and closure to demonstrate that we all in fact inhabit TMI and post-nuclear bodies.

**Chapter 1, "Future Promised,"** opens on the image of the weed-covered Visitor's Center of Three Mile Island Nuclear Power Plant, which sits across the street from the plant.

---

<sup>14</sup> In emphasizing the plant and its aftereffects' liveliness, I am also viewing it as a social actor of sorts with agency to transform bodies, environments, politics, and imaginaries (see Chen 2012).

When it was originally constructed, the contractors built an observation deck on the second story so visitors could look out over Three Mile Island—the cheaper, cleaner energy-fueled America of the future. This chapter uses this image of postindustrialism as an entry into the history of nuclear power in the United States, one in which a weapon of war is recrafted as a peacetime energy source, and the history of a small American town thrust into the center of national nuclear debates. In doing so, it ethnographically situates Middletown, Pennsylvania within a broader historical narrative, one in which a small town with struggling industry largely welcomed the introduction of nuclear power as a source of employment, tax revenue, low-cost electricity, and clean energy only to host the country’s most publicized commercial nuclear power accident. Drawing from secondary historical sources, as well as archival work and oral histories, this chapter documents not only the major historical shifts nationally and locally around nuclear power, but also the affective dimensions (the initial excitement, the chaos and betrayal of the accident, and the disappointment of its aftermath) of a future promised that never in fact arrived. In doing so, it approaches decommissioning not only as the formal act of unbuilding, but also the culmination of a particularly American vision of the good life.

**Chapter 2, “Fantasies of Safety,”** follows the rise and fall of industries in Middletown and how the good life they promised brought with it its own national ideals of safety, security, and community in the late 1960s to 70s that remained long after the plants shuttered. The previous chapter, “Future Promised,” in part, explored how TMI’s physical infrastructure was the product of a 20<sup>th</sup> century world-building and optimism. This chapter turns attention to how in the normative horizon of capitalist progress remains alive and well in everyday life, even as these physical infrastructures become ever less practical in their states of decommissioning. It is a story of how the past affectively and materially lingers in the present landscape of industrial and

residential buildings that have been repurposed, abandoned, swept away in floods, and leveled to make space for a future that leaves many of Middletown's residents unsettled. Within this context, I track the past in the things my interlocutors attach to—library cards, nuclear cooling towers, tasers, skeleton keys, patented toys, and the stories of the town—not only as objects of both harm and desire, but also a cluster of fantasies that quietly inhabit, even haunt, everyday life. More specifically, they are fantasies of safety, the leftover material and affective attachments that are cobbled together to offer a sense of safety and security in the present when the good life erodes.

**Chapter 3, “Occupational Intimacy,”** draws primarily on interviews with plant employees to analyze safety procedures as rituals that transform the hazards of radioactivity into feelings of containment and intimacy. It examines how safety measures generate affects and relations with a particular attention towards when occupational safety measures become messy, entangled in more intimate, domestic, and personal spheres. Rigid, highly regimented safety protocols attempt to control for nuclear technology's inherent unpredictability through habituating workers' bodies to anticipate and automatically respond to emergency, but they also generate an intimacy with the plant, its machines and radioactive materials. Such occupational intimacy is sometimes encouraged, like one worker describing his position as being the eyes, nose, and ears of the plant. Other times, work, in the form of radiation, steam, and Covid, occupies the body. Additionally, occupational intimacy is not contained to the plant, but a relationship through which my interlocutors working in and living near the plant and myself occupy nuclear sites and are occupied by them.

**Chapter 4, “Embodying Dose,”** maps the various and contested attempts to make sense of the scale and impact of the accident. In particular, it examines the modes through which

radiation became visible in the bodies of my contemporary and historical interlocutors in the form of radiogenic injury even as government reports systematically rendered those effects further invisible through appeals to accident-stress and a reliance on uncertain metrics. After Three Mile Island experienced its partial meltdown, government and industry sources were able to capitalize on inconclusive short-term data to champion the safety of the plant. The result was that some residents living around TMI believed that the true effects of the accident were never uncovered in labs, statistics, or peer-reviewed studies but in their physical bodies. While government and industry sources attempted to quantify and bound the accident, residents' embodied effects defied this narrative of containment and instead indicated a much more significant release of radiation. Rather than quantifiable metrics, the body itself became a technology that sensed radiation and my interlocutors reached for the poetic to make their radiogenic injury legible.

**Chapter 5, “Mutated Futures,”** recounts how several of my female interlocutors who were pregnant or in utero in 1979 believed that TMI had caused their or their daughters' breeched births, mutated reproductive organs, and unexplained infertility. This chapter traces the boundaries of my interlocutors' bodies against toxic threats that span generations and challenge traditional epidemiological models of time and space. I document how my interlocutors imagine and experience intergenerational and reproductive harm in ways that further entrench fantasies of reproductive futurity, meliorism, and closure. The chapter ends with a meditation on illness narratives as “closure stories,” in which a multifaceted illness can be explained in terms of a singular cause rather than multiple. I draw on psychological theories of closure as a hallmark sign of progress in grief and mourning. Closure stories are compelling (or not) in that they contain risk to the past and preclude it from reoccurring in the future. But this cultural tendency

towards closure reproduces logics of containment that bracket radiogenic injury to the past and makes it impossible to talk about ongoing, diffuse, and collective environmental harm.

The manuscript closes with an attempt to think beyond closure and towards more collective visions of the future. Building on the idea of closure stories introduced in the last chapter, I scale this analytic of closure to think through decommissioning itself as a closure story that offers a tidy resolution, carrying an affective reasoning towards progress that remains even as it becomes ever less practical. Closure stories are, in short, effective because they bracket harm. However, this dissertation has sought to trouble closure as a feasible future and instead open up the possibility that TMI may never successfully close, from the storage of its nuclear waste to the remnants of its promised good life to the very real ways it continues to show up in people's bodies.

## **Part I: Host Community**

## Chapter 1: Future Promised

I pull my car up behind Doug's gold Toyota Avalon. He had offered to drive me, but I politely declined, opting to follow behind him so we could socially distance. We had just come from a late breakfast at Kuppy's Diner, a local spot among retired and current TMI employees. Doug was older than I had expected, and his memory was starting to fade. He spoke slowly with a slight Long Island accent not often heard in Central Pennsylvania when he told me he could get me *onto the Island*. I eagerly accepted.

I shut my car door in the parking lot of the Exelon Three Mile Island Visitors Center and try to hide my disappointment from him as it became clear that he merely meant across the street from the storied nuclear power plant. "They should call it 'Wake Up Island,'" Doug said and laughed at his joke. And indeed, without its iconic steam rising from half of its towers, TMI looked sleepy. All grey, hard, and dystopic. And the drizzly September day wasn't helping.

I had been here many times over the course of my fieldwork, including almost exactly a year earlier, on a much sunnier day, huddled with a handful of journalists, antinuclear activists, and residents at the small, funereal press conference to mark the plant's closing. We listened to a spokesperson from Exelon speak of the socioeconomic and environmental loss of the plant. His speech echoed the promise of nuclear energy—one harking back to a 1950s "Atoms for Peace" rebranding, in which the world can be made greener, cheaper, and more modern by the technology once used for war. The words mingled with the dwindling steam rising from two of the plant's four concrete cooling towers that slowly evaporated into the cloudless blue sky over the Susquehanna Valley.

Today, the Visitor's Center is overrun by weeds. Ivy has become unkept and greedy. It engulfs the white brick sides of the small building, the trees and bushes growing around it. It looks like hands, I think to myself as we walk around, with fingers curling around the railing of the second-story deck. What little of the building that is visible, including its bright blue awnings, is stained with mold. When it was originally constructed, the contractors built the second-story observation deck with a painted green floor, white cinder blocks, contrasting black railing, and tower viewers (metal binoculars fixed to a stand). It was a carefully crafted vantage for visitors to look out over the future embodied by the sprawling form of Three Mile Island Nuclear Power Plant. The Visitor's Center is just one part of "the material forms that allow for the possibility of exchange over space" that make up the infrastructure, as Brian Larkin defines it, at TMI and the US nuclear industry at-large (Larkin 2013, 327). But more than simply transporting radioactive isotopes, fissionable material, energy, and steam, this infrastructure also carried a promise for the future, and hopes and desires bundled around the steel and concrete that made up TMI's material infrastructure. Larkin argues, "[a] promise can refer to a vow, or a commitment, but its other meaning refers to the coming to be of a future state of affairs" (Larkin 2018, 181). Belying this orientation towards the future, however, are the uncertainties, harm, and possibilities that a tidy promise often elides.



*Image 7: Former TMI Visitor's Center, photo taken by author.*

Doug walks closer to the building with me and tells me they used to give tours, even after the accident, *especially* after the accident. Before he retired, he oversaw thirty-two people in communications, mostly tour guides for Unit 1. Hired in 1982 as Manager of Communications, Doug was brought on to handle media relations and largely to undo the damage MetEd Vice President Jack Herbein, an engineer with no public relations experience, had inflicted in press conferences in the days following the accident (most infamously, when he snapped at the concerned reporters and residents, “I don’t know why we need to tell you each and every thing that we do specifically”) (Kemeny and et al. 1979a, 120). According to Doug, Herbein’s defensive, patronizing attitude was reflective of MetEd’s “sleepy” attitude, a sort of “don’t bother us, we keep the lights on” mentality. “We had to live with that legacy,” he shakes his

head.

The 1979 accident was a catalyst for tours, not a hindrance. The tours stopped not because of fears of exposure, but due to security concerns following 9/11 and before that a 1993 incident in which a man drove his mother's station wagon through the access gate and into the owner-controlled area of the plant.<sup>15</sup> In an attempt to convince the public that TMI was safe, tours covered an astonishing amount of the plant, excluding only the reactor building. The tours were not merely educational; they were a public relations tool. Doug told me that the tours were intentional to show the plant was safe and still interesting, "To show it was accessible and that it wouldn't hurt anybody." Doug brought his mother and father over, using his employee access to show them around shortly after he first got his job. And like him, many of my interlocutors, remember taking their out-of-state visitors on the guided tours of Three Mile Island as a sort of local site-seeing activity. TMI also had off-shift tours, in which the managers from various departments could learn about the plant in an effort to cultivate what Doug told me in another email "safety...[as] a communal effort." Indeed, making nuclear power palatable to the public, particularly after the accident required various apparatuses of safety. These public-facing and industry-wide measures became increasingly important not only to show nuclear power was benign, but also an integral part to an imagined future for America in which energy was clean, reliable, and cost effective. Due to nuclear weaponry's military zoning, underground testing, secrecy, and lack of epidemiological studies, there was a startling lack of public information to suggest anything differently. Within and outside of the US, investment in nuclear technology translated to elaborate statistical, consumerist, and spatial apparatuses to make people feel safe living and working in radioactive sites. Instead, what many Americans saw was government and

---

<sup>15</sup> He was found four hours later hiding in the turbine building.

industry propaganda fashioning nuclear energy as the benevolent giant of modern technocapitalism, powering the way to the future.

This chapter outlines these apparatuses as they were employed by the government and the industry at a national and industry level, as well as the shifting affects of the local community towards the plant—from hope to doubt to betrayal and ultimately ambivalence. I ethnographically situate Middletown, Pennsylvania within a broader historical narrative, one in which a small town with struggling industry largely welcomed the introduction of nuclear power as a source of employment, tax revenue, low-cost electricity, and clean energy only to host one of the country’s worst commercial nuclear power accidents. The now closed Visitor’s Center embodies the domestication of nuclear power in the United States, one in which a weapon of war is recrafted as a peacetime energy source and a small American town is thrust into the center of national nuclear debates and Cold War anxieties. This domestication is not a triumphalist linear narrative of progress attained through technology and infrastructure nor a teleological tale of its ascent and eventual failure, but a story of disruption, deferral, and suspension, of a technology always already becoming undone (Anand, Gupta, and Appel 2018; Appel 2018; Gupta 2018; see also Stoler 2008). I examine how nuclear technology’s seemingly paradoxical characteristics of spectacle and familiarity tenuously coexisted in government and industry propaganda, rendering nuclear technology as a safe, integral, and utterly ordinary part of white, middle-class American life.

### **Atomic Utopias**

Although tours started or ended at the Visitor’s Center, buses took visitors across the street to the 384-acre plant itself. Before they could enter the active parts of the plant, visitors

were prepared much like employees. Tours, after all, were an important public relations tool, but they were not without their risks and chief among them was plant security. At the Processing Center, visitors received a plant badge with a small Thermal Luminescent Dosimeter, TLD, a radioactive measurement device to track exposure during their hour-long walk through the plant. They then went through three tiers of security: a metal detector, a radiological measurement device, and an explosive detection instrument. Finally, they would exit through a turn-style to an outdoor walkway with chain-link fences directing them to the service building, an unremarkable-looking office space with ice cream and soft drink vending machines.<sup>16</sup>

The first stop to the power-portion of the plant was the turbine building. Visitors donned hard hats and eye protection as they walked underneath a maze of noisy pipes, highways of steam transporting the electric-generating pure, demineralized evaporated water throughout the plant. With workers going about their jobs and industrial-sized pipes gently swaying overhead, the tour guide took visitors to a science-museum-like light-up display outlining the “Three Separate Systems.” Each water system was illuminated with a different color to demonstrate how radioactive water and non-radioactive steam never came in contact under normal operations. In a pressurized water reactor such as TMI, high-pressure water in the primary circulation loop gathers heat from the nuclear fission occurring in the uranium fuel rods in the reactor vessel and flows to the heat exchanger in the steam generator. Using this heat, the secondary circulation system channels water through the steam generator, where it vaporizes into the steam and drives the turbine to generate power. Although the primary and secondary systems exchange heat to produce electricity, the water flows through closed systems. More precisely, this means that

---

<sup>16</sup> This tour is reconstructed from interviews, as well as the C-SPAN video “Walking Tour of Three Mile Island,” which aired on October 18, 1984 in Harrisburg, Pennsylvania (Collins 1984).

under normal operating conditions, the irradiated water flowing through the reactor in the primary loop should never combine with the secondary loop-generated steam. The condenser cooling system cools the steam from the secondary loop, converting it back into water, and returns it to the steam generator to be used again (“Introduction to Reactor Technology - PWR,” n.d.).

Not listed in the diagram are all the potential malfunctions that can occur, or in fact did occur at the storied nuclear power plant. For example, to prevent the core from overheating, the pressurizer in the primary system ensures that the high-pressure water can heat to approximately 600 degrees Fahrenheit without boiling, evaporating into steam, and leading to the loss of precious cooling water. Loss of pressure, due perhaps to a stuck open pilot relief valve, results in water that boils at dangerously low temperatures and leads to loss of coolant accidents, such as the one that occurred at Unit 2 in 1979 (“Introduction to Reactor Technology - PWR” n.d.).

With a brief, yet reassuring overview of nuclear power technology, the tour took an elevator to the turbine deck. Here, they could walk alongside the upper-most portion of the massive turbine generator to yet another display providing an overview of the owner company at the time, General Public Utilities (GPU). Following the accident, MetEd sued the plant designer Babcock & Wilson citing equipment malfunctions and, in an attempt to rebuild its public image, renamed itself GPU Nuclear. In 1998, GPU sold the plant to American Energy Company, now known as Exelon, which still owns Unit 1 today.

The pale green control room was perhaps the most exciting stop, where visitors could observe workers operating the endless array of screens and buttons making up the nervous system of the plant. It was like stepping into a science fiction movie, the interior of a spaceship hurtling towards the future. During a tour, it was an environment of calm control and technical

mastery. However, it was this dizzying assortment of screens and buttons that caused so much confusion in 1979. When the reactor experienced its loss of coolant, indicator lights flashed up and down the control panels and over 100 alarms sounded. Yet none of these monitoring devices indicated that the pilot relief valve had been stuck open for hours, allowing precious cooling water to escape and dangerously overheat the reactor. The accident catalyzed the decline of the nuclear industry in the United States, and with it, the future “the peaceful atom” so optimistically promised.

\*\*\*

In 1953, President Eisenhower’s “Atoms for Peace” transformed the nuclear industry from a global weapon of war to a domesticated source of carbon-free energy (Ford 1982a). The energy produced by the atom would power cities and homes across the country; its radioactive isotopes would revolutionize fertilizers, sheet aluminum, and medical and biochemical diagnostic imaging. It could even, its proponents fervently proclaimed, unite nations. At the ratifying of the International Atomic Energy Commission, the President proudly presented nuclear technology’s rebranding: “In fact, we did no more than crystallize a hope that was developing in many minds in many places... the splitting of the atom may lead to the unifying of the entire divided world” (Cole 1957). Ushered by the hand of American stewardship, the peaceful atom could transcend the deep Soviet-US divide and modernize the global South (see Zaretsky 2018). Drawing on post-war optimism, the program crafted a utopic future, in which government, industry, and technology could unite to form a better, more modern world.

In the scientific realm, the nuclear hype was perhaps even more pronounced, and its proponents described the atom with almost breathless excitement. In his 1947 book *Atomic Energy in the Coming Era*, David Dietz describes how atomic energy would completely displace

oil and gas—and by extension geopolitical conflicts over them—as “pellets of atomic energy the size of a vitamin pill” would power families’ automobiles and atomic powered “artificial suns” would allow summer resorts to “guarantee weather” and farmers to grow their crops regardless of the season (Dietz 1945). Dietz not only forecasted scientific achievement and increased industrial production but also re-imagined ways of life and consumerism. Visions of this science fiction-esque good life were always presented in the near future, a piece of science fiction becoming reality due to American ingenuity and innovation. Indeed, in a 1970 article for the *Bulletin for Atomic Scientists*, Dr. Glenn Seaborg, the chairman of the US Atomic Energy Commission, started with a hypothetical speech taking place in 1995, in which he describes the atom’s path to becoming the “lifeblood of our society”:

It lights, heats and cools our cities and homes. It powers our industry. It helps to control our waste and re-cycle our resources. On its tireless energy, space vehicles move to and from the planets with men and scientific packages, while satellites hover over the earth retrieving and relaying valuable information on the condition of this planet and man, and automated nuclear ships silently ply the seas carrying huge cargoes of essential goods between the continents and nations that are no longer armed camps. The atom is also quietly at work in our hospitals, on our farms, in our factories (Seaborg 1970, 7).

In his speech, Seaborg crafts a world in which there is little the atom cannot achieve, powering everything from medicine and space technology to recycling resources and managing waste. The “massive nuclear accidents predicted by alarmists,” Seaborg assures the audience, never occur beyond those due to natural weather events, and even then, the effects are expertly managed and contained (8).<sup>17</sup> It is nothing short of an atomic utopia, just within Americans’ grasp in the near future. During Seaborg’s tenure as chairman of the Atomic Energy Commission (AEC) between 1961 and 1971, the AEC issued construction permits for sixty-nine nuclear plants, a start on the

---

<sup>17</sup> Seaborg was already well-known in scientific circles prior to his appointment as chair of the AEC. In 1951, he and colleague Edwin McMillan discovered plutonium and promptly “hung up his lab coat” to devote his career to promoting its civilian uses (Ford 1982a).

thousands of reactors the AEC hoped to build across the country by the end of the century (Ford 26). But the AEC's work was slow, and this utopic future was dependent on severing the public's association with the wartime technology's violent past.<sup>18</sup>

Prior to President Eisenhower's speech, the legislative groundwork for the peaceful atom had already been laid by former President Harry Truman, who approved the order to drop the atomic bombs on Hiroshima and Nagasaki. Signed in 1946, the Atomic Energy Act transferred control of nuclear technology from military to civilian uses and created the Atomic Energy Commission. President Truman, however, was against nuclear power falling under the realm of the private sector; instead, the Act forbade private ownership of nuclear materials and established an absolute government monopoly: The Atomic Energy Commission (AEC). The AEC was tasked with complete oversight of the fledgling nuclear energy industry, as well as the labs, plants, and equipment that made up the sprawling domestic and international infrastructure of the nuclear bomb. Reflecting the Atoms for Peace shift from government monopoly to private industry, President Eisenhower appointed Lewis Strauss as chairman, a former Wall Street investment banker, to oversee the development of this new nuclear world. Under Strauss, the Commission began its "Power Reactor Demonstration Program," which enticed private companies with the promise of free nuclear fuel for up to seven years, as well as government compensation for reactor design and research (Ford 1982). In 1954, Strauss predicted, "It is not too much to expect that our children will enjoy in their homes [nuclear generated] electrical energy too cheap to meter." "Too cheap to meter" would stick, and the phrase would be parroted

---

<sup>18</sup> I do not mean to suggest that nuclear power was accepted uncritically among nuclear experts in the US. Indeed, J. Robert Oppenheimer, the lead physicist of the Manhattan Project and father of the atomic bomb, led the AEC's General Advisory Committee and in 1947 issued a report that argued the nuclear power program was impractical and would require decades to establish (Ford 33).

by nuclear proponents for decades to describe the almost magical energy source that could power American abundance and security without cost.

The explicit switch from the public to private sphere wove the wartime technology into the consumerist ideals making up the white, middle-class home. From the industry's infancy, nuclear power was marketed as a technology that would power everything from refrigerators to toasters. Historian Natasha Zaretsky succinctly summarizes:

If the bomb symbolized the instability of the atomic age, then power plants would be associated with the opposite: a tranquil domestic space that provided white, middle-class consumer-citizens with safety, health, cleanliness, and abundance. Within the atomic imaginary, an ostensibly apolitical, consumption-oriented, feminized domestic realm provided cover for a technocratically managed war machine (2018, 16).

Part of nuclear power's economic argument was not only that it was "too cheap to meter" but that this very characteristic would be what would allow for a certain type of consumerism and lifestyle. In doing so, the nuclear industry not only marketed a cutting-edge technology but a historically specific version of the good life.

To welcome the peaceful atom into the home, much of the success of nuclear power's domestication hinged on marketing the technology as safe, even familiar and domestic. The government produced an enormous amount of propaganda from cartoon films to coloring books to comics. In coloring books, Reddy Kilowatt personified the tireless work of the atom as he traveled from his reactor cradle to the power outlets of homes across America (Zaretsky 2018). In "A is for Atom," a short film produced in 1953 by General Energy, the cartoon narrator Dr. Atom explains to viewers how atoms are the microscopic building blocks of life itself and make up everything in the world "from cabbages to kings." The film starts with the iconic mushroom cloud transforming into the neon outline of a human-form, "a giant of limitless power at man's

command.”<sup>19</sup> The atom was a friendly cartoon helper, an essential and natural part of humankind and the world, and the benevolent giant of technocapitalism that emerges from the cloud of atomic energy’s destruction (Sutherland 1953).

Just a decade earlier, the US government and military had capitalized on this very fear of destruction to galvanize its citizens’ support and weaponized it against national enemies.

Following the first two post-World War II atomic tests at Bikini Atoll in 1946, the government released graphic reports of the destruction wrought by the bomb:

We can form no adequate mental picture of the multiple disaster which would befall a modern city, blasted by one or more bombs, enveloped by radioactive mists. Of the survivors in the contaminated areas, some would be doomed by radiation sickness in hours, some in days, some in years. But, these areas, irregular in size and shape, as wind and topography might form them, would have no visible boundaries. No survivor could be certain he was not among the doomed, and so added to every terror of the moment, thousands would be stricken with a fear of death and the uncertainty of the time of its arrival (U.S. Joint Chiefs of Staff 1946, 84).

Part of what the US Joint Chiefs of Staff described in their report was radiation’s sprawling, incoherent form through both time and space and the fear such uncertainty provoked. They went on to suggest that this very fear could be weaponized; missing from the Hiroshima and Nagasaki attacks, they argued, was precisely this “psychic stimuli” (86). Had the Japanese men, women, and children known the sheer magnitude of what they had faced, they noted, the violent impact of the bomb would have been amplified tenfold. In shockingly clear and unflinching terms, the report details how the bomb could wreak physical destruction should the extreme need for it arise, but more importantly, a profound psychological impact: “The bomb's potentiality to break

---

<sup>19</sup> Throughout the film, the unnarrated death and injury brought about by nuclear technology is glossed as technological progress necessitated by war but now used for peace. The Cold War is a “war for survival,” a battle of necessity requiring ever-advancing technological discovery and innovation, and Oak Ridge and Hanford are worlds in which the “impossible becom[ing] reality” rather than processing sites that generated international violence and domestic injury to their workers. In its place, the atom is transformed into simply another feature of nature that science can control and harness for the greater good.

the will of nations and of peoples by the stimulation of man's primordial fears, those of the unknown, the invisible, the mysterious” (86-87). This very uncertainty that had been acknowledged and weaponized needed to be brought under the artful control of scientific domestication.

Anthropologist Joseph Masco approaches the bomb as a technoaesthetic object that engenders the awe and fear of what scholars have called the “nuclear sublime” (2006). From the scientists witnessing these detonations to citizens watching filmed footage from the safety of their couches, the nuclear bomb numbed the senses through overwhelming them. Seared into many Americans’ minds was not the peaceful, innovative atom but images of mushroom clouds and nuclear apocalypse. While Seaborg had foreseen a future in which the peaceful atom would remake American society, the US Joint Chiefs of Staff speak to apocalypse and the foreclosure of that future. In the “utopian-apocalyptic circuit of Cold War national politics,” the peaceful atom and the atomic bomb would not be reconciled but tenuously balanced against each other (Masco 2015, 310). Even as Atoms of Peace propaganda wove its way into schools and science lessons, students were practicing duck-and-cover drills to prepare for a foreign nuclear attack that held the potential to not only wipe out their school and hometowns but render entire swaths of the US uninhabitable. Historian Natasha Zaretsky argues that a Cold War era “culture of dissociation” shaped the techniques of abstraction and distancing that surrounded the construction of the nuclear bomb, as well as the Atoms for Peace program (2018, 19). Americans had been trained to “live on the knife edge of war and do so in perpetuity” (Masco 2006, 109), but domesticating nuclear energy now required a national celebration of the atom’s untapped potential for good and “an amnesic suppression of its dangers” (Zaretsky 2018, 18). The pro-nuclear propaganda that the AEC churned out throughout the 50s and 60s not only transformed

the atom from an unstable weapon of war into an almost magical entity that could be domesticated and controlled, but it created a carefully crafted infrastructure that suspended its risks. In the cartoons, government-issued coloring books, scientific memos, and speeches glorifying the future promised by the atom, the AEC simply declined to address the technology's instability and its dangers.

### **Host Community**

Before the Visitor's Center was built, the area across the street from the plant was an ideal location for observing the trucks, cranes, and heavy machinery that were in the process of building a science fiction into reality on an island in the middle of the Susquehanna River. When MetEd announced the building of Three Mile Island in 1966, residents largely welcomed the plant as a source of employment, tax revenue, low-cost electricity, and clean energy (Zaretsky 2018). People would drive down, cups of coffee steaming in their pickup truck cup holders, to watch the \$130 million construction of the 845,000-kilowatt Three Mile Island Nuclear Power Plant. When construction began on the bases of the twin cooling towers, a local newspaper described it as “breathtaking,” “a land of giants” (Kessler 1968b) and “a dramatic story of man's progress—from primitive Native life to the Nuclear Age” (*The Sunday News* 1968). Others encouraged residents to get a better vantage point by boat, offering up a summertime family activity as the weather warmed (Kessler 1968a).

However, even if newspapers tended towards documenting the extraordinariness of the plant, my interlocutors remember the events less remarkably. What resonated with residents was not so much the national messaging about nuclear power's future-building qualities but its economic arguments, along with the AEC's attempts to craft radiation as a normal, safe part of

everyday. Even when people would drive down to watch the plant, it was not so much because the community was hosting the midcentury future-building projects of the nuclear industry but to watch such a huge infrastructure take shape. Attempting to capture the feelings of awe and anticipation that might have been drawing them to the site at the time of its construction, I would ask them how they felt watching the plant come together, but people would merely shrug and tell me *it was just a construction site*, unremarkable and ordinary. For other life-long residents of the area, the building of the plant barely registered, and they have no memory of the decade-long construction.

In part, this attitude towards TMI is due to the very real fact that it is not the first industry that Middletown has seen rise and fall (as Chapter 2 describes in more detail). At the time, industries across the US were shuttering their plants. In Pennsylvania, the hardest hit industry was steel (Stein 1998), including Bethlehem Steel in Steelton, Middletown's neighbor. While other parts of the state declined, central Pennsylvania remained relatively unscathed due to a diverse economy of agriculture, manufacturing, candy, tourism, medicine, and civil service work (Stranahan 1993). Hershey Chocolate generated jobs and created a tourism-generating American utopia with a company town, theme park, private school, and luxury hotel (Brenner 2000). The area's proximity to Harrisburg, the state capital, provided government jobs, and the introduction of a teaching hospital, Hershey Medical Center, in 1967 brought in white-collared, professionals.

While the surrounding area thrived, Middletown's future remained uncertain. In 1964, the Department of Defense closed the Olmstead Air Force Base, which had been a major employer. A local coal plant provided some jobs, but also covered the town in soot and dust. The construction of TMI was a monumental undertaking and brought in hundreds of jobs, as well as attracting nuclear engineers and other skilled employees to work the plant once it was up and

running. As a result, TMI was marketed to the area as a safe, clean, and cheap energy source, along with being a source of crucial employment.

From the industry perspective, Central Pennsylvania, and Middletown specifically, was an ideal location for a nuclear power plant. The company could build a plant in a geographic area with relatively little seismic activity and on a naturally occurring island in the middle of the Susquehanna River, which would provide an ever-present source of coolant for the uranium fuel. The area was rural with acres of farmland and few densely populated areas; the cities of Harrisburg and Lancaster were just over ten and twenty miles away, respectively. Hence, within a ten-mile radius proper, the area had a low population density and distribution, an important criterion for obtaining a construction permit and operating license. (Of course, the Susquehanna River's propensity for flooding and the area's farmland are also ostensible vulnerabilities in terms of nuclear safety.) Additionally, the area was in need of an employer, and the plant would provide critical jobs. Less tangibly, the area was also a white, middle- and working-class community, precisely the demographic which nuclear power promised to benefit through its targeted propaganda, and the utility received relatively little pushback from local residents when they proposed building a plant in their backyards. In fact, seventy-five percent of the population, according to a survey, was either neutral or positive about the plant prior to 1979 (Zaretsky 2018, 61). At the public hearing the AEC held (postponed twice from February to March to finally occurring on April 10, 1968), few people attended and even fewer voiced their opposition, with the exception of one local geologist who worried about a potential plane crash with the airport so close to the plant. Local residents were largely supportive to be chosen as a site of the industry and government's vision of an atomic utopia.

The community's initial faith in TMI was also a reflection, Natasha Zaretsky argues, of

the area's insulation from the 1960s and 70s anti-war and civil rights activism around the US. Central Pennsylvania was and remains a Republican stronghold with residents who have long combined conservative politics with Protestant Christianity (Lamis 2009). Many of the area's residents were German and Scotch-Irish immigrants from the 18<sup>th</sup> Century, gravitating to the area's rich soil and plentiful natural resources (Stranahan 1993). The German influences are most obviously seen in the area's large Amish and Mennonite populations, which drive agriculture and generate tourism, but also a conservative deference to authority, and the accident exposed for some residents how they had been living with what they called "rose-colored glasses" and a naïve trust in government (Culley & Angelique 2003).

## **Doubt**

On May 26, 1958, during the height of the Cold War, President Eisenhower appeared on public television to wave a magic "neutron wand" (which was, in reality, a stick with a lightbulb attached at the end) and the first commercial nuclear power plant crackled to life in Shippingport, Pennsylvania. By 1974, fifty four reactors were operating across the United States with another 197 on order (Davis 2012). Pennsylvania became one of the country's leading producers of nuclear power, second only to Illinois, as companies flocked to build nuclear reactors cooled by its rivers. The most popular were pressurized water reactors, like TMI, and the AEC poured its resources into their development.<sup>20</sup> Furthermore, unlike the poorer communities of color that lived alongside the country's toxic waste processing and dumping, the industry's overconfidence in nuclear power's safety translated to a large proportion of nuclear power plants being built in

---

<sup>20</sup> Pressurized water reactors were not the most sophisticated or practical—they would require large amounts of precious Uranium-235—but thanks to successful nuclear submarine designs, they were the most developed.

the backyards of white, middle-class communities. These communities, like Middletown, would not only act as host but the beneficiaries of nuclear power's promised safe and abundant energy.

However, the program had a slow start and failed to occur at the fast pace predicted by AEC's 1950s forecasts. By 1961, only two nuclear power plants had opened. Public enthusiasm also began to wane as the glamor of the space race eclipsed the futures promised by nuclear technology. And while the Eisenhower administration had removed legislative and political hurdles, nuclear power's economic success remained uncertain. Once hailed as "too cheap to meter," plants were taking longer to build and much more costly than anticipated, ending construction \$50-60 million over budget.<sup>21</sup> Despite public scrutiny and President Kennedy's prodding, the AEC under Seaborg only renewed their commitment to optimistically and enthusiastically promote nuclear technology's economic edge and scientific potential, fearing losing public support at this crucial stage could derail the program.

The debates around nuclear power's economic trajectory preempted attention away from reactor safety concerns. Daniel Ford, former director of the Union of Concerned Scientists, claims Seaborg often elided questions of nuclear safety, simply stating that it was a "'an overriding consideration' and that 'every possible precaution' was being taken to protect the public" (64). However, according to Ford, the AEC board lacked the technical skills to critically assess safety. Furthermore, as both the designated "promoter" and "regulator" of nuclear power, the AEC necessarily was a government organization biased towards the nuclear industry's success, at times prioritizing economics rather than public safety.

For example, to counter the technology's economic toll, the industry simply proposed

---

<sup>21</sup> Indian Point, for example, cost \$110 million to build, despite initial proposals for a budget of \$55 million.

building bigger reactors with increased production, a design that included Three Mile Island. At the time, the industry and the AEC had still not proven their technical mastery of the smaller reactors coming on the scene. The Commission's scientific advisors warned that larger reactors would necessarily be more complex, harder to control than smaller ones, and contain more radioactive material. Of principle concern in the mid-1960s was a sequence of events known as the "China Syndrome," in which an ordinary plant occurrence—a ruptured pipe or stuck valve—could suspend the plant's cooling systems, allowing the uranium fuel rods to overheat and melt through the five-inches of steel to the bottom of the reactor vessel and leach into the ground below (all the way, the tongue-in-cheek scientists claimed, to China). The name was facetious, but one scientist worried that such an accident could render an area the size of Pennsylvania a disaster zone (Ford 1984, 69-70). It was a line that was repeated later in the movie *China Syndrome*, a fictional telling starring Jane Fonda that portrayed this accident sequence-triggered meltdown and was released a mere two weeks before the eerily similar Three Mile Island loss of coolant accident.

Only in the mid-1960s did the AEC begin to quietly reexamine reactor safety concerns. The Commission mobilized a survey in 1964 to investigate the types, likelihood, and consequences of nuclear accidents. The 1965 results were meant to update a 1957 government-sponsored study, the Brookhaven Report, which found that a large nuclear accident or meltdown could cause up to 3,400 deaths, 43,000 injuries, and 7 billion dollars in property damage (Brookhaven National Laboratory 1957). The results of the 1957 study were much more significant than the AEC and industry's overconfidence let on. They hoped that newer estimates would be lower based on advances in nuclear safety strategies and expertise. Rather than allaying safety concerns, however, the 1965 results only amplified them. Based on the larger 1,000

megawatt reactors that had become the industrial standard, the study found that an accident could cause 45,000 deaths, 43,000 injuries, and 17 billion dollars in property damage at a plant 35 miles from a city (Ford 1982a). Fearing a public relations crisis should the reports become widely available, the AEC brushed off the results, arguing that such accidents qualified as “incredible events,” catastrophic but extremely unlikely, so much so that they posed no threat to public safety.<sup>22</sup> Under Seaborg, the AEC opted not to publish the results and instead drafted a short letter that briefly acknowledged that “the theoretically calculated damages would not be less and under some circumstances would be substantially more than the consequences reported in the earlier [1957] study” (qtd. in Ford 1982, 79). Rather than a detailed explanation of the study’s results, however, the letter went on to call for greater liability protection for the industry should such accidents occur.<sup>23</sup> In the following year, the AEC issued construction permits for thirty more large nuclear power plants in the US (1982, 81).

At the same time reactor safety was called into question by members of the scientific community, studies of the health effects of nuclear fallout were beginning to take shape, and the results were alarming. The US government conducted 588 atomic tests between 1946 and 1963, when the Limited Test Ban Treaty was signed and mandated that all testing occur underground. Nearly a third of these bombs were detonated aboveground at the Nevada Test Site and the Pacific Proving Grounds (the Marshall Islands and other parts of the Pacific) (Zaretsky 2018). Government records indicate that the sites were unpopulated and remote, but they were far from empty. The residents of the US Southwest and Pacific islands, as well as the plants and animals

---

<sup>22</sup> This lack of concern over “incredible events” is the reverse of the low probability, high consequence logic that would come to dominate the US security state following 9/11 (see Masco 2014).

<sup>23</sup> Leading to the Price-Anderson Act in 1957, which established an accident liability limit that the nuclear industry would be required to cover.

making up the ecosystems of these areas became nuclear test subjects and bore the brunt of atomic testing's fast and slow violence (Nixon 2013). Operation Bravo shocked scientists when the blast released a 15-megaton yield (1,000 times more powerful than the Nagasaki and Hiroshima bombs) in the Pacific atolls and carved a mile-wide, 200-foot deep crater, killing animals and vegetation and producing a plume of far-reaching fallout that injured an estimated 665 of the Indigenous residents of the atolls and traveled all the way to Japan, Australia, the United States, and Europe (Zaretsky 2018). In the "empty" deserts of the US Southwest, over 700 pigs were placed in various containment structures (open pens, aluminum tubs, and open-faced boxes) in a series of experiments to assess the effects of radioactive blasts on soldiers (Masco 2006). In Troy, New York, a professor alerted the New York Department of State Health that during a class demonstration, he measured alarming rates of radioactive rainfall thirty-six hours after a test bomb was detonated in Nevada (Clark 1954)

By 2001, a comprehensive report conducted by the Department of Health and Human Services, Centers for Disease Control, and National Cancer Institute estimated that anyone living in the US since 1951 was exposed to radioactive fallout, and that the aboveground testing in the US alone during this time caused 11,000 cancer deaths and between 11,300- 212,000 thyroid cancer cases among US citizens. The study transformed exposure, in the words of Joseph Masco, into a "general condition—a question of degree rather than kind" and an inevitable byproduct of the US weapons program (Masco 2006, 313). However, in the 1950s and 1960s, fallout's invisible, yet sprawling spatial reach and latent temporal effects created an elusive risk that heightened the public's uncertainty. Scientists and anti-nuclear groups pointed to low-level radiation's toxic effects in the form of leukemia and other cancers, blood disorders, infertility, and birth defects and miscarriages. President Eisenhower countered these claims by arguing that

atomic testing “would be only a small fraction of the exposure that individuals receive from natural sources and medical x-rays during their lives” (Hamblin 2007, 175). Like the friendly atom that made up everything from cabbages to kings, radiation was ubiquitous—a harmless, even normal part of American life.

The AEC increasingly came under public critique for lax safety regulations and a failure to protect public and environmental health. It was dissolved in 1974 when Congress passed the Energy Reorganization Act and replaced by two branches of regulatory oversight: The Department of Energy (created in 1977 by President Jimmy Carter) and the Nuclear Regulatory Commission. The DoE would oversee nuclear technology’s research and development. The NRC’s key purpose became to ensure nuclear safety. The hope was that separating the promoter and regulator roles of the AEC would lead to more objective oversight of the nuclear program. However, the NRC inherited some of the AEC’s overconfidence. In 1975, the newly minted NRC began its oversight with a reactor safety risk assessment study. Similar to the AEC reports in the 50s and 60s, the study’s aim was to estimate the potential damage of a large nuclear commercial accident. Headed by and named after the MIT professor Norman Rasmussen, the report concluded an American citizen was more likely to be struck by a meteor than suffer fatal effects from a nuclear accident (Zaretsky 2018). The NRC released the report in a highly public press conference and pushed the results to garner support for the renewal of the Price-Anderson Act. Over 2,000 pages long, the report had a short, optimistic Executive Summary meant for public relations and news outlets that expressed the extreme unlikelihood of a nuclear accident compared to non-nuclear events, such as earthquakes, hurricanes, dam failures, and airplane crashes. The remaining 2,000 pages told a murkier story, and members of the scientific community quickly picked apart its unreliable methods and assumptions, including the exclusion

of human rather than mechanical errors, the calculation of only short-term rather than long-term fatalities (i.e. cancer deaths), and narrow scope of “anticipated” accident sequence events. In stark contrast to the report’s triumphalist announcement, the NRC quietly withdrew its endorsement in January 1979 just before the TMI accident (Ford 1982a).

The combination of human and mechanical errors that gave rise to the loss of coolant accident that TMI Unit 2 suffered on March 28, 1979 was just one of the sequences that was “unanticipated.” Despite Seaborg’s 1970 prediction and the Rasmussen Report’s anticipated accidents, this accident was not caused by natural events or predicted mechanical malfunctions, but human error at the level of plant operators, the utility, and the NRC at large. The incident at TMI catalyzed the decline of the nuclear power industry, already tenuous yet stubbornly moving forward. After two decades of the institutional optimism and overconfidence that came to characterize it, the slow progress of the nuclear power industry came to a halt. After only 90 days in operation, the \$500 million Unit 2 was destroyed. 20 tons of melted uranium had sunk to the bottom of the core, and it would take \$1 billion and fourteen years to clean up the reactor damage (Associated Press 1993). The accident shook the AEC and NRC’s carefully crafted image of safety and led to new regulations and the creation of independent regulatory bodies. And for a brief moment, central Pennsylvania was the center of an international news story.

## **Betrayal**

News of the possible meltdown at Three Mile Island spread rapidly. WKBO, a Harrisburg radio station, broke the story that an incident had occurred at TMI-2 on its 8:25am newscast after a local broadcaster heard that police and firefighter teams were dispatched to TMI. Local reporter Mike Pintek aired the story, but “tried to tone it down so people wouldn’t be

alarmed,” and by 9:00am the Associated Press released its first dispatch (Kemeny and et al. 1979a, 104). As the morning progressed, hundreds of reporters flocked to the Visitor’s Center; the NRC, EPA, and DOE were dispatched to assess the radiation levels and damage; and people around the Susquehanna Valley were waking up to learn they were the leading news story in the world. Overnight the Visitor’s Center had transformed into “Trailer City,” a network of temporary offices for radiological experts, government agency employees, and reporters.<sup>24</sup>

If you speak to anyone about the days following the morning of March 28, 1979, they will describe it as a time marked by fear and chaos. The Kemeny Commission, a retroactive report organized for President Jimmy Carter, described “the response to the emergency [as] dominated by an atmosphere of almost total confusion” (Kemeny and et al. 1979a, 17). Residents felt betrayed by contradictory government and MetEd reports, which indicated that the radiation had in fact been contained, only to claim a few hours later that there had been a “low level release of radioactive gas beyond the site boundary” (J. S. Walker 2005, 83). Governor Thornburgh writes in his autobiography that he received contradictory reports, often just minutes or hours apart and was forced to make decisions based on conflicting information (Thornburgh 2003). Some families started to quietly pack up and head to relatives’ homes upstate, in Pittsburgh, Delaware, and other areas within a one- or two-hour driving distance. They left whole bags of dog food torn open for pets they were not sure they would return to and gathered family photo albums. Others packed in a panic, taking only an overnight bag. Other people called friends who worked at the plant, who relayed that everything was fine, the media was overstating it, and decided to stay.

---

<sup>24</sup> The network of trailers became so large, “Trailer City” had its own newspaper to keep its temporary residents up-to-date with the plant’s happenings.

On Friday, March 30, a helicopter team detected a reading of 1,200 rem per hour over the containment building. The reading prompted Thornburgh to order the evacuation of pregnant women and children living within a five-mile radius of the plant.<sup>25</sup> The following day, the NRC issued reports of a hydrogen bubble forming inside the reactor vessel from the zirconium in the fuel rods reacting with the hot steam to form gaseous and explosive hydrogen. Based on their staff's data, the NRC concluded that an explosion was imminent, and public worry and concern reached a climax as the state and local governments contemplated more sweeping evacuation plans. The following day, however, further investigation indicated there was not sufficient oxygen in the reactor to generate a hydrogen explosion; furthermore, the NRC admitted they had the necessary information available from other sources outside of the organization to determine the lack of danger at the time (Kemeny and et al. 1979a).

---

<sup>25</sup> Thornburgh had been hesitant to evacuate, given the logistics and safety of facilitating an evacuation whose scale had never been attempted before. All of these factors were exacerbated by the fact that the area had little prior emergency evacuation planning in place. Initially, experts advocated the evacuation of all people ten- or twenty-miles downwind of the plant—a plan that attempted to account for both the direction and scale of radioactive release. However, an evacuation of ten-miles would include hospitals, and 20-miles would include the evacuation of 650,000 people, 13 hospitals, colleges, and a prison—a task unthinkable to orchestrate for the area without preexisting evacuation plans. Instead, the evacuation parameters were determined by what would have the lowest impact while still ensuring some safety to the population, and the five mile radius was not decided so much based on radiation release or exposure but logistics (Thornburgh 2003). PEMA set up evacuation centers around the area, including the Hershey Stadium, a mere ten miles north of the plant.



*Image 8: A PEMA evacuation center at Hershey Stadium, a mere ten miles from the plant. Photo courtesy of Ron Mann.*

The reversal of the NRC's reports regarding the hydrogen bubble severed residents' already tenuous trust in the organization. With American trust in the government still reeling from Watergate and the Vietnam War, the public worried that the mixed reports were covering up a much more serious problem. People began to fear that the people in charge did not have the adequate knowledge to address the problem, or worse were systematically attempting to cover up the full extent of the damage. Yet the government continued to maintain that the accident had been successfully contained; very little radiation had been released.

To assuage local and national fears, President Jimmy Carter and his wife Rosalynn Carter, traveled to the area and visited the plant. A nuclear engineer and vocal proponent of nuclear power, the President and the First Lady slipped yellow covers over their shoes and spent

a total of thirty-six minutes in the plant, fifteen of which were in the control room. After their visit to the plant, they traveled to the town hall to give a short, reassuring speech. “I felt perfectly safe,” he told reporters a week later at the White House, “I was in the control room just a hundred feet away from the reactor core itself. The level of radiation was carefully monitored even before they found out the president was coming” (Stencel 1999). Laughter followed, and his visit was indeed successful in reassuring some Middletown residents who felt that if the President of the United States was there, the plant must be safe.

Yet for others, the accident and the government and industry’s confusing response were not easy to forget. In the wake of the chaos the accident had generated, residents—from housewives to longtime antinuclear activists—mobilized themselves to gather and disseminate information. They wrote letters to elected officials, provided testimonies at public hearings, formed demonstrations to protest the reopening of Unit 1, filed class action lawsuits against MetEd, and traveled to DC antinuclear mobilizations.<sup>26</sup> The six-year fight over the plant led to over a dozen grassroots organizations with acronyms like PANE (People Against Nuclear Energy) and ANGRY (Anti-Nuclear Group Representing York) that reflected their members’ strong emotions at the time. The female-centered Concerned Mothers and Women of Middletown and

---

<sup>26</sup> TMI’s conservative environmental politics were set against a backdrop of blooming, often left-leaning environmentalist movements. In her 1962 *Silent Spring*, Rachel Carson documented the indiscriminate use of pesticides, primarily DDT, and cited government secrecy and negligence as key reasons for pesticides’ proliferating effects. Linking human health to that of the environment, Carson spurred a discourse which channeled toxicity to critique the unforeseen and harmful byproducts of industrialization, or what Ulrich Beck (1992) called the conditions of a “risk society.” While *Silent Spring* is often marked as the birth of modern environmentalism, it was more specifically the birth of a particular form of environmentalism—specifically one concerned with middle-class consumers. Environmental justice, emerging from the grassroots activism around the Love Canal and Warren County in the 70s and 80s, implicated the structural and racial inequalities in the distribution of environmental risk (McGurty 2007). By the end of the 1980s, the various strains of environmentalism created a widely recognizable structure for telling stories about toxic threats (Buell 1998).

the male-run TMI Alert. The gendering of this activism reflects the conservative undercurrents of the area's antinuclear culture (Culley and Angelique 2003), and although they became activists with a heightened suspicion in the government, they distanced themselves from left-leaning protest movements (Zaretsky 2018).<sup>27</sup>

For Paula Kinney, one of the founding members of Concerned Mothers of Middletown, the TMI accident ruptured her relationship with the government. "I could see the towers from my kitchen window," she told me over the phone. "I knew it was a form of energy, but I was—I had no fear. None." I asked her why that was, and she replied, "Because I was very trusting, or extremely trusting, because I, I never dreamed that profits and greed would come before people's lives." It was a concept "that was too foreign" to even have crossed her mind. For the white, middle-class "reluctant activists," as they described themselves, mobilizing was not a natural extension of their political sensibilities.

For residents like Paula, this sensibility had taken a passive shape, a silent trust in a paternalistic government working in their best interest (embodied by Governor Thornburgh shepherding pregnant women and children to safety through his largely arbitrary evacuation plan), even if they did not know or understand the daily machinations taking place. They were used to being the population that the government cared for and, indeed, to whom nuclear power promised an atomic utopia. While betrayal of both the government and the industry ruptured this trust, the emerging activist politics around TMI maintained elements of its conservative roots.

---

<sup>27</sup> Natasha Zaretsky argues that TMI crystallized a particular conservative ecological imaginary that appropriated liberal protest culture's emphasis on bodily vulnerability. The post-Vietnam awareness of bodily vulnerability created a new patriotic body politics which linked bodily injury to a suspicion of authority, what she calls "biotic nationalism." However, whereas this patriotic bodily politics during antiwar demonstrations centered on the prisoner of war, this conservative ecological politics took up the bodies of women, children, and the unborn.

This cultural and political conservatism not only revealed itself through the activism’s maternalist politics, but also its local scale and focus. The compensatory nature embodied in “reluctant activism” directly tied the grassroots movement’s participants to their locale in central Pennsylvania. Their white, middle-class homes and hometowns had been endangered, compelling them to activate to safeguard them. Unlike the rise of women’s and gay liberation and the black and women’s health movements in the 1960s, which emphasized the universalist appeals to bodily autonomy, “conservative activists were driven by the sense that *their* bodies and the bodies of the people they loved—the patriot, the veteran, the radiation victim, the loyal American—had been injured and betrayed by the government” (Zaretsky 2018, 194). Hence, many of them often told me their activism is not about being pro- or anti-nuclear, but safety. And indeed, this sentiment remained at the 2019 decommissioning hearings when one member of Women and Mothers of Middletown told the NRC in 2019 at one of the decommissioning hearings that her concern was not a political issue but a safety issue: “The safety of my children, our children, the people of this community.” Her statement was met with cheers around the packed room. The victimized body of TMI was not a general irradiated body, but a highly local one, silently infused with the raced and classed dimensions of the predominantly white, middle-class area, and the far-reaching geopolitics of nuclear power were worked out on a local rather than global scale.<sup>28</sup>

Despite the grassroots activism and conservative national politics, the TMI accident catalyzed, Unit 1 came back online in 1981 and the plant quietly faded into the background of daily life in central Pennsylvania. The lack of conclusive epidemiological and scientific evidence

---

<sup>28</sup> As a result, I rarely heard the Middletown activist groups engage with nuclear topics outside of TMI, such as subsequent nuclear accidents at various plants around the country and the major nuclear accidents at Chernobyl and Fukushima years and decades later.

that the accident had released significant amounts of radiation or caused radiogenic injury generated widespread uncertainty, but it also allowed for a stunning array of discursive registers to emerge after the accident. The plant was not only a site of fear and protest, but dark fascination, humor, and even ambivalence. Running parallel to the area's grassroots activism was a local and national economy of kitsch memorabilia and dark humor.

### **Domesticating Fear**

While Middletown housewives and other anti-nuclear activists marched on Washington with signs reading "We are not guinea pigs," residents donned T-shirts following the accident with a proud, tongue-in-cheek adage "I survived Three Mile Island." They would drive to the Visitor's Center and take their picture, smiling in front of the infamous plant. Bumper stickers declared "Hell, No! I Don't Glow!" In a (rather brilliant) parody of the hit movie *China Syndrome*, Saturday Night Live performed a skit called "Pepsi Syndrome," in which Bill Murray plays a clumsy control room operator who spills a soda over the control board that leads to a nuclear meltdown that irradiates a visiting President Carter, who despite becoming a mutated giant maintains his full support of nuclear power. As a gag gift, you could purchase canned radiation, "canned on location at TMI," and pillows stitched with the TMI cooling towers. "REACT-OR," a boardgame promises to be a "radiating experience" and challenges players to accumulate the least radiation during a meltdown. Players work their way through the separate water systems rendered on the board as loops for the game pieces to move through, reproducing the light-up display from TMI's guided tours. Whoever is least irradiated, wins.

Echoing the fear and fascination that characterized the start of the nuclear power industry and the consumerism encouraged by its domestication, some people collected these items with

fervor.<sup>29</sup> One such collector, Nick, eagerly showed me the various objects he had curated over the years over Zoom from his apartment in New York, though he assured me that he had gotten very “selective” more recently. Six-years-old at the times of the accident, Nick grew up in Hershey and remembers evacuating to his grandparents’ home in Maryland. He remembers it “like a vacation”; he and his family went to the beach and D.C. museums and returned a few days later. As we talked, he held up the canned radiation to his laptop camera so I could see it over Zoom. Then he pulled out a box underneath his bed with a decorative plate and a dozen different t-shirts. “My great white whale is this lamp that is shaped like a cooling tower” crowned by a pictograph of the plant on its shade. Once he had that, he assured me with a smile, his collection would be complete. A cooling tower-shaped lamp, an electric household item so similar to the ones early nuclear power propaganda promised to power, seemed like a fitting object to culminate Nick’s collection.

When he had finished showing me everything, he laughed, “Only in America, right?” And I had to agree. The register of dark humor and consumerism built around the TMI accident did feel particularly American. For Nick, it reflected the American tendency to capitalize on any opportunity, even those potentially traumatic. But for me, I always felt that belying the varying registers of how people understand the TMI accident is the deep uncertainty at the root of nuclear power. Without epidemiological or scientific evidence to suggest otherwise, the general consensus following the accident had been that it was successfully contained (although Chapter 4 troubles this conclusion), and local residents, including Nick who researched the accident extensively for a small-scale documentary, generally followed this understanding. Furthermore,

---

<sup>29</sup> The pop culture fascination with the nuclear bomb—in the form of movies on nuclear apocalypse and board games that challenged players to gain global domination through nuclear war—had already carved a space of play and entertainment around with nuclear fear (Masco 2014).

in line with the pro-nuclear propaganda at the time, TMI memorabilia played on nuclear power's domestication. As plates, board games, and bedside lamps, the consumer products followed a well-worn social script in which nuclear power had woven itself into the American home, not only as a source of energy but a form of dark entertainment.<sup>30</sup>

Despite Nick's adult fascination with the plant and the accident, he never thought about the plant growing up. Nick described how TMI "seeped into the consciousness." It was physically present, but he never studied it in school or talked about with friends, beyond a few jokes about glowing in the dark. Even after TMI-1's controversial restart, the plant was rarely on the news. In large part, he attributes this lack of remarkability—that returned relatively quickly after the accident—to the economic boom that TMI offered. His friends' parents and neighbors worked at the plant. His baseball coach worked in the control room and was there the night of the accident. Similarly, Nick's childhood friend, Christine, recounted to me through tears how her family evacuated to her grandmother's house in Ohio and stayed for over a week, uncertain of what they would return to, and how even the summer after, her parents limited her and her sister's time outside. But eventually the plant "faded into the background." And indeed, most people did not activate to shut down the plant or collect kitsch memorabilia but simply went about their lives like they always had. Nuclear power had once again become utterly ordinary.

What Nick and Christine described was familiar to me. As someone born after the accident who grew up in the area, I never remember thinking or talking about TMI at school, with friends or family. Unlike Nick and Christine, I didn't know many people who worked at the plant. It was not on the news. It was just always *there*, the steam pooling over the horizon. How

---

<sup>30</sup> These consumerist products drew on atomic pop culture and a widespread fear of and fascination with the nuclear bomb. The mid- and late-20<sup>th</sup> century saw an explosion of movies, songs, and comics depicting nuclear technology's perverse effects—from mutated superheroes to board games that challenged players to gain global domination through nuclear war.

can something that once drew crowds to marvel at its construction then to protest its existence simply fade into the background of everyday life? In many ways, some of my interlocutors' present ambivalence towards the plant (a theme that reappears throughout this manuscript) is in part due to the very real fact that a nuclear power plant that offers hundreds of jobs while threatening biological and environmental life is an easy thing to feel ambivalent about.

However, beyond this tension between livelihood and life, the present ambivalence towards nuclear power is a mutation of the Cold War era's "culture of dissociation" that Zaretsky argues relied on "stark distinctions between the foreign and the domestic, safety and danger, and war and peace" (Zaretsky 2018, 41). The TMI accident had ruptured the culture of dissociation the government and the industry had spent years crafting to weave nuclear technology into everyday life, severing its military violence from its peaceful, domestic uses. By the 1980s, however, Zaretsky argues that the Cold War-borne culture of dissociation had been sutured back together. In the decade following the accident, GPU increased its public relations budget dramatically, opened Unit 1 for tours, and "embarked on a low-key but well-coordinated publicity campaign to rebuild its reputation" and "reintegrate itself back into the local community" (142). The culture of dissociation had created well-worn psychosocial paths through which nuclear technology could paradoxically exist as both a specter of apocalypse and intergenerational violence, as well as a perfectly safe and normal feature of everyday life.

Yet in reality, nuclear technology's real and fantastical qualities always tenuously co-existed. In his analysis of the bomb as a phantasmagoria and national fetish, Masco argues that the "apocalyptic focus on weapons [preempted] attention to the everyday social and material effects of the US nuclear production complex" (Masco 2006, 21). It was precisely the US nuclear complex's weaponization of fear that obscured the daily machinations of violence and introduced

an apocalyptic sensibility. Indeed, cracks in this culture of dissociation started to show when movies like *China Syndrome* and their lines premonishing that nuclear accidents “could render an area the size of the state of Pennsylvania permanently uninhabitable” hit too close to home. As a result, TMI may not represent a story constituted by various moments in which residents were either entirely dissociated from or aware of nuclear power’s dangers, but living the everyday messiness of a national culture of dissociation that was always already coming undone—more a set of ideal separations than lived experience.

The dark humor and kitsch culture embody the muddied and fraying culture of dissociation—a sort of tongue-in-cheek nod to nuclear technology’s terrible consequences if mishandled and an overconfidence that such an incident is more fantasy than reality. As a result, consumers are not so much dissociating from the fear of the technology, which indeed is commodified in this kitsch economy, but *domesticating* it. The uncertain futures that the TMI accident generated are transformed into household items, T-shirts, and boardgames. Much like the process of domesticating nuclear energy, the process of domesticating the fear that TMI precipitated hinged on bringing it into the home as a familiar, yet strange part of everyday life and purifying it of its violent undercurrents.

Nick is sad to see the plant close. For him, it is a nostalgic feature of his childhood, and he hopes the cooling towers remain as a historical monument, the ultimate artifact to embody the plant’s “ambiguous legacy.” The cooling towers that rose so high reporters called the Island “the land of giants” could also stand as a reminder—a cautionary tale of when technology outpaces expertise, when industry trumps public health and safety, and when the future promised never in fact arrives.

## Unbuilding a Future Promised

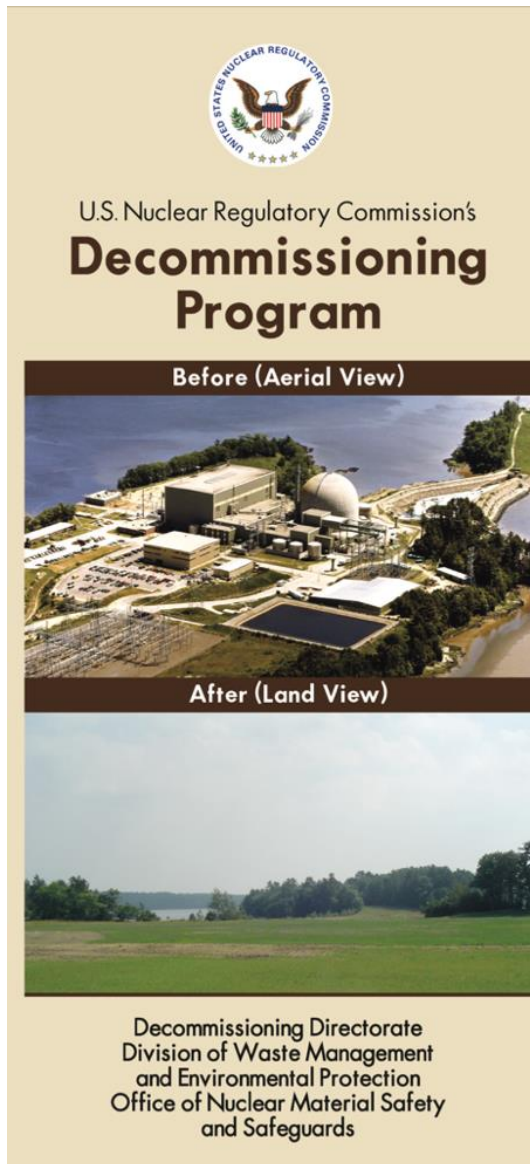
On September 19, 2019, I stood at the Visitor's Center with a handful of journalists, antinuclear activists, and residents listening to a spokesperson from Exelon mourn the socioeconomic and environmental loss of TMI's carbon neutral energy. Unlike the massive public relations built around the atom's midcentury branding, the press conference was small, and I only happened upon it on one of my drives by the plant in the early days of my preliminary fieldwork. Its modest size also contrasted with the outpouring of local support Exelon mobilized around TMI when it announced it was in danger of needing to close the plant due to financial concerns. Despite being one of the most well-run plants in the country, according to Exelon and its employees, it simply was not producing enough power to offset the cost of its aging infrastructure. Once heralded as the epoch of modernity, the plant was recast as antiquated, expensive, and obsolete.

The announcement incited a renewal of interest in the forgotten plant. TMI and other nuclear employees took to Harrisburg to demonstrate their support not only for the jobs that TMI supplied, but its green, allegedly carbon-free energy.<sup>31</sup> At public hearings organized by the NRC to debrief the process of decommissioning to the local area, I sat with other central Pennsylvania residents to learn more about what decommissioning would mean for our hometowns. NRC representatives greeted us with sizable smiles and safety brochures outlining the nuclear decommissioning process with before and after pictures of decommissioned nuclear sites—a midcentury utopia on the top and an empty grass field on the bottom. A table over, local activists handed out potassium iodine tablets to suppress thyroid absorption of radiation in the event of a

---

<sup>31</sup> When viewed from the full scale of its production, however, nuclear power is far from carbon-free. The mining, milling, and production of nuclear fuel, as well as the construction and decommissioning of nuclear plants, nuclear technology can emit greenhouse gases varying from 10 to 130 grams of CO<sub>2</sub> per kilowatt hour of power, lower than fossil fuels, but higher than wind and solar (Lenzen 2008).

nuclear crisis. I passed by plant employees in Carhartt jeans lamenting on failed efforts to save the plant and the withdrawal of local politicians' support when the plant's controversial future threatened their own political careers. Decommissioning also rekindled, for some residents, the fears and uncertainty of 1979, and when the NRC invited public comments, activists once again told their stories of the harm and betrayal they faced when they believed the government and industry's promises that nuclear power was safe and instead were faced with one of the worst nuclear power accidents in the country. Yet in almost a complete reversal of the area's public opinion from the 1980s, the overwhelming response was, as one former reporter put it, *a surprising crusade to save TMI*.



*Image 9: NRC Decommissioning Program Brochure with before and after pictures of “Yankee Rowe” Atomic Electric power plant in Massachusetts, which was permanently shut down in February 1992 and decommissioned through 2007. It is known as a success story in nuclear decommissioning and was often lauded by the NRC at public hearings on TMI Unit 1’s decommissioning.*

Despite the initial renewal of interest in the plant, after that press conference on September 19, 2019, TMI quickly faded from public awareness. Its decommissioning quickly became eclipsed by Covid, concerns about a financial recession, and the polarizing presidential election of 2020. Even Paula, so active following 1979, told me while she is concerned about decommissioning—the “shortcuts that are being taken” and the “unchartered territory”—“it’s not the same” as the accident. Her family’s life was reorganized after the accident; part of her

daily routine became planning for a possible evacuation should something happen at TMI, and when the plant's sirens would malfunction or run a test, her adrenaline would rush.

Decommissioning was different; it did not elicit this trauma-borne visceral reaction. Its chronicity was simply something to monitor and live alongside. For my interlocutors, the accident followed a conventional arc of crisis, a state of emergency triggered by an event followed by panic and eventual resolution. Yet decommissioning presented a different crisis formation, one that defied a tidy narrative. Indeed, decommissioning renders the area even more vulnerable and chronically so, as several hundred metric tons of radioactive waste will continue to be stored on an island in the middle to the Susquehanna River managed by deteriorating infrastructure and a skeletal staff. Many residents, however, simply told me that it had closed and were unaware that the process was ongoing and would likely outlive them. Just as it did after the accident, TMI had flared into the local imaginary only to recede once again into the background.

TMI is one of twenty American nuclear power plants set to close over the course of the next half century. These decommissioning efforts begin without comprehensive long-term waste solutions (beyond the decommissioning process itself) and largely culminate in the failure of the nuclear promise of the mid 20<sup>th</sup> century. The next chapter details how this plant closure is felt in the present day-to-day life of Middletown residents as a decommissioning of a particularly American version of the good life. In the closing of this chapter, I want to explain the technical process of decommissioning, its vulnerabilities and its orientations towards the future.

As a result of the 1979 accident, Three Mile Island is relatively unique in that its two reactors are owned by two different utilities and undergoing decommissioning on different timelines. Unit 2, the accident-prone reactor, began its clean-up in the summer of 1979. It was the first decommissioning the NRC and the nuclear power industry attempted. And unlike the

decommissioning processes that would occur decades in the future, TMI-2's process was complicated by the very real fact that the industry lacked the expertise and technology to clean-up and successfully close a contaminated nuclear plant. The core was the most daunting problem: The upper third had "fragmented like glass," one employee told me, completely reduced to rubble and leaving the center totally exposed, which had fused together into an impenetrable mass. Removing the radioactive contents would require technology that could safely and effectively break through and posed a major challenge to the nuclear industry's tools at the time. GPU Nuclear, the NRC, and the DOE developed technology to meet the needs of clean-up as they emerged, and the timeline of TMI-2's clean-up was determined by a frenzy of innovation. They designed equipment to lift the reactor vessel head, a huge drill that bored through the core like *Swiss cheese*, and finally the protected rail carts that would transport the waste across the United States. The technology took years of designing, building, and testing before it was ready to operate in Unit 2. And much like scientists championing nuclear power itself, the clean-up innovations were heralded by some of my interlocutors as *cutting edge* and *the first of its kind*. In doing so, the accident was recast not as a failure but an opportunity to showcase American ingenuity. The mixture of pride and awe in the clean-up technology echoed the industry's nationalist ideals and optimism, carrying over the melioristic hope in American innovation even to the reactor's early, compensatory decommissioning.

The undertaking brought in thousands of skilled and non-skilled workers, providing an economic boom to the area in the wake of the accident. Many of the employees I spoke to for this project were hired in the early 1980s to perform what would become a decade-long process. Those going into the reactor building and other contaminated areas would take shifts to minimize their exposure to radiation. They did everything from mopping up radioactive water to operating

the huge drills breaking up the molten core. The process produced hundreds of tons of high-level radioactive waste, which employees loaded on to the specially designed cargo freight cars to await transportation out to Idaho. Some employees claimed the train's schedule was kept secret, and they just remember one morning, in the predawn hours, a train rolled in and took the loaded cars away.<sup>32</sup>

By April 1990 when most of the spent fuel and contaminated materials had been removed, the NRC declared TMI Unit 2's clean-up was complete. The unit entered a form of long-term management called post-fuel monitored storage, a sort of liminal state between clean-up and decommissioning in which the GPU and the NRC determined the remaining materials and infrastructure were sufficiently safe to move towards a strategy of monitoring, securing, and maintaining the site (Standerfer 1986). Throughout the 1990s and early 2000s, Unit 2 remained largely untouched. The NRC's current statement regarding the accident-prone reactor is "TMI-2 has been defueled and decontaminated to the extent the plant is in a safe, inherently stable condition suitable for long-term management" and estimates its closure to occur in 2037 when the infrastructure of the plant will be torn down and the land returned to a "natural" state ("Three Mile Island - Unit 2" 2022). In the meantime, Unit 2 has slid from the hands of numerous utilities who promised to safely complete its decommissioning.

Currently, there are two NRC-approved options for decommissioning: SAFSTOR (Safe

---

<sup>32</sup> The schedule was in fact the product of careful planning. The train left early on Sunday morning to minimize the number of transitions and traffic. The carts were outfitted with cutting edge transponders to track the shipments of nuclear waste as they moved from Middletown to Pittsburgh through St. Louis, where Conrail transferred it to Pacific Railroad, who finished the journey through Colorado and Kansas to Idaho. In Idaho, it was taken to a "reservation area," as they are known in the nuclear field, known as Idaho Test Area North (which was dismantled in 2000). It was slow-going. Every time the waste-laden train passed an incoming train, it would stop to minimize contact with moving objects, another safety measure.

Storage) or DECON (Decontamination). While SAFSTOR proposes a 60-year process, DECON can complete decommissioning in as little as five-years. SAFSTOR is known as the safer, more conservative option. At the time of writing this, Exelon still owns Unit 1 and is currently executing SAFSTOR (“Backgrounder on Decommissioning Nuclear Power Plants” 2022). The 1,000 metric tons of spent uranium fuel continues to be kept in the 40-foot deep spent fuel pools inside the containment building.<sup>33</sup> The fuel will be most vulnerable here, where it is consolidated and densely packed to maximize space in the containment building, until it is moved to dry storage casks. The fuel will sit in these specially designed casks for forty years before finally being transported out to one of the country’s four low-level waste sites in South Carolina, Washington, Utah, and Texas. In the final ten years, the physical infrastructure will be dismantled. The entire process is projected to cost 1.2 billion dollars, supplied by a trust fund that like all nuclear plants was started at the reactor’s inception. And indeed, the 60-year timeline is not based off of how long it will take radioactive material to decay, nuclear experts informed me, but economics. Decommissioning trust funds start off low and then accumulate the remaining funds through interest over the following decades. For example, as of December 2020, Exelon’s trust fund consisted of \$742,497,000, several million dollars shy of the total anticipated cost, when the NRC approved Exelon’s request to terminate Unit 1’s license based on sufficient funds (T. Smith 2021). In doing so, the NRC shifted the midcentury atomic utopias—which despite their fantasy, the AEC maintained were firmly rooted in the near future—into a space of speculation towards a distant future.

---

<sup>33</sup> This is an estimate based off of an interview with Edwin Lyman, the Director of Nuclear Power Safety for the Union of Concerned Scientists.

## Speculative Futures

In the most recent decades, as more nuclear plants are set to close, nuclear decommissioning has become an economic rather than public safety process and attracted companies lured by the promise of a lucrative investment. In a strange corporate financial calculus, investment companies venture to decommission nuclear power plants in less time and for less money than the utility. When they purchase a decommissioning plant, these investment companies often acquire the utility's decommissioning trust funds—paid for by taxpayers—up front; buy other adjacent businesses, such as waste management sites, to offset future costs; and bank on keeping the profit margins (Maag 2019).<sup>34</sup> If these companies have wagered correctly and succeeded, it potentially rids these sites of radioactive waste more quickly than the SAFSTOR option. However, pursuing these timelines could involve taking shortcuts that jeopardize public safety for profit, such as moving or mishandling unstable radioactive waste before it has had sufficient time to decay or cutting down on staff to monitor the process and the materials.

Being dependent on the financial market also layers another vulnerability onto shuttered nuclear power plants. Because the trust funds are often comprised of investments, their clean-up becomes directly contingent on the health and stability of the stock market. Further amplifying this risk is the unpredictability of nuclear technology that extends into its

---

<sup>34</sup> For example, Holtec International operates a subsidiary that promises to “begin and complete the physical work of decontamination and dismantlement decades sooner than if the current nuclear plant owner retains ownership of the plant.” The words “Giving the Next Generation a Cleaner Tomorrow” title their website page that details their decommissioning approach with a picture of a spring-time field, the sun catching on the rolling hills dappled with yellow wildflowers. Most often this decommissioning approach follows an NRC-approved process known as DECON, which completes decommissioning in as little as five-years-time. Perhaps the most aggressive of these opportunistic companies, Holtec owns four of the eleven shuttered nuclear plants in the US that are in the process of DECON.

decommissioning, which have notoriously come up against numerous stalemates and a track record of going over budget. Some experts, politicians, and activists fear the consequences if it turns out that the investment companies misjudged the profitability of nuclear decommissioning. If funds run out, clean-up will be forced to stop, leading to the indefinite storage of nuclear waste in host communities and shifting the financial burden of completing decommissioning onto taxpayers (Maag 2019).

TMI has not been immune to the nuclear industry's unexpected bedfellows. In December 2020, First Energy sold the idled Unit 2 reactor to EnergySolutions, a New Jersey company owned by TriArtisan Capital Group who mainly works with food and consumer-brands, such as Sara Lee, TGI Fridays, Sur la Table, and P.F. Chang.<sup>35</sup> It is significant that the nuclear decommissioning of a storied nuclear power plant such as TMI Unit 2 falls under the portfolio of a private equity firm that mainly funds restaurant- and consumer-brands that produce sandwich breads and cookware rather than energy-related businesses. It is not arbitrary; it is an ironic culmination of the technology's domestication. The privatization of nuclear decommissioning continues a historical process that President Eisenhower began in 1953 with the call for "Atoms of Peace" and the appointment of former Wall Street investment banker Lewis Strauss as chairman of the AEC to oversee the nascent industry. With this history in mind—one that has frequently prioritized economic and technological progress over public health and safety—it is perhaps not surprising that the domestication of nuclear energy has culminated in private investment companies seeing a profit in unbuilding the decaying and

---

<sup>35</sup> One of the area's long-time activists, Eric Epstein, voiced his concerns that the decommissioning trust fund only has reportedly \$862.5 million to complete the projected \$1.044 billion project (Charles Thompson 2022). However, EnergySolutions assured the public that the fund would accumulate enough interest to cover costs on a year-to-year basis. It is a common strategy in what has now become a growing industry built around profiting from decommissioning nuclear power plants.

dangerous infrastructure that once promised the future.

This economic focus of decommissioning creates a particular orientation towards the future. If the atomic utopias hinged on a spectacle of progress, this aspect of their slow unbuilding hinges on the speculation of market economies. Decommissioning is not possible given the current conditions of trust funds; instead, it is reliant on the speculation that these funds will accumulate the resources to complete the process. In the speculative futures created by decommissioning practices, the specificity of the near future is evacuated in favor of a more long-term horizon (Guyer 2007). Jane Guyer argues that this shift in temporal orientations away from the near future, in economics and culture-at-large, “has involved a double move toward both very short and very long sightedness, with a symmetrical evacuation of the near past and the near future” (410). In the process, at the level of lived experience, temporality becomes “punctuated rather than enduring,” a compilation of dates-of-events that become a way of marking time (416). Throughout fieldwork, I continuously encountered interlocutors, like Paula, who insisted on talking about TMI in terms of the accident—before and after March 28, 1979—rather than decommissioning. The start of decommissioning did not constitute a date-as-event nor was it an ongoing process that continued to pose a threat, for my interlocutors. It was simply a closure of a crippled power plant. However, even if market logics increasingly prioritize a distant future at the expense of more short-term needs, at the level of everyday life, both the near future as well as the present are still inhabited, stilled *lived*. I do not want to think of my interlocutors dismissal of decommissioning as avoidance but an ambivalent way of occupying the here and now “when the spectacle of infrastructure already fails to enchant” (Lesutis 2022, 955). Rather than the teleological future of nuclear infrastructural promise, my interlocutors’ attempts to live

alongside TMI as it decommissions is both a product and refusal of this “future fantasy” in favor of the “enforced present” (Guyer 2008, 410). Nuclear power, after all, had become a familiar, if not strange, part of their everyday life, why wouldn’t its unbuilding?

As a promised future gives way to a speculative one, the development of the US nuclear program has largely been abandoned. Despite a brief flicker of public and private interest to reboot the aging industry as a green and relevant energy source to combat climate change, the nuclear industry never recovered from the accident at TMI. The accidents at Chernobyl in 1986 and Fukushima in 2011 only further alienated a wary public. No new reactors began construction between 1978 and 2013. Under President Obama, the plan for a nuclear renaissance led to the construction of one new nuclear plant in Georgia, which almost ten years later is grossly over budget and behind schedule.

Looking back, perhaps it was unfair of me to feel so disappointed by my misinterpretation of Doug’s promise to get me on to the Island, only to show me the outside of the weed-covered Visitor’s Center. In the past few years since our meeting, I have thought about that Visitor’s Center frequently. As the interface between residents and the plant, the building became a synecdoche of the peaceful atom’s winding road to domestication that mirrored the nation and host community’s ambivalent relationships with it. The Visitor’s Center morphed with the rise and fall of nuclear power in the United States—from the building’s present abandonment to its roles as a public relations tool for a recovering industry, a site of protest for a betrayed public, an informal place to gather to watch the promised atomic utopia take shape, and a space to mourn the loss of a future promised that never in fact arrived.

The advent of nuclear power was one of tremendous optimism and private and public investment to fund the technology. Government and industry propaganda constructed the

technology as both the symbol of the modern era and an utterly banal part of everyday life. The result was a technology that was both fantastic in its future-orientation and familiar. The fact that for many people in central Pennsylvania, TMI faded *into the background* of everyday life despite its enormous infrastructure and infamous history showcases that these efforts were to some degree successful. Today, its abandonment lays bare the historical and contemporary apparatuses that allowed for this paradoxical relationship between spectacle and familiarity, as well as the affects bundling themselves around the material infrastructure of TMI. And indeed, as the next chapter explores, decommissioning is not only a formal act of unbuilding, but also the culmination of a particularly American vision of the good life.

### **Interlude: Under the Willow**

We sit in the screened-in porch of their 1750s stone farmhouse, eating pretzels and drinking ice water. I ask Mary if she needs help, but she shoos me away and coos over the summer night sounds of frogs and cicadas, “I used to be a waitress.”

The porch looks out over the willow tree on their highly successful 80-acre three-generation family farm. It sprouts up from the underground spring that has provided them with some of the best corn in the county. George told me with obvious pride that people had driven down their farm lane to take pictures of it. Grandchildren had been married under it, and George was hoping his granddaughter, an old classmate of mine, would soon be too. “But I hope it’s okay!” George said. It had been struck by lightning a week earlier. He asked Mary to pull up the pictures on her iPhone since the small grainy screen of his flip phone would not do justice to the large, naked scar running up one of the tree’s main branches.



*Image 10: Mary and George's willow tree. Photo taken by author.*

Mary, who had been sitting quietly as George scrolled through the pictures, looks from George and then to me, “But this is not about Three Mile Island!”

“But she’s asking about it, honey.”

“I do miss seeing the smoke,” said Mary gazing out over farm behind me, steering the conversation back to what she imagined I thought was important.

“Oh really, you could see it?” I said, referring to the iconic steam rising from the cooling towers of the plant.

“Well, let’s go out there,” she invites. I follow them up past their tennis court to the back of the barn. She pointed to the horizon out over the cornfields, “We could always see the steam. I miss it.”

When I asked her why, she replies, “It was just part of life. It was just part of the environment.”

Her husband, George, used to pass by the plant once a week when he plays golf at Sunset Golf Course, “It’s not there anymore. Imagine that. Times change.”



*Image 11: The rear view from George and Mary’s barn, where they could once see the steam from TMI-1 on the horizon. Photo taken by author.*

We stand there silently for a moment, and I look across the corn swaying in the light breeze. The sky is clear, just turning to the milky lavender and rose colors of late summer sunsets. On the horizon, a red light blinks, a runway for the incoming planes from a small regional airport. I was surprised to hear Mary and George, farmers whose lives and livelihoods depend on the health and sustainability of their environment missing a nuclear power plant that threatened, and still does, to destroy it.

Mary breaks the silence to circle back to a question I had asked earlier about how they feel about TMI closing, “Probably the only thing that I feel about there is that it’s not a threat anymore.” She brings up “what happened in Russia.” I was confused for a moment since she did not say Ukraine, but then I remember Mary, unlike me, had spent most of her life

conceptualizing Eurasia as the Soviet Union rather than discrete, fragilely independent countries. “Oh, Chernobyl?” I clarify. “Yes, that really did devastate the community. So no, I never lived in fear, but now that it’s not there I think well that’s something we’ll never have to experience, but they’re talking about taking the one down from ’79, and you hear them saying well what are they going to find? But it doesn’t pay me to worry about it.”

After George and Mary walk me up to the back of their barn to show me the horizon, we start meandering our way back to their porch. I stop to take a picture of the willow tree and comment again on how beautiful their setting is. “It’s home,” Mary said, and George added “It’s home is right.”

## Chapter 2: Fantasies of Safety

Sylvia hands me three stacks of tan cards, 2x3 inches, with a Post-it note and three hand-written dates. Like I do every week, I take the stamp and ink out from under the cash register, slip off the rubber band holding them together, and get to work. I try my best to transpose the date neatly, straight and tidy, as Sylvia instructed me, tightly clustered around the other dates to use up as much space as possible. Like many of the people over sixty in this area, Sylvia is loath to waste things, and she is keenly aware of the library's dwindling resources. If the cards are full, I can throw them in the trash. The library doesn't recycle. But often Sylvia goes through the cards beforehand, flips them stamp-side up, and throws away the old ones. But when Lydia works the front desk, I do the work of sorting, flipping, and determining what is finished and what can still have use-value eked out of it.

There is something comforting in the activity of stamping the cards. Monotonous and easily mastered. They get slipped into the fronts of books, blocking the sensors, so they can move freely out of the library and into the homes and hands of Middletown's residents. Though I think Sylvia would be disappointed in my crooked work. I put the straight ones on top and try to hide the sloppier ones when I bundle them back up in their neat piles. I doubt anyone will get to the cards mangled by my messy stamping.

As libraries are digitizing, Middletown Public Library has remained stubbornly manual. Rather than stamping as we go, we pre-stamp cards, which would feel efficient if we were busy, but the library is rarely busy. Yet every week, I stamp roughly 100 cards with due dates for new releases, DVDs, and standard books for the following day. I help Sylvia prepare for an onslaught

of people who never come. Yet there is also something so poetically definitive about the stamped time mark. A claim. A promise. A hope that maybe all those cards will suddenly go flying out one day, slipped inside the jackets of dusty books tucked underneath eager arms. And this is the hope of many of the volunteers and staff of the library.

I volunteered in the library for about 15 months over the course of my fieldwork, not sure of other community spaces where I would have the opportunity to get to know Middletown and its residents more. When it closed from March to July in 2020 due to Covid, I was relieved. I dreaded my library volunteer shifts. We were often slow, and unsure what to do, I would select a book from the shelves to pass the time at the volunteer desk, glancing back at the clock hanging on the wall every few minutes. I both wanted the distraction of a patron, but also begrudged the push out of inertia, the slow monotony.

When Lydia worked, things were more exciting. She would commute 45-minutes each way, every day from her mother's home across the state line in Maryland. A recent Penn State grad, Lydia and I would chat about friends, GRE prep, our dogs, and our partners. Her boyfriend was a police officer in Baltimore, and she was preparing to apply to master's programs. She would also update me on the library gossip: Another volunteer nailing her Trump flag to her porch because people kept pulling it down; the time an older male volunteer left "adult comics" in the printer and the library's bookkeeper found them the next day; two men catcalling her from a van while she walked to her car; the man who "bribed" her, promising to buy her a rose in exchange for free printing; and what became of the audio recorder that she found one day while we were working taped underneath the changing table in the women's restroom with its blinking red light turned on. After a few of these incidents, she bought a taser and showed it to me one

day. It looked like a thick tube of mascara. Uncomfortable with the juxtaposition between the glittery, fake leather cannister and its contents, I half-laughed and half-muttered, *that's so cute*.

After a few months, I started to notice the regulars. The man who always came in to use the computers donated by Exelon on my Wednesday afternoon shifts, who told me about coming here as a boy when it was the town's fire station and how he fished every day in the Swatara creek that runs out to the Susquehanna. The army veteran who always checked out historical non-fiction books with dirt-caked fingers and a gruff attitude. The other man who would venture in, muttering to himself full conversations as he perused the shelves and used the computers. The two teenage boys who would play Candy Crush for hours, even on school days.

There were more regulars before Covid the other volunteers told me, often those hanging out for the day. An older woman who would come right at opening, walk over to the plastic-feeling leather couch by the windows facing Catherine Street and sit quietly, dozing in and out of sleep, until she would wake with a start at approximately 3pm and ask what time it is, *I have to get going! My family is going to be here to pick me up*. They never knew who the woman was or who dropped her off—they never asked. A homeless man hung out outside and in the bathroom, until the director had the outdoor outlet removed to dissuade him from using the benches to charge his phone in the warmer months. Another couple—aspiring real estate agents—worked on opposite ends of the library. The husband would nod off in the children's section, and the wife diligently typed away downstairs by the newspapers. Their cat waited in their van, a can of cat food and cup of water in each cup holder and a litter box in the back. *We think they lived in their car*, the other volunteers told me. John calls these people *squirrely*, and his sister Jeannie points to me and instructs, *add that to your paper*. Without other community resources, the

library is not simply a library. In the absence of adult daycares, homeless shelters, and employment offices, it becomes a catchall for folks requiring extra support during the day.

When Sylvia hands me the cards, I ask her how she determines the quantity to stamp. It is based more on sight and feel, she said, than a number at this point. Lydia had handed in her two-weeks' notice, and the library would be short-staffed again. The library is slow today, and everyone seems disheartened by it. It makes the air feel stuffy and thick. Sylvia's words get caught in it as I reach for the stamp and ink.



*Image 12: The Middletown Public Library. Photo taken by author.*

\*\*\*

The stamping of the library cards, for me, became a symbol of the many unfulfilled promises the town received from the industries it optimistically, even enthusiastically, hosted only to witness them rise and fall. For my interlocutors, Middletown, much like nuclear power, was the beacon of American promise and quintessential of *small town America*. As in other midcentury small towns in America, families had one car. You could walk everywhere. And, unlike today, there were places to go. It had a clothing store, a bowling alley, a movie theater, and a pharmacy with a soda counter. On the weekends, residents would take the train into Philadelphia to go to museums or catch and release sunfish and bass at the nearby creek. On Saturdays, boys ambled over to the local fire station, now the library, for a fire safety course, a program called “Sparkies.” “It was very, very nice,” Jeannie told me. “Everyone was friendly. There were numerous churches and stores downtown. Yeah. It just was... It was a lovely place, in my opinion, to grow up in.” I was always interested in these oral histories; in part, because they seemed so fantastical against the town’s present dissolution.

Like George and Mary pining for the steam rising over their horizon, many folks I spoke with were nostalgic for a time gone by, one in which TMI either explicitly or implicitly fit into.<sup>36</sup> Unlike George and Mary, however, who live in the neighboring county on a very successful multi-generational family farm, my interlocutors living in Middletown proper experience the legacy and decommissioning of TMI not as a mere symbol absent on the horizon but as a material reality whose absence continues to structure the present. Both these responses to the

---

<sup>36</sup> The common thread of nostalgia is perhaps a product of doing research with folks mostly over 60. This was something that was both intentional and accidental. I purposefully sought out individuals who had lived through the lifetime of the plant—from its introduction to the area in the 1960s to its present decommissioning. But it was also accidental in that I found the population of the area was an aging one, and that most of the folks concerned with TMI or those who even remotely thought about the plant, were also those alive during the plant’s partial nuclear meltdown in 1979.

plant's closing—one a longing for its material shadow on the landscape and one as a longing for the less explicit modes of life it enabled—are visions of a home (and an America) that are no more, one in which TMI played both a direct and indirect role in creating.

These visions, propagated by industry, brought with them their own national ideals of safety, security, and community in the late 1960s to 70s that remained long after the plants shuttered. The previous chapter, “Future Promised,” explored how TMI’s infrastructure was a product of a 20<sup>th</sup> century world-building and optimism. This chapter turns attention to how in the 21<sup>st</sup> century, even as these physical infrastructures become ever less practical in their states of decommissioning, the normative horizon of capitalist progress remains alive and well in everyday life (Rofel 1999; Ferguson 1999; Povinelli 2011; Berlant 2011; Muehlebach and Shoshan 2012). It is a story of how the past affectively and materially lingers in the present landscape of industrial and residential buildings that have been repurposed, abandoned, swept away in floods, and leveled to make space for a future that leaves many of Middletown’s residents unsettled.

Within this context, I track the past in the things my interlocutors attach to—library cards, nuclear cooling towers, tasers, skeleton keys, patented toys, and the stories of the town—not only as objects of both harm and desire, but also a cluster of fantasies that quietly inhabit, even haunt, everyday life. More specifically, they are fantasies of safety, the leftover material and affective attachments that are cobbled together to offer a sense of safety and security<sup>37</sup> in the present when the good life erodes. That they occur in a town that has hosted and negotiated both

---

<sup>37</sup> I use safety and security interchangeably in this chapter because they are emerging from the same imaginary or vision of the good life. This perhaps threatens to flatten the distinctions between the two but is representative of how my interlocutors often tended to collapse the conceptual gap between them as I hope this chapter will make clear. Physical safety was closely tied to economic and social security. This differs from future chapters which take up more explicitly the vulnerability of the body to radiation.

the economic security and environmental risk of steel, coal, and nuclear industries only heightens their multifaceted impact and appeal. Fantasies of safety became a mode through which my interlocutors remembered, reimagined, and resuscitated Middletown as *small town America*, itself a fantasy that is alive and well and ever less attainable.

I understand fantasies of safety as artifacts of the good life, that “moral-intimate-economic thing,” that Lauren Berlant argues shelters numerous fantasies—upward mobility, meritocracy, reciprocal political systems, caring institutions, or even the affection of a loved one (2011: 2). These fantasies populate the ordinary and shape an affective structure in which “an optimistic attachment involves a sustaining inclination to return to the scene of fantasy” that allows for the belief that the object might somehow produce in the present moment the very things it is promising (2). It is for this reason that Berlant argues that “all attachments are optimistic,” a cluster of promises, even when such promises are distant or even harmful and cruel (23). Building on Berlant’s careful attention to how attachments to objects that harm are intimately linked to promises and experiences of the historical present, I examine how these relationships with unfaithful objects and unkept promises are just as material as they are affective, even as remnants.<sup>38</sup>

---

<sup>38</sup> My use of fantasy also builds on scholarship examining the phantasmagoria that appeared in the early 1800s as a form of theater, in which an often hidden network of lanterns and mirrors projected images of skeletons, ghosts, demons onto a screen or wall to shock and entertain audiences (Marx 1981; Adorno 1981; Buck-Morss 1992; Masco 2006; Murphy 2017b). This work understands phantasmagoria as a symbol of the distorted perception of modern experience, in which commodities are sets of social relations that obscure their processes of production and also alter the senses of the consumer—that is, they ultimately numb the senses through overwhelming them. “Phantasmagoria are a technoaesthetics,” Susan Buck-Morss argues, “The perceptions they provide are “real” enough...But their social function is in each case compensatory” (1992, 22). For instance, Joseph Masco and Michelle Murphy argue that the spectacular scale, affect, and phantasy that cluster around the quantifiable, hard facts of nuclear war and GDP (gross domestic product) distracts attention away from these sciences’ routinized violence, the daily machinations that give rise to them, and instead views them as inevitable steps of scientific progress. I find this work useful for thinking about the good life, as something entrenched in capitalist modes of production, as a type of phantasmagoria that projects past ghosts of safety and security into the present

## **Skeleton Keys**

John, a retired schoolteacher, is one of the library's most loyal volunteers. He is on the library's board and was always willing to sub in when needed. He picked up extra shifts during Covid, despite his chronic health conditions, when other volunteers worried about coming back too soon. John and his sister Jeannie have lived in Middletown their whole lives (though Jeannie moved down South briefly for a marriage). Now they live side-by-side in two row homes that have been in their family for three generations now. They did everything together. In fact, I first thought John and Jeannie were twins. *We get that a lot*, Jeannie laughed. She has a rich, gravelly voice and punctuates her sentences with "girl," speaking to me or herself in third-person. *Everyone thinks that*. But no, John is three years and eight days older than Jeannie, making her soon-to-be 65 in January when we first spoke in October 2020.

John and Jeannie are local historians of sorts. It's in their blood: Their aunt was Grace DeHart who dedicated a large portion of her life to reading and writing about Middletown's history, including two books that were published. Their Aunt Grace instilled the same passion for Middletown's history in her niece and nephew. Every year, they dress up in colonial garb and lead a ghost tour of the town for various organizations or Penn State classes. They frequently curate exhibits at the Middletown Historical Society, and I was never surprised to see them quoted in the local paper, *The Press and Journal*, as informants on the town's past. When this beloved 166-year-old newspaper closed due to Covid funding shortages with a headline that read "We're History," John told me he cried, lamenting the loss of another Middletown institution, especially one that he felt provided balanced information in a world teetering on the edge of

---

while preempting its daily modes of exclusion and exhaustion, as well as its failures to deliver on its promises.

extremes. John's real passion though is fighting for certain buildings to be recognized as historic landmarks, including their homes, which were part of the Underground Railroad he tells me. But for John, it is not just about the historical recognition, it is also preservation.

Like other folks I spoke to in Middletown, John and Jeannie told me that investors are increasingly interested in buying up homes in town. One of the other library volunteers, Theresa, bitterly told me *they want my land, they want my land*. Theresa was referring to the town Borough, which had approached her multiple times to buy her property. We sat across from one another at one of the two picnic tables in a small park—no more than half-a-block square with a small swing set—just next to the home that had been in her family for four generations. Theresa traveled—Tennessee, Los Angeles, then South Dakota—working odd administration jobs, but she came back to settle in her family home. Every so often I could hear her rottweiler, Doberman, and bloodhound barking as we talked. After Theresa had gotten two knee replacements and could not keep up with her yard maintenance, the town came by and measured her grass. At over eight inches long, it was in violation of Middletown ordinances (something I was surprised to learn since few of the properties in town were kept up to these standards). Theresa received a ticket and was fined. And she saw it as yet another antagonism, attempting to force her out of her home. “Who’s going to pay for it? Hi, I am retired. I went out on disability. So it’s not like I can earn more money.” I switched sides with Theresa on the picnic table, so she was not facing the sun. When we settled in our new seats, she continued, “They tried to ordinance me out of my home. But they picked the wrong little old lady.” We both laughed. Theresa was sixty seven, but not the feeble-bodied and shaky-handed image that the phrase “little old lady” conjured up.

I was always intimidated by Theresa and had to work up the nerve to finally interview her. Theresa had a blunt manner about her that took me aback when I met her on the first volunteer shift back from Covid in June. She had just come in to check out a book, while I fumbled with answering someone's increasingly frustrated questions over the phone about a program we were no longer providing. Without hesitation, she walked behind the desk, took the phone from my hand, and simply told the person matter-of-factly that we were enforcing Covid restrictions that prevented us from offering the program (something I had also said but apparently not as effectively). Theresa never hesitated to tell you exactly how she felt. As a staunch conservative, she would often talk to me about how she feared that Joe Biden would lead the country down a Socialist spiral, changing the subject before I could stammer out a rebuttal.

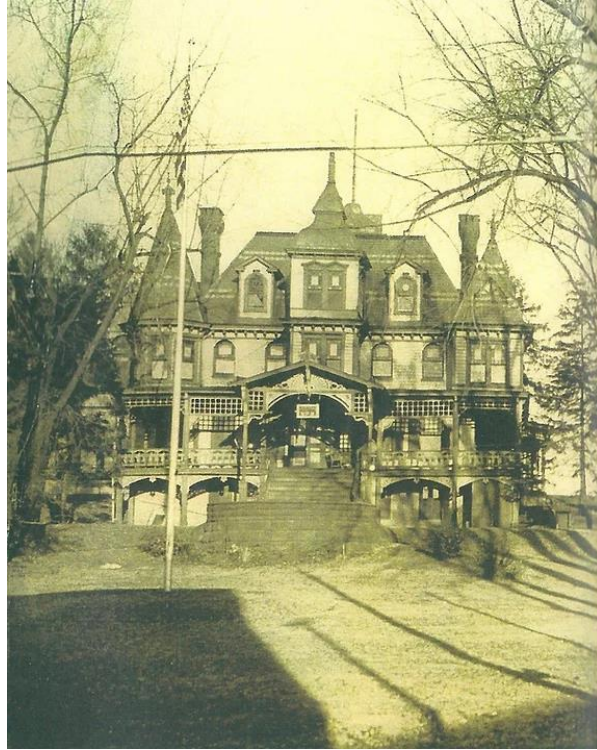


*Image 13: The park where I met Theresa. The sign reads "Park equipment is not cleaned or sanitized. Use at your own risk." Photo taken by author.*

What exactly did a small town want with Theresa's four-generation home, which on paper at least seems to be exactly the sort of stability and continuity it would strive for? First, she tells me, they wanted to build a firehouse museum; when enthusiasm for that tapered, attention

turned towards constructing a strip mall with a Starbucks and other shops within walking distance for students from the local commuter college, a Penn State satellite. “Then they wanted to put a mini mall in because there are no stores in Middletown. Like you can't buy underwear in Middletown, and then you have to go out to at least a Target.” Then they wanted to build a hotel with parking for the “tens of thousands of visitors Middletown has for Penn State’s sporting events,” Theresa said sarcastically, rolling her eyes. Unlike main campus in State College, the satellite campus in Middletown, although growing rapidly, did not attract those numbers. Then they needed public parking for downtown. We both looked at each other, and Theresa smirked. Neither of us had ever struggled to find parking in the mostly quiet, if not dull, downtown area.

Around John and Jeannie, developers are interested in converting them into rentals or dorm housing for Penn State University. Whenever I drove by their multi-generational house, I was struck by how they truly were engulfed by campus dorms and housing, which jut up around them and into their backyards. They often complain about the noise, late night parties, and unsafe driving of the students. PSU’s student housing is in part built on the land of steel magnates’ torn down mansions. One of the mansions was lost to a fire in 1970, but the remaining three were bought in 2011 by Green-Works Development, on behalf of the University. Two were torn down. One was repurposed as a campus building. John has dedicated large amounts of time to reconstructing these mansions through words and archival images for the public on the Historical Society’s online blog (Ziats and Avolese, n.d.). For him, losing these intricate and luxuriant mansions meant losing part of Middletown’s *charm and character*, along with its history as a successful seat of industry.



*Image 14: A home designed by British architect, Charles Eastlake, for the family of George Matheson, superintendent of the American Tube and Iron Company in Middletown. It was built over the course of two years between 1888-1900. Image courtesy of Lower Swatara Township Historical Preservation.*

But it also meant losing a piece of the landscape that made up John's childhood home. John and Jeannie live just beyond the lots of these once-mansions in two white semi-detached row homes on a small side street with four other homes right near a side entrance to student dorms. In 1937, their grandparents built the house John lives in, digging the basement out by hand. Ten years later, their son, Jeannie and John's father, built the home attached to it for his wife and soon-to-be family. The houses saw John and Jeannie grow up, their parents' divorce, their grandparents pass away, their mother get sick and eventually pass in 2011. Eventually, they inherited the houses. Neither John nor Jeannie was married, so they each took one, living side-by-side. Today, the house next to them is a rental. Two of their second cousins live down the street, and their mother's side of the family is on the other side of town.

This current neighborhood is a remnant of what was once a robust network of family and neighbors. Most of their neighbors were relatives of their father's or people that had lived *up on this side* for a long time. John and Jeannie grew up in the type of nuclear family that was the lifeblood of the American dream. Their father took the family's only car to work; their mother stayed home with them. The kids walked to school and home for lunch. On Sundays, they went with their parents and their relatives to church.

Growing up, all their neighbors had skeleton keys, universal keys with the serrated edge shaved off. In this perfunctory form, it could fit in to more than one lock. They would keep the key hanging on a nail above the door. "If you lost it," Jeannie told me, "You go to the neighbor because all the locks would fit." Her friends at school, "latchkey kids" who needed to let themselves in at the end of the school day because one or both parents were working at Olmstead Airforce Base, thought they were made of bones, Jeannie laughed. The skeleton key may not have been made of real bones, but it neatly encapsulated the multi-generational homeownership and network of familial stability and security in Middletown that characterized John and Jeannie's early memories growing up there. The skeleton key, after all, is still a key, an enactment of property and so also an enactment of exclusion (Harris 1992). Just as it allowed ease of access to people within John and Jeannie's family and circle, it also ensured that this access was not universal to other members of the town. After all, they still kept their doors locked. Instead, the skeleton key provided a fantasy of safety in two senses—access to and a symbol of a robust and proximate network of support, on one hand, and protection from those outside the bounded unit the skeleton key created, on the other.

When Olmstead Airforce Base closed in 1964, the family got a deadbolt. John and Jeannie were in fifth and fourth grade, and "transitional people were coming in and out of town."

Once a neatly contained community of mostly white families who had lived there for several generations, Middletown's contours began to shift and blur.

The transition for their family from the universal skeleton key to the deadbolt indexes a larger shift in the town that has reached new heights in the years of the pandemic. In the Covid-catalyzed housing market boom, supply of and demand for rentals has increased as traditional single-family homebuyers are often outbid by investors who can afford the above-market prices for homes. Middletown's rental tax is lower, but there are other reasons Middletown is an appealing place for renters. Harrisburg International Airport, an Amazon distribution center, and government and hospital jobs in nearby Harrisburg and Hershey offer employment to people in the area. However, the surrounding area is mostly rural with few rentals and no public transportation; the state capital, Harrisburg, is *dangerous* and *crime-ridden*; and Hershey, the town well-known for its chocolate, theme park, and medical center, is *expensive*. So Middletown is often a desirable place for workers looking for affordable nearby housing.

John estimates that sixty percent of the properties in Middletown are rentals. According to the Borough, the town's rentals make up fifty two percent of the town's community, excluding the student housing for PSU. However, this number is fairly consistent with surrounding towns, some of which also have college campuses. In Lancaster, where I lived during the second half of my fieldwork, rentals made up approximately half of the city's housing; yet long-time residents did not have the same fraught relationship with the city's newer residents. Instead, for John and Jeannie, the rise of renters in the area erodes the small town feel and sense of security that they grew up with. With the rentals creating a more transient community, Jeannie, who once walked everywhere, does not go out past four in the afternoon by herself.

There's just too many strange people lurking around. Some of the people left the area, or they passed away. But it's not—How can I say it? I don't feel safe anymore

like I have in the past. Maybe that's because I'm older. But I just am living up in my neighborhood where I live now with college students surrounding me and cars in and out all hours in the day at night and construction going on. I just don't feel very safe anymore.

Growing up, she would walk to see friends, go to the movies or a town dance, or to pick up something from the store for her mother. And up until more recently, she used to walk to her job at a local restaurant in an old brownstone building on the main drag where she cleans a few days a week and offers an extra hand with service when needed. But now she drives to work or to the store and then drives straight home. "It's like being a prisoner in your own town," she said. Jeannie's loss of physical mobility due to her changing perception of her once-safe hometown in the present also indexes an anxiety over other forms of "stuckness" that arise after the good life (L. G. Berlant 2011). She no longer knows her neighbors, *the transients* or *gypsies*, and that leaves her feeling uneasy. She is kept up at night from the noise of college students, the train station, and the nearby airport. And her middle-class childhood has not enabled the sort of life she imagined for herself at 65.

Jeannie's sense of safety as a quality of her past when she could walk anywhere, play in the streets, and access the homes of her family's skeleton key network is intimately connected with the changing landscape of homeownership in small towns. *We were taught if you owned something, you took care of it, you took responsibility for it*, she and her brother would tell me. They felt like renters and absentee landlords, for the most part, just did not take care of their properties as much as a homeowner would. In fact, Middletown, they told me, did not look at all like it did when they were growing up. When I asked her to describe Middletown for folks out of town, she looked at me, paused, and shook her head, her Southwest jewelry clinking gently:

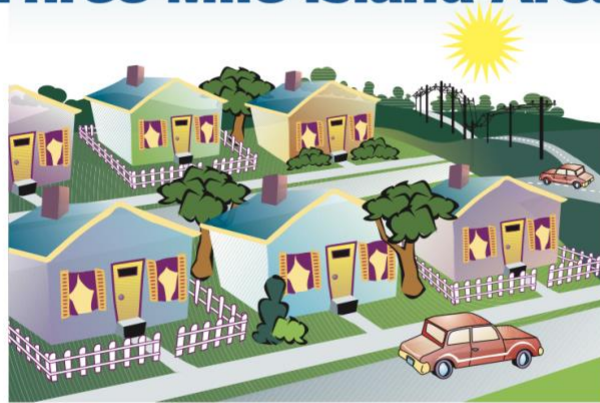
Well, I'm ashamed of my hometown. The way the main drag looks. My brother and me often say we wish that they would run out a power washer for some of the

houses, especially on the main road. Granted my house isn't no luxury mansion. It's older, but I try to maintain it.

A key part of small town America, for Jeannie, was its aesthetic. It was nice to live there, in part, because it *looked* nice. People had flowers in their yards, sturdy porches, freshly painted houses, and clean streets. Like Mary and George missing the steam on the horizon—an aesthetic element of their past—Jeannie missed how her town made her *feel* safe in part because it looked safe.

When she said this, I thought of the Exelon-issued Three Mile Island emergency planning brochures that were mailed to residents within a ten-mile radius with their gleaming colorful cartoon single-family houses, white picket fences, and shiny cars driving down a power-lined road and into the sun. I had never seen a picket fence in Middletown and simply thought of the brochure as another instance of Exelon quite literally glossing over the profound risk it presented with a cliché stock image. But what made it powerful (or perverse) was that it was meant to represent small town America and how companies like Exelon powered them as a way to distract away from the fact that it also endangered and ultimately abandoned them. Aesthetics, after all, are a key element of fantasy; it is more about appearance than reality, more about the shadowy image, than the lantern (Benjamin 1982).

## Emergency Planning for the Three Mile Island Area



### Important Safety Information For Your Community and Annual Needs Survey **2020/2021**

*Image 15: Exelon Emergency Planning Safety Brochure. Image accessed from Exelon Corporations Documents.*

The epitome of this homeownership for my interlocutors was multi-generational property. A safer, cleaner, and even more caring town hinged on people who had been in their homes for a long time, preferably people who grew up in them. It is a well-rehearsed fantasy to imagine people who spend more time in their communities to be more invested in them and such fantasies often work to legitimate the exclusion of others.<sup>39</sup> The irony of course is it is precisely

---

<sup>39</sup> Like the skeleton key linking some members and barring others, Harris (1992) traces how property and whiteness in US law are intimately entangled and share a common premise “of a right to exclude” (1714). The enslavement of Black bodies as the property of white landholders and white settlers’ entitlement to indigenous lands reified whiteness, and its privileges, as a natural fact rather than a legal construct. As a result, whiteness, as an identity and as property, is founded on racial subordination.

these homes that the town is targeting to level for development. John, Jeannie, and Theresa believed that the town is increasingly displacing its concern for people like them, favoring instead the renters or the students. In 2015, Middletown Borough introduced its “Revitalization Overlay and Design” project with the promise that “an attractive high-quality coherent building fabric and streetscape can help create a unique identity for the Borough, increase property values, and help market the Borough to new residents, businesses, and developers.” The project had a mere \$47,580 budget and never received much traction. But like Jeannie, it identified the town’s aesthetics as both the problem and the key to its revitalization. Yet for the Borough, the aestheticization of Middletown depended on the buying up and leveling of the homes that made up the backbone of Jeannie’s childhood community.

### **Small Town (Nuclear) America**

When I asked folks about growing up in Middletown, they would often provide stories similar to John and Jeannie’s, one in which the town boomed while they were in high school in the 1960s and then gradually declined. People provided different reasons for the dissolution from small town America to a renters’ haven, mostly revolving around the closure of one industry or another. For example, Jeannie said she noticed Middletown declined in the late 70s and linked it specifically to when Fruehauf Trailer Corporation, a trucking company based out of Detroit, closed their east coast headquarters in the late 1970s. John argues it started even earlier when Olmstead Airforce Base closed in 1964. The military base brought in not only jobs, but also men and women with families from across the country to work them. As a result, John, Jeannie, and Theresa all described their classes and classmates at Middletown as more racially and religiously diverse than most small towns at the time. When it closed, those families left, and the town was

down a major employer, creating a gap that TMI would fill in 1968 when it began its construction.

Most people agreed that when Three Mile Island was *booming* and *had all those workers and everything*, Middletown was at its prime. The construction of Three Mile Island from 1968 to 1978 was a huge undertaking, and it provided hundreds of well-paying, skilled jobs, including one for John and Jeannie's father. It also brought in people to work those jobs. Families moved to Middletown, and residents not only formed the host community for the plant but also hosted contractors who were commuting from longer distances during the week. People were *making good salaries, and they had money to spend*. When the 1979 accident occurred, this same network of TMI employees/neighbors provided security for folks unsure of whether to evacuate and faced with contradictory information from the NRC and MetEd. *We just called up our neighbor who worked at the plant, and they said it was all fine, so we stayed*. TMI brought a fantastical promise to Middletown, and with it, people invested in small local businesses, creating the walkable, small town that John and Jeannie remember so fondly.

When they talked like this, it was easy for me to become immersed in the dreamy landscape they wove in response to my requests to reconstruct the past for me. But they were also fantasies, not necessarily untrue, but surprising given the context in which they grew up: A small town whose landscape was powered by nuclear technology on the heels of the bombing of Hiroshima and Nagasaki and the height of the Cold War. They played by and fished in the Susquehanna River and Swatara Creeks, waterways that wove their way to the plant. In elementary school, they would have practiced duck and cover drills in case of (Soviet) nuclear attack. Researchers have documented the often traumatic effects for children of these drills and news media coverage which engendered fear and worry about a future threatened by total nuclear

war and the annihilation it entailed (see Beardslee 1986). At the same time, the imagined, often generic white, middle-class child was marshalled as the ultimate symbol of vulnerability and innocence that demanded, even required, the construction of the US nuclear arsenal (Stephens 1997).

Yet the security state that nuclear technology operated within and constructed was one in which risk was often foreclosed or eclipsed by the modes of consumerism it enabled. Kate Brown tracks the construction of “plutopia” in the sister nuclear sites of America’s Hanford and the Soviet Union’s Maiak plants. Despite their seemingly irreconcilable capitalist and socialist roots, these postwar aspirational communities became a site of middle-class exuberance and consumerism, in which “residents gave up their civil and biological rights for consumer rights” (Brown 2013, 5). Funding was shuffled away from safety measures and waste management storage towards schools, shopping centers, and other symbols of affluence and upward mobility. Children of Richland, like John and Jeannie, remember their childhood as ideal, despite health statistics that tracked a rate of fetal and infant deaths at nearly twice the state average (223). The price for these aspirational communities was not only radiogenic injury, however, but also surveillance and restriction. The good life that plutopia enabled made it easier to overlook the routine and compulsory urinalyses, bloodwork, and other tests that quietly passed through the labs at the plants. While John and Jeannie did not live within a government-owned nuclear village like Richland or Ozersk, the rosy childhood they recounted fit well into this narrative of optimistic acceptance of military bases and nuclear development.

Throughout the decades that Olmstead Airforce Base operated, Middletown’s population slowly grew. In 1960, Middletown was home to over 11,000 people; by 1970, following the base’s closure, this number had dropped to 9,000 after the base closed (US Census 1960 and

1970). Since then, the town's population has continued to decline with the exception of the 1980s when it leapt briefly back up to over 10,000 people, accidentally but not randomly (US Census 1980). TMI-2's 12-year and \$973 million clean-up began in August of 1979, several months after the accident and brought in more than 1,000 skilled workers to drill through the molten fuel curdled in the reactor core, extract it from the reactor vessel, and load it onto 342 fuel cannisters on trains bound for Idaho (Schmitt, Quinn, and Tyacke 1993; "The TMI-2 Cleanup" 2012). Some of these workers chose to live in other towns and commute in, but others settled in Middletown. When clean-up was completed (at least by the NRC's standards) in 1991, the town's population had already declined back down to just over 9,000 people. With construction complete, clean-up finished for now, and half of an operational nuclear power plant, Middletown had few jobs to draw new residents or keep their younger ones. By the time TMI-1 began its decommissioning in 2019, most of its 675 workforce lived outside of Middletown, sometimes opting to commute in from thirty or forty miles rather than live in town like the plant's earlier employees.

Much of the Middletown that John and Jeannie are nostalgic for was made possible through the introduction of first the Olmstead Airforce Base and then the construction and ultimate clean up of Three Mile Island. Middletown is not unlike other small towns dotting the country that grew up out of military technologies and infrastructures in times of peace only to be abandoned by them later. In both material and affective ways, America has been shaped by them (see Masco 2006). Both TMI and Olmstead had created not only physical infrastructures, but affective atmospheres, which would remain after they both shuttered. My interlocutors remember not so much the harm these industries caused in Middletown and beyond it (pollution, radiogenic industry, abandonment, etc.) but the modes of life they enabled. Like Mary and George's explicit

longing for the steam on the horizon, John and Jeannie were nostalgic for something harmful, caught in a cruel attachment that both enabled and threatened their vision of home. But for people living in Middletown proper like John and Jeannie, TMI not only put the area in past and present environmental risk, it also precipitated its present economic and social precarity.

In its three centuries, Middletown as seen various industries rise and fall and has stubbornly persisted. From steel, to truck manufacturing, to Olmstead, to Three Mile Island, Middletown has hosted and witnessed its industries go through the cycles of boom and bust that have characterized so many towns lining and making up the Rust Belt. Each one was felt as *another hit*. All these industries brought in economy, and just as quickly as it was created, it declined following the closing of the plant or business. And with each iteration, the town shifted and made way for its new occupants.

### **Cartography**

“If someone said describe a person. You used an area to describe where they lived,” Brenda told me over the phone. Brenda was one of six black students in her graduating class of 80 to 90 people at Middletown High School in the 1960s. The school was integrated, and my white interlocutors described Middletown as a model of racial harmony in the 1960s and 70s. Robert Reid was a social studies and government teacher there, and in 1978, he became the town’s mayor, the only Black mayor in Pennsylvania at the time. It was at the high school that Mayor Reid received a call in 1979 that *something was going on down at the Island*. His transparent attitude during the 1979 accident, just a year into his tenure as mayor, earned him the town’s trust and respect. He refused to evacuate, and when the NRC, MetEd, and other government officials were offering conflicting information, many residents remember Mayor

Reid as a reliable source and loyal community member. When he stepped down after serving as mayor from 1978 to 2013, they named the town's elementary school after him. His enormous shoes were filled by a white man in his 30s, who people thought was *a joke* or *only really out for himself*. After Mayor Reid stepped down, people rarely attended the town's biweekly meetings and the town's relationship with the Borough council turned sour. The trust that Mayor Reid cultivated had been replaced by a general wariness and lack of interest.

Mayor Reid, as he is still affectionately known by people in town, told me *he was just the mayor* and that *people didn't see his color* when they elected him, and Brenda told me she *never had any problems* and often went over to her white friends' houses for sleepovers. I never knew whether their responses reflected something generational—a product of a time when color-blindness rather than anti-racism was a political means to an end—or my own positionality as a white woman and social scientist asking them simple questions to complex small-town issues. Unlike Jeannie, Brenda still feels relatively safe in Middletown. Middletown never had much crime, she told me. Maybe some drugs now, but not “people being beat up or shot or anything like that.” Safety was relative. “In this world,” she told me, “safe is different now.” If Middletown had more crime, according to Brenda, it was because the country as a whole had seen an uptick of crime. But there were never the hints of nostalgia that inflected my conversations with Jeannie and John when we talked.

John, Jeannie, and Theresa's rosy view of race in Middletown in the height of the Civil Rights Movement in the 1960s existed alongside their present disgruntlement towards Middletown's mostly Black and Latinx renters. While we were talking one day outside the library, Theresa gestured towards the train tracks just behind us. “A lot of people that rent live on

the other side of the tracks, and that's a big thing too. Which side of the tracks you live on, even today. On the other side of the tracks, here this year gone next year.”

Brenda grew up on the other side of the tracks on Market Street, where her childhood world consisted of the four streets where her friends and family lived. She walked to school and home for lunch. In 1979, she stood out on her porch to watch Jimmy Carter drive from the airbase to the plant, in an attempt to assuage national fear. When she married an Olmstead airman from Florida, she moved to a more residential area in the northern part of the Borough. But ultimately, they settled back to live on the other side of the tracks, which is where she was currently living when I called her in the winter of 2021 after getting her number from Jeannie.

The other side of the tracks quite literally referred to the south end of town, just a quarter square mile, divided by the train tracks, and closest to the Susquehanna River (and by extension the coal and nuclear plants lining it). Just to the west is Harrisburg International Airport, and to the east is Swatara Creek. It is a historically Black neighborhood that now has the reputation for being mostly rentals, in part because of a 44-unit apartment complex built in an old, early 1900s shoe factory that offers short-term leases and Section 8 housing. When I called to ask Jeannie if she agreed with Brenda that where you lived was definitive, I heard her raspy laugh on the other line. *Yeah, that was true.* She explained to me the cartography of the town: *All the African American kids lived on the other side of the railroad tracks. Our side was more middle-class. And then you had Oak Hills, a neighborhood with streets circling a small green park and single-story houses, which was more blue-collared.*

When Hurricane Agnes covered the town in water in 1972, this cartography shifted in some areas and was reinscribed in others. With the Susquehanna to its south and the erratic Swatara to its east, half of the other side of the tracks is considered a flood zone. On the north

end of the tracks, another middle class neighborhood *went from people who worked to Section 8*, Jeannie told me. The town lost power for days. People were rescued from their roofs and second-story windows and taken to firehalls, schools, and churches. Nearly fifty people died in Pennsylvania, and thousands lost their homes or businesses. In Middletown, residents worked alongside volunteers from the Red Cross and the Mennonite Disaster Service to clean up the damage the Flood of 1972 had wreaked on the small town. The Housing and Urban Development department (HUD) brought in trailers for people to live in and began purchasing the homes in the flood plain to repurpose them as recreational areas. On the other side of the tracks, houses were leveled to create the baseball diamonds and playgrounds that today sit along the Susquehanna River, relics of Agnes, adjacent to the abandoned MetEd's Crawford Station and its electrical grids, an old coal plant that used to blanket the town in dust, as well as industrial contaminants. Some residents resisted, refusing to leave their damaged homes, but the HUD successfully forced sales of their properties, nonetheless (Jefferson, n.d.). When people told me about Agnes, they did not tell me about the forcible sales of homes (that I found in the archives); instead, they told me about a community rising up together to overcome impossible odds. Down the river, the cooling towers had already been built at Three Mile Island, and Agnes only further solidified some residents' support of the infant nuclear plant. The cooling towers stood at over 375 feet and were like a beacon on the horizon: When other sources would fail due to hurricanes or floods, TMI would offer safety and security.<sup>40</sup>

---

<sup>40</sup> To be clear, TMI is not impervious to flooding. The same waters that cool the uranium fuel rods to an operable temperature, also present a risk. Following the nuclear disaster at Fukushima, it was discovered that the company's license had underestimated the Susquehanna's capacity to rise by four feet. Exelon updated their safety measures, installing new flood doors, seals, and hatches around critical equipment and buildings. Their spokesperson at the time assuaged public fears by citing Agnes: the new measures would protect against a flood 60 percent greater than the Flood of 1972 (Cralle 2011).

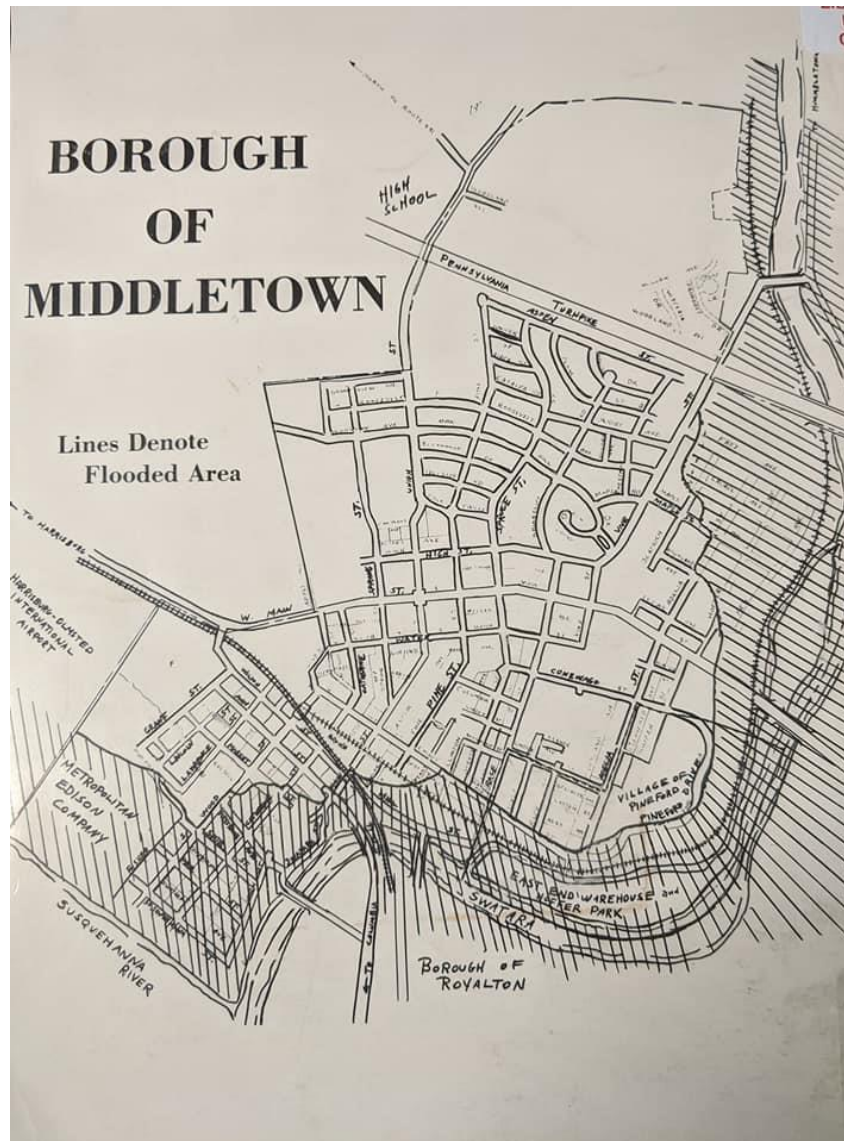


Image 16: Map of the flood zones. The southwest end of town, on the eastern part of the railroad tracks, is the “other side of the tracks” and the highest concentration of flood zone land. Image courtesy of the Middletown Public Library.

\*\*\*

A while ago, when she was seriously considering selling her home to developers and leaving, Jeannie talked to a real estate agent who told her Middletown was *the ghetto*. “Here’s the location,” he said, “Harrisburg, Steepleton, Highspire, Middletown. It’s a ghetto.” Like Jeannie, Brenda, Theresa, and Hurricane Agnes, the real estate agent was mapping and remapping the town and its surrounding area. “You go to almost any town,” Jeannie said, “it’s completely different.”

When and if people moved out of Middletown, the rumor was that they typically left for somewhere like Elizabethtown or Mount Joy, small towns in the neighboring county that were *more family-oriented*. What I found throughout my fieldwork was that *family-oriented* indexed many things—more (Protestant or evangelical) churches, more people in those towns going to those churches, more homeownership, and better kept houses with higher property values. And unlike Middletown, these small towns’ populations were slowly growing, as more young people chose to stay and raise their own families there. I grew up in Mount Joy on one of the main streets in town. My mom walked us to church on Sundays, which was just a block away and composed of several large farming families in the area. This is how I knew Mary and George. They lived just between these two towns on an 80-acre farm in the heart of Lancaster County, known for its rich farmland and rolling hills, and, on the surface, it embodied the ideals that Middletown residents mourned.

After we had settled back into the wooden chairs on their porch, I asked Mary and George what the future of this area looks like without TMI. “I’m more concerned about the future of America.” Mary told me. “The election is going to tell us a lot. This whole Covid thing. Part of it is real health, part of it is political. I am more fearful that that’s going to change the life of children and grandchildren and great grandchildren.”

Covid? I clarified.

“Well, the political part of it. I think Covid is going to go... just like polio and smallpox. You got control of that. And I think that’s what’s going to happen with this virus...The political parties are making this a political issue. They’re moving away the freedom.”

“Right, right,” George nods.

“They’re shutting down the churches.”

“And you know what, Steph—”

“And even in the last six months, all the freedoms we’ve had that we’ve given up,” Mary was on a roll.

“—I’m just afraid, Steph, we’re going to see empty churches because people are saying ‘Oh, we can Zoom.’”

Mary nodded, “I think that’s going to have more of impact than TMI.”

We sit there for a while as they talk about going back to church, how moved they were to hear the congregation sing together for the first time after returning in-person.

Then George adds, “You know, Steph, the hardest thing for me is I remember you as a little girl at Mount Joy [Mennonite Church] and all the lovely young ladies at the church we had. Here we are in our eighties, where did the time go?” I merely nodded, but I did not quite understand what George meant by this and could not help but feel that I was representative of not just a time gone by, but as an unmarried woman pursuing a PhD who never returned to that childhood church, also of this uneasy future, one in which my freedoms were synonymous with a challenge to theirs. I twisted my abandoned mask in my hands.

“This is what Hitler did,” Mary added, “Hitler led them to believe like us ‘you have to wear masks, you can’t go to churches,’ and he had them right in the palm of his hand. And people believed it. I just hope that doesn’t come to America.”

I was stunned, politely nodding and trying to understand the logic connecting public health measures to the Holocaust’s complete erosion and annihilation of human rights. For Mary and George, TMI quickly became eclipsed by the more pressing worry of Covid’s denial of freedoms, most notably religious freedoms. Covid did not so much threaten biological life, only

for a vulnerable few, but the rights and values of American citizens. It threatened their version of the good life.

This was the dark side of a *family-oriented* small town. And in some ways, all Mary feared was already quite at home in America but taking a different shape and reaching a climax in the summer of 2020. On June 14, armed local white militia groups took to the rooftops of small businesses in Elizabethtown to “monitor” the town’s small Black Lives Matter protest. Two weeks later, a man walked into Lancaster’s Central Farmer’s Market wearing a black T-shirt, green shorts with a montage of big cats, and a rifle slung across his back in protest of its mask mandate. In August, the National Justice Party, a large white supremacist group, secretly organized in a barn in south central Lancaster County (C. Walker 2021). While these intimidation tactics incited outrage in some of the area’s residents, they were also silently tolerated. The police arrived after the man, who was shopping with his wife, had already left, and Pennsylvania is an open-carry state, so there was not much action to be taken. The police present at (and participating in) the peaceful protest in Elizabethtown did not remove the armed militia members. And when national supremacist leaders from across the country met in a sleepy barn surrounded by corn and soybean fields, no one was the wiser. And I was a product of this small town, trained to nod politely when my interlocutors warned me about the country’s brushes with socialist spirals or Hitler’s Germany.

That same summer, a Middletown Borough council member posted a cartoon depicting a police-uniform clad donkey with a shirt that read “Decades of Democratic Policies” kneeling on the neck of a Black man wearing a shirt that said, “Black Communities Matter.” In another post, Governor Wolf and Secretary of Health Levine wear Nazi uniforms. The town had to move their meeting to a bigger building because, in a rare demonstration of public interest, so many people

attended, but “apparently not enough,” Brenda told me, “because he’s still on Council.” An unsuccessful petition was circulated asking for the resignation of the councilman, who issued a public apology but kept his seat.

When I heard or read about these things, I thought about Jeannie. I thought about how even the small towns she thought of as aspirational, and the ways in which they fit the mold of the midcentury good life promised to Middletown, flowed with a toxic undercurrent. All of these iterations of small town America—founded on family values, religious freedom, and shared aspirations of the good life—obscured the real harm afflicted by their ideologies of race, class, and gender. Small town America itself was a fantasy, that my interlocutors only seemed to become more enchanted by even as it unraveled.

### **David and Goliath**

When I first reached out to John for an interview, he was reluctant. He had heard that I was doing research on TMI. *I don’t like to dwell on the negative, and TMI was a negative.* When I replied that I was more interested in Middletown as a place in and of itself, before and after TMI, he opened up. He told me that he was working on a plaque for a house next door to the Presbyterian church. *We can talk about those things. They’re so much more interesting than TMI.* John was uncomfortable with Middletown becoming solely defined by the plant and the accident. For him, Middletown deserves to be remembered in its own right—as more than a passive bystander to and node of nuclear catastrophe in 1979.

Once, I asked John if there was anything he wished people knew about Middletown, his face fell slightly, *I just don’t want them to think it’s a dying community. It still has opportunities. It still has life.* Then he spread his hands out and gestured around the upstairs of the library, a large rec room with roundtables, chairs, and sofas that the library used for board meetings and

prior to Covid, community events. *That's why we try to keep this place open because I kind of feel it's kind of like a cultural center for the community.* The library for John is central to, but only one part of, Middletown's revival. He also believes that if young people knew more about Middletown's rich and unique history that they would find pride in their hometown and want to stay.

The Historical Society, for John, was part of this mission to recover the town through its history.<sup>41</sup> Located on the first floor of a 1755 frame and log cabin-structure, the museum is fully volunteer-run and only open from 9:30- 12pm on Wednesday mornings. I went one day, before Covid, thinking I could quickly walk through their exhibits and jot down some notes before my library shift. When I walked in, an older man greeted me. He guided me over to the check-in book on a small cherry table underneath the window facing Main Street. I picked up the pen and noticed my name was the first and only name to start their December visits. I signed my name and wrote in the date. When the man stayed by my side, it was clear he would act as my docent in what would be a one-hour personal tour.

The museum's display cases were filled with objects ranging from glass milk jugs from local dairies, small glass bottles from the old apothecary, to local artwork, including a number of clown drawings and paintings done by a beloved high school English teacher. A cherry corner cupboard housed pictures of the library when it was the firehouse in 1891 and the ribbons and awards the brigade accumulated over the years. Underneath this display, yet notably predating it, was an arrangement of arrowheads, needles, and other stone tools made by the Conoy and

---

<sup>41</sup> John and Jeannie are a part of the Historical Restoration Commission in Middletown rather than the Historical Society. Despite their common interest in history, Jeannie explained that they are roughly divided along political party lines. The Historical Society tends to be more Republican, while the Historical Restoration Commission is more Democratic. Although distinct, the two organizations do collaborate with one another occasionally.

Ganawese tribes, who lived in the area between today's Pine, Spruce, Main, and High Streets. Before the land was excavated to become Three Mile Island Nuclear Power Plant, it was known as a site for arrowheads and other native artifacts, and residents would canoe out to the island and search for them in the woods and brush, collecting them. The Conoy and Ganawese tribes were offshoots, my guide told me, of the once-powerful Susquehannock Nation. There was no mention of the Paxton Boys, a group of Scotch-Irish frontiersmen who conducted brutal land raids in the local area, violently seizing control of large swaths of Susquehannock land.<sup>42</sup>

The guide used the Walt Disney cartoon on the silk scarf of a WWII pilot and Middletown resident's uniform to transition to the next display housing a small, peculiarly shaped black figure: A small children's toy with blocky feet, flexible thread-wrapped wire arms, and a tail extending out to small hand-like balls. "Micky" was written on its chest in large yellow letters against a red circle. Middletown-resident Rene Grove designed the Micky Mouse in 1926 for his Performo-Toy Company, settling on the name through an employee contest and one man's newfound affinity for alliteration. Grove's design was wildly successful between 1927 and 1931, traveling to the shelves of Borgfeldt in its New York flagship department store. At the same time, a struggling and uninspired Walt Disney was in New York to meet with Universal Pictures about his latest cartoon idea, Oswald the Rabbit. In an article written by the Middletown Public Library, resident Mark Ferraro says, "The events that followed are largely circumstantial, but Middletown historians believe it is likely that Walt Disney borrowed his most creative idea from the Performo-Toy Company." According to local myth, Disney was so taken with the toy that he went on to create his own version but added an "e" to the first name. Mickey Mouse

---

<sup>42</sup> Their violence reached a bloody climax on December 14, 1763, the Paxton Boys burned the cabins of and murdered six members of the Susquehannock tribe. The six adults and eight children of the remaining tribe members were placed in Lancaster City's jail. On December 27, the Paxton Boys broke into (or were turned a blind eye) the jail and scalped and dismembered them.

became an international icon. The two toys coexisted peacefully until 1931 when Walt Disney successfully sued Grove for copyrighting his idea, despite Grove's design and patent predating Disney's by four years. In the Great Depression years following, Grove would go bankrupt, like *a lot of small, family owned businesses at the time*, my guide said.

As we walked through a room containing antiques, a pristine coverlet hanging on the wall, two looms, a drop-leaf cherry table, and a dry sink, my guide turned towards a fake fireplace. Hanging above it was a long wooden rifle. *This is a Pennsylvania Rifle, though it is more commonly known as the Kentucky Rifle. As you might imagine, it has a story. You may have heard of a man called Daniel Boone.* I replied that I was, in fact, distantly related to Daniel Boone. *Oh well, this story might change your mind*, he glumly replied. Like Walt Disney and Micky Mouse, Boone was so taken with the Pennsylvania rifle's long-barreled accuracy, he brought the idea to gunsmiths in Kentucky. The rifle quickly gained popularity and the Kentucky people claimed it as their own. *Kentucky Rifle is easier to remember than the Pennsylvania Rifle*, my guide explained. The pattern repeated in Tennessee and Texas. Finally, we crossed into what he called the "School Room," decorated with pictures, uniforms, and pennants from the Middletown public schools. *Middletown excelled at education, so much so that the State used Middletown High School's curriculum as a model for state standards of education*, he told me proudly. He himself had graduated from there, like Brenda, John, Jeannie, and Theresa.

Throughout the entirety of the one-hour tour, TMI was conspicuously absent.

Instead, as I walked through, I could not help but feel like this was not just a showcase of town pride. It was also a retelling of history. It was a desire to fit Middletown into a national narrative—that the town had significance in its own right beyond being a midway point between two major cities, Harrisburg and Carlisle, in the late 1700s and hosting nuclear infamy in the late

20<sup>th</sup> Century. The history the glass cases and the objects gathered inside of them told was one in which Middletown was noteworthy, innovative, and exceptional, pioneering a path into the future, but bigger, richer folks appropriated its ideas and inventions for their own benefit, leaving Middletown not only without the economic gain but also unremarkable. Displays dedicated to the invention of Micky Mouse and the Pennsylvania Rifle sit alongside those commemorating a local WWII hero and touting Middletown's once exemplary and progressive education. After my tour guide showed me Micky Mouse, I said *Ah, a David and Goliath*, to which my guide appreciatively answered *Yes, exactly*.

When Middletown did achieve its fame, it was not through these accomplishments, but near catastrophe. *TMI put Middletown on the map*. And indeed, for a while, Middletown was synonymous with TMI, and TMI was synonymous with disaster and national nuclear fear. When my interlocutors would travel out of the area and folks asked where they were from, they would answer Middletown only to be met with blank stares. *Where TMI happened*, they would add and instantly receive recognition and a twinge of alarm.<sup>43</sup>

The museum and my interlocutors' insistence on place and emphasis on the particular stands in sharp contrast to and even subverts the ever-expanding scales of time and space of nuclear technology. They wanted to celebrate the historical specificity and exceptionalism of Middletown, independent of the nuclear industry, as a conduit to its revitalization. Kathleen Stewart distinguishes between "hegemonic and resistant nostalgias, 'middle-class' and 'working-class' nostalgias, the nostalgia of 'mass culture' and the nostalgia of and for local, nameable places" (1988: 227). Hegemonic nostalgia is a product of late capitalism; it is middle-class and

---

<sup>43</sup> However, more and more, this social memory is changing. As I am/was writing this dissertation, I also adjuncted at a college upstream from the plant and was surprised to learn that very few of my students knew about the 1979 accident, let alone that the infamous plant was just a few miles away and quietly decommissioning.

something distanced and distancing. Resistant nostalgia stems from an insistence to remember and name the local in the face of systemic pressures that threaten to unravel it. The history I heard told at the museum and by interlocutors was a combination of these two forms of longing and remembering. It was highly specific, but it also favored the erasure of past harm (TMI, the Paxton Boys, Agnes, the town's raced cartography) in the face of a fragile future. I did not know it at the time, but the museum, as a formal curation of that history, laid bare the logics that would animate my conversations later in my fieldwork. These histories were not a passive form of remembering but a creative, often optimistic retellings of past events that blurred their consequences into a coherent vision of the good life—a life in which TMI and the industries before it played a pivotal, often contradictory role in both creating, threatening, and ultimately foreclosing.<sup>44</sup> It's not that these histories and stories of small town America were untrue; it's that they were fantasies.

## **Haunting**

On Wednesday afternoons, I help Lydia close up the library. Today is dark and grey, even though it's only four, and the darkness only intensifies as we move to turn off the lights throughout the first floor. Lydia flicks the switch for the upstairs, and we hear a quiet child's voice say *Thanks a lot*. At first, I didn't know if I had heard correctly, it was so quiet and calm and childlike, and the upstairs was so dark; surely, I thought, a child would have a different reaction to darkness than cold sarcasm. I look at Lydia with surprise, and she calls up. The library director's son bounds down the stairs from the children's section with his computers, like

---

<sup>44</sup> In regard to TMI, such erasure is made possible in part because the effects of the accident are largely uncertain. Instead, the lack of epidemiological and environmental evidence (explored more in the second part of this dissertation) fits well into a narrative of containment—an event with a distinct beginning and end—that American fortitude and wit kept from becoming a Chernobyl-level disaster, as Mary believed.

the ones downstairs, donated by Exelon Three Mile Island in one of its efforts to establish itself as a community-minded company. I laugh. I had a brief moment of thinking the place was haunted and tell Lydia this. *It is*, she replies. A TV network came out a few years ago because people could hear people playing billiards at night.

The library is one of the Middletown's prized historical buildings. Built in 1891, it was originally the fire station. Theresa's great grandfather helped found it, when its large windows were originally a door for a horse and cart to get through. When horses were replaced by fire engines, the station moved to the outskirts of town and the building became a recreation and town center. The town had its elections there, and when Theresa's mother would volunteer, she would bring over food and hot water bottles to keep her mother warm.



*Image 17: The children's section, located on the second floor of the Middletown Public Library. Like the other patron computers, these were donated by Three Mile Island. Photo taken by author.*

I feared ghosts, but Lydia held other fears while closing up. *Can you imagine if there was just some guy waiting back here for me to turn the lights off? That's how my mom raised me. To*

*think like that.* I walk Lydia out to her car each day per her mother's request that she always walk with someone (and Jeannie's advice). We pass by Theresa's house, a big Trump flag hanging on the porch. *She cracks me up,* Lydia laughs, *Apparently her signs kept getting stolen from her yard, so she told me she nailed the sign to her home.* Theresa liked Lydia and liked talking about whether *things were looking good* (or not) for *our* (their) *boy* throughout the election. On Lydia's last day, Theresa brought her a hand-sewn quilt, a patchwork of leftover fabric from lap cloths and handkerchiefs Theresa had made for Holocaust survivors.<sup>45</sup>

*No one's getting that.* I responded, referring to the newly secured flag.

We say goodbye and laugh when we both say "drive safe" at the same time.

As I drive away from the library, I think about Jeannie's comment about how she wishes that the town would get power washers to tidy up some of the houses, which are not so much rundown as unkept in ways that John and Jeannie feel are indicative of renters' lack of concern for their properties. And I think of TMI and all the phantom industries, plants, business and their accompanying ideologies of race, gender, and class that continue to haunt the town.

Today, Middletown's longest existing business is Gingrich Memorials, a fourth generation cemetery monument and memorial producer founded in 1921. The Gingrich family purchased its Middletown headquarters and renamed the business, which was originally founded in 1886. Across the street is the town cemetery where many members of Jeannie and John's family are buried. A few months ago, Jeannie convinced John to sell their burial plots. *It used to be so peaceful. It was sedate. It looked relaxing,* she told me after they visited over an Easter weekend.

---

<sup>45</sup> Theresa's attitude towards Judaism, like Mary and George, is founded on the Christian belief that Jews are God's chosen people, despite not being Christian, and the acknowledgement that Jesus was a Jew. This view is complicated by the historical and contemporary violence of Christians against Jewish people. For instance, anti-Semitism is a core value of the National Justice Party, brought up earlier in the chapter, and the growing contingency of Christian Nationalists in the area, which use the language of Christianity to advance white supremacist agendas.

*I do get sad. I think about the good times. How we grew up.... This path of my life I never thought I would be going through, living in a town like this.*

In that same conversation a few months after I wrapped up fieldwork, Jeannie asked me how things are in Lancaster city, the vibrant, historically rich, hyper-local small city thirty miles south where I am currently living. Am I living in a safe neighborhood? Do I have a yard for my dog? I tell her my partner and I are really enjoying it and like the ability to walk everywhere and take advantage of the new markets and restaurants. I feel guilty telling her these things, as if I am describing precisely what she has lost. All these things that are supposed to make me feel safe now and once made Jeannie feel safe exist as fantasies that obscure the very ideologies of race, class, and gender embedded within them. Who is vulnerable and who is safe when and from whom and from what.

Jeannie has dreams of moving to the ocean. Not too far away, just Delaware. Finances are one factor keeping her here, but her brother's unflappable commitment to the library, a remnant of their childhood lessons to take care of the things that you own, is the primary obstacle. John is reluctant, a cruel optimism holds him to Middletown, the hope that one day all those books will go flying off the shelves and into the arms of Middletown residents. And Jeannie won't leave him. "My brother says, 'Well, we have this here, we have that.' I said, 'John, we can always volunteer at different places.' I said think about it, but probably we won't get anywhere. We're probably stuck. Yeah. You know, you always had that in your mind that you would like to get—I would like to live closer to the ocean. I would." Jeannie's sad and little wistful as she is saying this to me. It is like she is nostalgic but for the future, or a particular vision of it, one that once felt tenable but now will likely never arrive. She is at an impasse, a "holding station" and "thick

moment of ongoingness” that opens into new anxieties and forms of ambivalence after portraits of the good life begin to show their wear (Berlant 2011: 200).

A year and a half later, I send Jeannie a card, picking one with an oil painting of two houses side-by-side at the shore, a sandy path between them leading out to an ultramarine blue.

## **Part II: TMI Bodies**

### **Interlude: Boundaries on the Homestead**

The smell of mint wafts out of Liv's house when she opens the door. *My house is in shambles; why don't you come in through the front?* My dog and I follow the path back out with its ornamental thyme pushing through the stone slabs and scattered herbs, day lilies, and cone flowers bordering it. There's a cornfield a few feet away, upwind and uphill, and in the July heat, it is already high enough that you can't see over it. Liv and her husband live on a picturesque six-acre homestead just a few miles from the plant. There's a willow tree by the creek they use for baptisms, a small red barn they use for storage, and a large vegetable garden out back. I step up to their front porch and nudge the screen door open. Liv is standing in jean shorts and a tank top in her kitchen. She apologizes and points over to the living room, an empty room with plywood floors, sawhorses, a mattress and pillows, and a bag of golf clubs. Her husband is redoing it and had just put drywall up.

I am here to pick up masks. I hover in the entrance, not sure whether to stay outside and social distance or close the door to keep the hot July air from getting in. Liv is my childhood friend's aunt, and, at the start of the pandemic, she sewed dozens of pieces of cloth together to form a thin shield of protection that a year later would lay crumbled and pushed to the back of one of my drawers when N95 masks became more accessible.

She gestures me into the kitchen. *I'm not worried about you*, she tells me and then pauses, *Isn't that silly? Who we worry about and who we don't.* There are dozens of pots neatly hanging from a pot rack, an old range, and a worn butcher block in the center. Liv cans and cooks and has even written a cookbook. The smell of mint is even stronger inside. I comment on it, and she said, *Oh, I just made a big batch of meadow tea! The boys go through it so quickly.*

The pale green sweet tea, a staple in Lancaster County, sits in large and neat mason jars on the butcher block.

I noticed one of my mom's painted floor cloths in the kitchen and commented on how it matched her yellow and tan checkered floor. *Let me tell you something about this floor*, she said, *It's fabric! We finished it with polyurethane. It was meant to be a temporary fix, but I kind of like it.* So did my normally very timid dog, who laid down right away by our feet.

Liv leaned up against the counter. As we make our way through the family updates, I tell her about my project and ask if she ever thinks about TMI or radiation when she's out gardening. *Oh, that's interesting*, she ran a hand through her short dark grey hair, *I don't really. I'm the type of person who if I can't control something or can't do anything about it, I try not to think about it.* She told me that her father did die of cancer, and they think it was related to the 1979 accident. Her dad was a farmer and was out *working in the fields when probably he shouldn't have been.*

"During the accident?" I asked.

*During the whole thing.* Not long after, he started to show symptoms and remained unwell for years before he died. I felt uncomfortable prying, but I wondered how long and when exactly he died, what type of cancer, but I didn't ask the questions as they bubble up. *Of course, you never know if it was due to radiation or not*, she continued, *but we always thought maybe that was it: TMI.*

I replied how many people have similar experiences and stories, yet the government and other experts say the radiation was insignificant. She sort of rolled her eyes and gives me a sad smile, *Well, significant to them is something very different. If it's radiation at all, isn't that significant?*

There's so much we don't know, she told me and pointed to the unfinished drywall in her living room, the carpeting, the polyurethane floor, naming each one and making visible the unseen risks that surround us, even as we learn to live with them. I ask if she uses pesticides in her garden, and she shakes her head and crossed her arms, *No, and very little if we do.* Sometimes she'll ask her husband, my old shop teacher, to just "touch" the plants but only in particular cases, like when she wants to yield a little something before the plant gives way to pests.

*But our neighbor, oh yeah!* And she hunched over and walked around with her right hand out, maneuvering an imaginary nozzle connected to an imaginary Roundup can. *And wouldn't you know, he died of cancer. Again, you don't know, but statistics would tell us...* she trailed off, leaving me to connect the cause and effect. She tells me the farmer who owns the corn in the back of their house sprays, uphill and upwind from them. When he does, they can smell it. That sharp chemically scent. It makes me think of the smell of mint that felt so welcoming to me when I arrived but now I hardly notice. *They're not even tilling anymore. Just spraying,* she shakes her head. Farmers were increasingly opting to forgo the more labor intensive process of tilling to spray instead, particularly those who relied on horse-powered rather than machine-powered equipment, such as the Amish and Mennonite communities.

*And of course, the farmers spray the corn, feed the corn to the cows, and we eat the cows,* Liv neatly sketched out the cycle of farm to table, Lancaster County's lifeblood. Fresh produce and local animal products were plentiful, accessible, and relatively cost-effective. Small, roadside farm stands pepper the county's more rural areas. In its small city, the Lancaster farmer's market has a two centuries-long history of sourcing from and supporting local farmers. These farmers also source out to Philadelphia and New York restaurants, who can boast of the

small-scale production of their produce and animal products. Local dairies also supply products to more regional brands like Turkey Hill, Swiss, and Rutters, as well as global brands, such as Hershey Chocolate. The food cycle that Liv lays out so clearly does not stop at the county's borders.

People talked about organic farming—it was the future, a safeguard from toxins, or just too expensive and unregulated to be worthwhile—but no one talked about radiation. When I would drive down 441, just on top of the hill that would slope down to TMI's Visitor's Center, a farmstand always had several cars parked while their drivers perused the wooden shelves of vegetables. Just across from the plant, I would drive my car past a dairy farm with a small outbuilding, the words "The Cheese Shed," written over it and the cows in the barn just a few feet away. I went in a few times to see what they had, barn cats running over to greet me and cows mooing just beside me, but I never bought anything. Once, my mom bought a block of cheddar. I couldn't bring myself to eat it.

Liv said she knows a lot of people who live *right there*. I should talk to them. Later, I wonder why she thought I had to get closer to the plant to hear from people more concerned with TMI. She only lives five miles away. But she told me that these people can see it from their homes. Just like my hesitation to eat the cheese from a farm where you can see the plant on the horizon, Liv was operating under the logic that the threats that we see are what we are most concerned about. When she smells spray and sees the farmer out in his fields, she moves inside—she tries to control for it. But there's only so much she can do. *It's in the air. They're only supposed to spray when the air is still, but all it takes is a little breeze to spread it.*

When I get ready to leave, Liv hands me the masks in a legal envelope. *I love to reuse things!* she laughed. She told me to just wash the masks in the laundry and hang them out to dry, *I guess unless they're out spraying.*

### Chapter 3: Occupational Intimacy

Pete credits his softball skills to landing him a job at TMI. At its peak, TMI was a large-enough employer to host its own intra-company softball league for its 3,400 employees. He heard the money was good in nuclear and applied for a job in maintenance in 1985. They asked if he could play—and he could—so he was hired. He started as a janitor and slowly got more involved with operating heavy machinery. He worked there for 35 years, taking a retirement package that was offered when Exelon announced the plant's decommissioning.

It was actually through softball that I already had met Pete, though I was too young to remember. In the early 1990s, when TMI's league started to taper and its workforce reduce, he joined a club league in the area and played with my father. But I did not know this at the time we first scheduled to meet. Instead, I connected with him through a friend of a friend who knew I was doing this research. I pulled my car up next to his red pickup and walked to the door of their bilevel home. Corn fields reached up around it. I hadn't even rang the doorbell before Pete was out, barefoot on his stoop, *We have some questions for you!* Around six foot three, Pete has a big physical presence tempered by his quiet demeanor, until you get to know him and find he laughs easily and cracks jokes more often than not. His wife, sitting in a big leather easy chair behind him, called out, *You look just like your mom!* After thinking about my last name, Pete realized the connection. They asked how my parents were doing, were they healthy, was my dad retired yet. They asked about my older sister and shook their heads when I told them she had passed away several years ago. Like some of my interlocutors, I had the experience of re-meeting people from my childhood, of becoming known again. We occupied the same space, these small

towns dotting the corn and soybean fields and dairy pastures lining the Susquehanna River, which acts as the coolant for several industrial plants, most notoriously TMI, whose toxins and pollutants, in turn, occupy us.

The boom in jobs that created Pete's position, as well as the softball league, was due to the massive manpower required to clean up Unit 2 after the partial meltdown and to get Unit 1 back online. Pete was good with equipment. Before working at TMI, he helped on the family farm of his future wife, operating the tractors, combines, and other heavy machinery that were required for seeding, maintaining, and harvesting the land. Like Liv's father, on the day of the accident, Pete was outside working on the farm; he remembers that every day for a week or so the NRC sent someone out to buy a gallon of milk and test it for radionuclides. The farmers never heard anything and took that to mean *it was pretty much under control*.

During TMI-2's clean-up, he operated the drilling rig to bore into the melted core, creating "Swiss cheese" so other employees could haul it out, place it in special lead containers, and transport it via train to Idaho. He wore a full hazmat suit and respirator, and he and his colleagues took turns taking hour-long shifts to distribute the radiation. But Pete said despite joining after the accident, he was never concerned about it; friends of his worked there and told him everything was under control—the accident had been contained. When he got the job, he and his wife were excited. He would be making a good salary. He would get to be outside and work with his hands. The work was different everyday: driving cranes, building scaffolding, and digging holes. It was close to their home, which was right next to her family's farm. And it was work he could be proud of, he told me, contributing to a green energy source.

Throughout most of his career in the nuclear industry, Pete was in Unit 1, where his hazmat suit and respirator were replaced with a hard hat, eye protection, and work gloves. But

the gloves got in the way, he tells me. And he often removed them to *feel the pipes*, whether they are hot or cool, whether water is flowing through them or steam, whether they are vibrating or still. The gloves also got in the way of the nimbler work, changing a bolt or tightening a screw.

It is actions like removing one's gloves and playing in a softball league comprised of a workforce recruited for nuclear clean-up, as well as the occupational hazards that necessarily come along with working with nuclear materials, that I want to understand as intimate, an entanglement that though oftentimes toxic, brings people into affective and material relation to their work, their environments, and other postindustrial sites. Intimacy seems to have little place in the workplace, particularly male-dominated industrial sites, such as nuclear power. But the processes through which people collapse the boundaries of their bodies to their work—its hazardous materials, practices, and shift rhythms—as well as their workplace to their homes, is inherently an intimate act. In a world comprised of already altered bodies and environments (Murphy 2017a), occupational intimacy is the leftovers of containment; what manages to still get through despite (and sometimes because of) occupational safety procedures.

How do people come to *feel safe* when working with or living near radioactive material? This chapter draws primarily on interviews with plant employees and their families to analyze safety procedures as rituals that transform the hazards of radioactivity into feelings of containment and intimacy. Rather than how knowledge of risk and harm gets produced, I analyze how safety measures generate affects and relations by juxtaposing the rigid, procedural nature of nuclear safety protocols with workers' intimacy with machines and materials that harm. Similarly, rather than examining when such protocols are followed, I look at the ways in which occupational safety measures are transgressed or become messy and entangled in more intimate, domestic, and personal spheres. In doing so, I describe how rigid, highly regimented safety

protocols that attempt to control for nuclear technology's inherent unpredictability through habituating workers' bodies to anticipate and automatically respond to emergency also generate an intimacy with the plant, its machines and radioactive materials. Such occupational intimacy is sometimes encouraged, like one worker describing his position as being the eyes, nose, and ears of the plant. Other times, work, in the form of radiation, steam, and Covid, occupies the body. As a result, I approach occupational intimacy as a process not only contained to the plant, but a relationship through which my interlocutors working in and living near the plant and myself occupy nuclear sites and are, in turn, occupied by them.

In using intimacy here as an analytic to describe the dissolution of boundaries in nuclear spaces, I draw from queer and feminist scholarship that has often reached for it as an analytic to trouble dichotomous thinking. Lauren Berlant challenges readers to rethink intimacy as a relation that transects the public/private divide that both reinscribes hegemonic norms and opportunities for flourishing despite them (L. Berlant 1998). Mel Chen understands intimacy as closely tied to animacy, or a more capacious definition of liveness that destabilizes subject/object relations. That is, once we conceive of toxins occupying us (rather than merely being occupied *by* them), new forms of intimacy emerge that are “not dependent on a heartbeat” (Chen 2012, 203).

To describe occupational intimacy as a relation between the bodies of interlocutors and their nuclear milieus, this chapter is divided into four sections that gradually move away from the plant. First, I illustrate how workers habituate themselves to dissolve the boundary between the human worker and the plant and occupy “nuclear nature,” something at once highly regimented and controlled and also inherently unpredictable. In the second section, I demonstrate how despite the boundaries put in place by occupational safety protocols, radionuclides still enter and occupy the body. Next, the chapter tracks the domestication of nuclear energy as not simply the

repurposing of wartime technology, but also the process through which my interlocutors feel at home with it. The fourth section shifts focus to the impact of decommissioning and Covid on these forms of occupational intimacy.

### **Embodying Nuclear Nature**

“I am basically the hands, eyes, ears, and nose of the plant,” George tells me over the phone. When we talked in the summer of 2019, he had been working at TMI as a non-licensed operator (NLO) for eleven years. His job has him on the ground, assessing the everyday operations of the plant and reporting to control operators what “I smell, hear, and see, and then we diagnose and go from there.” His particular position is one in which the paradoxes of what he calls “nuclear nature” is particularly salient: On the one hand, nuclear nature is highly regimented and surveilled through routinized safety protocols; on the other, it is inherently unpredictable. As a result, such protocols do not so much prevent harm but mitigate it. “Nothing is routine,” George says. For both George and Pete, this unpredictability is partially why they liked the work, it was always different each day, and they were always learning something new.

George tells me he is “not the typical employee” in terms of background. He is not ex-Navy, nor does he have any military experience. But he does have a four-year science degree, and there was an opening. He had to take two written tests before he even got an interview. “I grew up in the area. I knew all about TMI.” In fact, he was three and a half months at the time of the accident. His parents were living in downtown Harrisburg, and his mother evacuated with him to his grandparents’ home in Reading, thirty miles northwest. They returned two days later. “I was never afraid of it,” he tells me forty years later. “It was just always there. And when this opportunity came, I was like, sure I’ll give it a shot. And so, it’s just worked itself out that I was able to get a foot in the door, passed the test, and it’s been 11 years now.” Although George did

not grow up with an inclination to work at the plant, TMI was *just always there*. Like Mary, George, John, and Jeannie in the previous chapter, the plant made up the affective and material landscape of his hometown.

Like other nuclear industry employees, George is on a swing shift, rotating every two weeks from day- to nightshifts. “It takes a toll on the body, takes a toll on the family.” He and his wife live forty minutes away from the plant in a neighboring county with their five children. As we talked on the phone, I would hear them in the background, wanting his attention and George quick to reply with a *good job, look at you, or how did you get up there?* When he works nights, it is harder on his kids. They have to be quiet while he is sleeping, and George is not as available to act “as a human jungle gym.” Swing shifts are also, as George notes, hard on the body. Health studies show how people who perform shift work have elevated blood pressure, blood sugar, cholesterol, as well as an increased risk of obesity, diabetes, heart attacks, and stroke (Wang et al. 2011). It is a slow wearing out of the body (see Berlant 2016) as it shifts, teeters, and adjusts to corporate time. Despite these drawbacks, the swing shift is the “typical lifestyle that everyone is accustomed to.”

George’s workday, like that of nuclear employees across the country, starts with a five-step security process. After 9/11, security at nuclear plants dramatically tightened. “It’s not like the old days where you could just flash your badge and high-five the guard anymore.” Just before TMI started decommissioning in September 2019 and when I spoke to George on the phone, security made up roughly fifty percent of the plant’s workforce and had its own union. After decommissioning began, it became the largest division on the Island, protecting the spent fuel from possible terrorist attacks. To begin the security screening, George is hand-scanned as he enters through a turnstile gate. Then, he and his belongings go through both a metal detector

and an explosive detector. It is pretty sensitive he tells me; it will pick up gunpowder on your backpack if you have been to the shooting range the day before. After he passes through the detectors, he goes through another turnstile and is hand-scanned once more before finally receiving his badge. All of this takes one minute. "It's very streamlined," George assures me, some people pass in and out of security multiple times a day.

Badge in hand, George goes to the locker room where he picks up his PPE: a hard hat, safety glasses, hearing protection, and safety shoes. "Even though it's safe to walk in the plant, you can go in in flip flops. Nothing's gonna happen. It's just a matter of *in case* something happened, from the time you walk in, until you get up there, something could happen. You want to make sure you're covered." Most of George's safety equipment is standard for any industrial site, with the exception of his badge, which acts as a radiation monitoring device. But even this basic industrial equipment is translated into the logics of the US security state, which prioritizes potential events that are high consequence, low probability (Masco 2015). *Nothing's gonna happen.... something could happen*. Safety equipment is part of this equation, but so is the security screening itself. Security guards are armed and many of them are ex-military. *Safety is preached there*, one security guard told me with pride. If someone got through with explosive material, the consequences could be catastrophic. TMI has very few incidences of security breaches, though employees liked to tell me about the time a man drove his car across the bridge, through the gates, ran into a building, and hid in a warehouse before finally being found and escorted off the premises. They would laugh and say *the guy was crazy*.

At either seven in the morning or the evening, depending on his shift, George relieves his counterpart and receives a debrief: What's working, what's not, what problems came up. All the crews gathering for a meeting to formally debrief on the status of the plant and develop "a plan

of attack for the day.”<sup>46</sup> Rounds begin at 8:00, when they all go to assigned areas of the plant and ensure that everything is functioning within the safety parameters. At midnight or noon, there is lunch, followed directly by another set of rounds. “There is not a lot of sitting down. Operators are usually the ones that are out in the plant all the time. And that's just to make sure it's running, we call it, on autopilot. It just basically runs itself. And we're sitting there just making sure it's doing what it's supposed to do.” The whole shift lasts twelve hours, and he rotates between days and nights over a five-week period that also includes five days of training and five days off. At the end of the 35 days, the process repeats itself.

Throughout his rounds, a supervisor follows him to ensure operators are not missing anything. “So, they're seeing us, and we're constantly getting evaluated and critiqued on every little thing we do,” he explains to me, “That’s the nuclear nature of everything—down to if I circled a step correctly before I went on and move to the next page; that's how crazy it is.” Nuclear nature, for George, was something highly specific, regimented, and routine, but also surveilled. To make his point, he asks me to imagine cooking spaghetti with a highly specific, detailed recipe.

You're making spaghetti? Very simple. Okay, but in the nuclear world, if you're making spaghetti, first thing you do is you circle the page number that you're on. Okay, here's the title. Again, a recipe. Great. Go to your next step. Get ingredients. So, the ingredients needed. It could also be the equipment that you need. Find the pot, check, find the lid, check, add water, check. It’s like that. It's very regimented. And if you didn't circle a step, they'd flip out over that.

---

<sup>46</sup> Like other spheres of the nuclear industry, TMI was home to language that often relied on metaphors of militarism. Among nuclear experts, Carol Cohn found that beneath the surface of technical jargon lurked “homoerotic excitement, heterosexual domination, the drive toward competency and mastery” and a sense of privilege and elite belonging (Cohn 1987, 717). To gain full access and group membership, Cohn observed a “militarization of the mind” not only in her informants but herself (714)

Following the 1979 accident, the NRC developed the “TMI Action Plan” in 1980, which implemented new safety measures in response to the human errors that contributed to it (NUREG-0660, NUREG-0694). One particular intervention was the identification of confusing, text-heavy emergency operating procedures (EOPs). An NRC study found that the procedures “were deficient as aids to the operators primarily due to a failure to provide a systematic method of problem diagnosis” (Malone et al. 1980, 107). In a follow-up 1988 inspection, another NRC study found that the majority of plants did not have up-to-date EOPs and that often they did not correspond with plant controls and displays. Additionally, the EOPs were often vague, organized poorly, or simply unreadable due to poor writing, format, or storage. Furthermore, they found there was an “insufficient focus on EOP training” (NUREG-1358, 7). In response, the industry shifted to rigorous training in highly specific, paper-driven procedures that took employees through both event- and function-oriented tasks step-by-step, oftentimes relying on visual aids such as flowcharts (NUREG/CR-5228). Like George, some employees found the new form to be tedious, requiring them to document even the most seemingly insignificant actions. But it created a system in which the series of human errors that contributed to the 1979 accident were controlled for in both training, execution, and liability.

As a result, George carried out his daily tasks under strict supervision, something he associated with the negative aspects of Exelon’s more corporate culture. Although supervisors generally get paid more and have a more managerial role, George never aspires to be one. He is not “a corporate guy,” he told me, and it wasn’t in his nature “to write someone up just to feel

like I can accomplish something one day.” For George, “corporate” indexed surveillance, hierarchy, and a general detachment from employees on the ground at the plant.<sup>47</sup>

Pete largely agreed with George. When I saw him after his retirement, I asked him if he missed working at TMI. “Honestly, I don’t,” he replied. Sure, he missed *some of the guys*. But he did not miss the industry. It was too “paper-driven,” or what George describes here as corporate. “It made doing your job hard at times.” For Pete, the paper trail the NRC implemented was simply inefficient for routine maintenance jobs:

Because if you read a procedure to do a job, and if you read something into it, or if something wasn't worded quite right, you had to stop what you're doing. You had to get a hold of your supervisor, then you had to get a hold of the guy that wrote the procedure. So, you might lose two or three hours before you can go to the job. And it might be a half hour job. But they wouldn't, they really wouldn't let us use our own minds to do it. We did it for years. We knew how to do it. But because they thought making work paper-driven that they could hire anybody off the street and give you the paper and say, “Well, fix something.”

*They wouldn't let us use our own minds.* After reports revealed the various stages of human error that contributed to the 1979 accident, the NRC implemented itemized actions to respond to routine and abnormal events at the plant. Pete’s frustration had hit on something central to nuclear safety protocols: The work was meant to bypass human decision-making all together to make nuclear power as routine, controllable, and knowable as possible.

Such safety procedures required a significant amount of training for staff. George had training every five weeks in classrooms with subsequent performance-based or written tests, as well as an annual exam, totaling to about ten exams a year to keep his job. Control room operators would take written exams, as well as spend time in the simulator, a life-size control room that ran employees through possible accident scenarios and tested how they responded to

---

<sup>47</sup> Supervisors were rarely hired out of the operator pool. It would create a strange power dynamic, according to George. They were mostly off the street or from engineering.

them under pressure and surveillance from an upper-level engineer. All safety procedures are kept in large binders with tabs, so employees can quickly flip to the appropriate section or page through while communicating via radio to colleagues in other areas of the plant. Like the security to get into the plant, training and access to these procedures is meant to streamline decision-making and reduce human error as much as possible to ensure the plant runs within its normal parameters. “That's just more of the preparation that we have to always go through in case something would happen, it's automatic,” George explained, “We don't have to worry about it and second guess, and that is part of the results from the accident, what they learned, and how we've moved forward from that.” Safety training habituates the workers’ bodies to emergency through simulation, either through physical exercises or written examples. Paradoxically, these highly ritualized procedures exist on the flipside of what George describes as nuclear nature: The inherent instability of nuclear fission that was harnessed to create the explosive-power of the nuclear bomb. “Even though they try and make it as programmable and proceduralized to be routine.” George described how “anything can change one parameter, and it has a domino effect throughout the plant.”

The plant was not simply an environment but an interconnected entity, one in which a small shift in one area echoed in others. Viewed through Chen’s work, the robust training program transforms the plant into something animate that requires workers to intimately attune themselves to its idiosyncrasies and control for its instability (Chen 2012). George describes himself as the “eyes, nose, and ears of the plant,” a sensing medium for the plant in his daily operations. The training habituates this occupational intimacy at a bodily level, leading people through simulations, asking them to page through binders with tabs, and circling steps. In doing so, it programs human decision-making, bringing it more in line with how the plant computer

itself operates. Though they work to contain risk, the safety procedures ironically collapse the boundary between plant and worker through this intimate attunement.

This two-sidedness of nuclear nature belies the ever-present specter of disaster that haunts the procedures, themselves born of a partial meltdown and the impetus for implementing them. Nuclear nature is unpredictable, and it is also potentially devastating if left uncontrolled. Pete talked in hypotheticals about terrorist attacks, particularly with the airport being so nearby. “Because it’s just in a huge concrete swimming pool, just in water,” he said, describing the spent fuel pools where used uranium is kept. “If for some reason, that would break and all the water rush out of there, it’d be very devastating to this *big* area. I mean, big area.” He likened it to the scale of Chernobyl, though not necessarily an explosion. “I’m just talking about radiation. The doses would be pretty high. We probably—where we’re at, we probably would have to leave. That’s my speculation.” And indeed, if something like what Pete described did happen, radioactive water could leach back into the Susquehanna River and flow all the way to the Chesapeake Bay, the largest estuary in the United States. Pete and his wife would certainly have to leave their home just a few miles from the plant, as would people living hundreds of miles away. Like most of the things Pete says, he says this softly, calmly. The paper-driven safety procedures keep this specter of disaster at a distance during work, but as Pete describes, the possibility is ever-present, even if quietly.

## **Occupied**

When he was in junior high and the plant was beginning its construction in the 1960s, Pete would go down to the river to watch the cooling towers being built. His neighbor worked as an engineer at the island and promised him a tour. He remembers being disappointed that he was

not able to climb up the cooling tower because someone had fallen a few days earlier, caught by nets and unharmed, due to the wind. When I asked him what he felt when he would look out at fledgling plant, he shrugged and said it was “just a construction site.” The theme of nuclear power’s non-remarkability carries into his career as well; it was just a job and the dangers he was concerned about were hazards typical of any plant, not particular to working with nuclear materials.

“Steam will slice you in half,” Pete tells me. He was never afraid of radiation, even as someone hired during the clean-up of Unit 2 following the accident. But he was afraid of steam. “If something went wrong, there was nowhere to go.” Nuclear power plants rely on water in both its liquid and gas forms for cooling. Indeed, steam generates the electricity in a closed loop, where water flows through the heat exchanger, boils, expands into the steam, and drives the turbine to generate power. Because this steam is generated through a closed loop it should never come in contact with the radioactive water used to cool the uranium fuel rods in the reactor core. A steam leak could occur from a small hole in a pipe or a loose valve. But even if the pipes’ structure remained intact, steam that was turbulent due to air bubbles could swing the suspended pipes enough to injure a worker caught in their path.

Working in maintenance meant that Pete spent some of his time on the job working in the turbine room. Periodically, nuclear power plants shut down for refueling or they automatically “trip” when key operating functions, such as coolant temperature, reactor power level, and water pressure, begin to exceed normal operating parameters. Trips initiate all the control rods to drop into the reactor core and absorb the neutrons emitted by the nuclear fission occurring there, decreasing the reactor power and effectively shutting down the plant for several seconds. When the cause of the trip is determined and addressed, the reactor is restarted (Moderator 2012).

“The plant recognizes it.” Pete explained to me how the computer rather than operators initiates a trip. “I mean people don’t have to say it; the computer knows. And makes sure everything is in a safe position and shuts itself down. And then operators have to go around to stations to watch steam pressures. That’s all they have to do.” In the way Pete describes a trip, the plant’s computer is the primary (even animate) actor initiating the safety response when it detects something outside of normal conditions. The human employees then monitor levels to diagnose the problem and then get the plant running again.<sup>48</sup>

A trip or a scram is not common, but it is normal. Pete had experienced six in total during his 35 years working at TMI. One time it was from a breaker blowing out; another was due to a power line falling down. Five of the trips he heard from his house several miles away and one he experienced *in* the plant itself while he was on night shift. At the time, he knew something was off not from the presence of some new sensory element, but the absence of the machine noise that made up the sensory landscape of his occupational everyday. He and a colleague were in the turbine building. During normal operations, steam rushes through the network of pipes overhead that are suspended by spring-loaded hangers that absorb the movement of the pressurized water flowing through. “They’re this big,” Pete holds up his hands about three feet wide, “and there is

---

<sup>48</sup> Before scrambling reactors was automated, trips did depend on someone to push the button. Trips are also known as “scrams” or “scramming” the reactor, a term with a much debated etymology in the nuclear industry. In one version, scram comes from Enrico Fermi, an engineer at the Chicago Pile atomic reactor developed for the Manhattan Project in 1942. Fermi created the acronym Safety Control Rod Axe Man for Norman Hilberry, a physicist at the lab whose assignment it was to use an axe to cut a rope to release control rods down on the reactor vessel and stop a possible runaway reaction. In another story, Fermi recruits a lumberjack from the Pacific Northwest to do the job and scram comes to stand in for “Super-Critical Reactor Axe Man” or “Start Cutting Right Away, Man.” However, the NRC historian Tom Wellock<sup>48</sup> believes scram was not so much an acronym for a person, but a process reflecting 20<sup>th</sup> century American slang. The original reactor included a big red button that, in an emergency, would initiate ‘scram’ rods to drop over the reactor pile. The button became known as the SCRAM line after one engineer told people they should push it and then “scram” (Wellock 2016).

a set of three or four that run right down the middle of the building.” The day of the trip, right after it had gone eerily quiet, the pipes, swelling with erratic steam, started swinging wildly “four or five—six feet to one side.... And I mean, they just were banging back and forth. We took off running.” Pete and his colleague ran to the opposite side of the building where the pipes were smaller and easier to dodge. They listened as the safeties on the roof lifted and released the nonradioactive steam into the air over the Susquehanna River.

Over the course of the next twenty minutes, Pete remembers all he could do was cover his ears as the safeties roared overhead. He is leaning back in his leather easy chair, and I ask him how loud a trip is. He laughs, “Well, you’ve probably never stood behind a 747 when it took off.” In the early days, he tells me they didn’t wear much ear protection. He can’t remember if he was wearing ear protection in the turbine building when the reactor tripped, but he figures he wasn’t. As someone whose job took him inside and outside of the plant, he often would forgo ear protection because it was more comfortable and easier to communicate with his team without it.

Pete’s experience with a trip mirrors how he thought of the nuclear industry as just another industry with normal industrial hazards. And indeed, there are certainly normal industrial hazards to be concerned about. When Pete was involved in cleaning up Unit 2, he helped construct temporary platforms and scaffolding up and down the 52-foot high steam generator in the reactor building. “And we didn’t wear safety belts back then, in the early days. You had them; if you wanted to, you could.... Most of the time they were interfering with what we wanted to do more than they were helping.” The rope would get tangled in his feet or limit his movements, so like the gloves and the ear protection, Pete opted to forgo it all together. In these moments, Pete prioritized getting his job done efficiently and well rather than his occupational safety. But his ambivalent relationship with the rationalized safety protocols and equipment also indicates how

they existed in tension with the more intimate aspects of his day-to-day tasks. He laughed when he described that when a hammer was dropped from an upper level with a warning shout, “you just see green hard hats running all over the place.” Additionally, at the end of my fieldwork, a contract worker died when debris from the dissembled plant fell on him (Stalnecker 2021). Like steam, these were the threats that Pete feared, not radiation.

“Radiation was never a concern for me,” he would tell me. He felt like the safety measures the plant had put into place were sufficient. “Steam was. Steam can be like radiation. You have a tiny hole in a pipe with a lot of pressure and you don’t see it except from many feet away and starts to show visibly. So I was always concerned about a pipe bursting. But the plant just runs so well.” The inability to see steam, like radiation, transformed it into an even larger, even more frightening threat. In turn, it required a greater intimacy with it: The sound right before a trip; the way a pipe might swing gently or manically from side to side; the way that, if you pressed your ungloved hand against it while changing a screw, you could feel whether its contents were smooth and stable or turbulent. It might also present itself in more visible, yet dangerous ways, “slic[ing] you in half” or burning the skin. These tactile clues require a trained eye or touch to discern. But even the most subtle of them also make steam decidedly not like radiation for the nuclear worker, and perhaps why the latter feels like a more distant threat. Like steam, radiation has no visible trace, no smell, no taste. But unlike steam, at low occupational doses, radiation also lacks a *feeling*, that immediate tactile input from the outside world.

Indeed, when Ed Houser received approximately four rem the day of the 1979 accident, he told reporters he “never felt a thing” (Richman 1979). Houser was one of four men who received overdoses that day, but he received the most. Despite the distant threat, according to workers, that radiation posed, it was still a reality of their work. In addition to their PPE, those

working in the reactor building or control room, wore Geiger counters that monitored their levels for quarterly and yearly quotas. In the absence of sensory cues, workers' training in radiation protection, crisis response, and instrumental readings transforms the insensible into "a sensation," according to historian Joy Parr, or "a form of a tacit knowledge with the same credibility as touch, taste, or smell" (Parr 68). It also involves developing an awareness of one's accumulated dose.

As a chemistry foreman at the plant, Houser was voluntarily tasked with pulling a sample of the contaminated water from the sampling room in the auxiliary building next to the reactor on March 28, 1979. It is a routine procedure, but mandatory during a crisis, such as the loss of coolant accident that Unit 2 suffered. Wearing rubber gloves, a mask with a iodine charcoal cartridge filter, and a plastic apron, Houser was exposed to radiation from three sources in the auxiliary building: The radioactive water puddling along the floor, 10 rems worth of background radiation, and the water itself, which went off scale at 1,000 rem (Yuhas and Shackleton 1979; Richman 1979).<sup>49</sup> He also knew the less time he was in the building, the more he lessened his exposure.

Like Pete and George, Houser credited his ten-years of experience and training to enabling him to remain calm and resolute in an emergency situation. He knew the risks, but it needed to be done, he reasoned. "All you can do is work three times as fast, then get out," he told the New York Times, "There's no room for error. I've been working with this for 10 years, and I have a pretty thorough familiarization. I'm not saying I'm brave. If you understand, your mind is at ease" (Richman, 1979). Houser understood nuclear nature and the procedures meant to contain

---

<sup>49</sup> Houser was aware of this dosimetric uncertainty and told NRC investigators two months later, "But I just wanted to say that you cannot say how much greater" of a dose he received since the instruments did go off scale (Yuhas and Shackleton 1979).

it. Even so, in the five minutes it took him to collect the water sample, gamma rays had pierced through the plastic barriers and his cotton coveralls, emitting a dose equivalent to 35 chest x-rays. And although he did not want to be seen as valiant, his actions were largely treated as an act of heroism by the public, a bodily sacrifice for the common good.<sup>50</sup>

In one day, Houser received almost the equivalent of a quarterly allowance of three rem, a standard set by the NRC. Yet he was back on the job just four days later. The three rems did not exceed his yearly quota of five (Richman 1979). And even if they had, the yearly quota was flexible: Unused portions could be carried forward to future years, like vacation days and other forms of corporate timekeeping. Theoretically, Houser, who had been working at the plant for a number of years, could have anywhere from ten to forty rems rolled over. In this strange corporate calculus based on calendar time rather than the body, Houser was approved to return back to work. Yet Houser was occupied by the radioactive isotopes emitted from the water and the air around him. They mingled with Houser's skin, tissue, and cells. When he left the plant, he took them home with him. Houser spent hours in the shower at work, trying to scrub the invisible radionuclides off of his body, never knowing if he succeeded. When he finally returned home, he was scared to hug his children, fearing transferring radiation from his irradiated clothing and skin to theirs.

Belying Houser's return to work a few days after his exposure and my interlocutors' assurances to me that their occupational dose was indeed safe, is the assumption that there is a threshold of permissible dose. Shannon Cram tracks the development of permissible dose in the

---

<sup>50</sup> Such language provided a scaffolding for the National Economic Council's 2000 report that American nuclear weapons workers' bodies "had been sacrificed in the name of national security and economic expediency" (Cram 2016, 221). The report marked a reversal in federal government's opinion that nuclear weapons workers faced any increased risk of radiogenic injury. Nuclear workers at civilian plants were left out of the analysis.

American nuclear landscape, particularly surrounding Washington's Hanford plant. She argues that at the heart of occupational safety regulations is the assumption that "injury is an operational necessity of nuclear industry" (Cram 2016, 522). Occupational safety regulations at nuclear power plants, in other words, are not put into place to avoid exposure, but to mitigate it. Some radiation exposure should be expected and accepted by workers as part of the job, as part of their occupational intimacy.

Like the federal safety regulations put in place that allowed Houser to return back to work, "As Low as Reasonably Achievable" or ALARA was adopted in 1975 and applied a cost-benefit analysis to gauge nuclear injury against the public interest. Still in use today, ALARA translates the inherent uncertainties of nuclear risk into the concrete, highly specific language of safety, in which exposure is unavoidable but some exposures are safer, and therefore more reasonable, than others. According to Cram, ALARA posits the worker as a liberal subject, informed and autonomous. Much like how Liv walked me through the numerous toxins that made up her everyday—from the polyurethane floor to pesticides to radiation—workers under ALARA *choose* their exposure. When toxic harm is unavoidable, one chooses the safest source or dose. And indeed, my interlocutors regularly assured me that radiation exposure was minimal, the equivalent a person would normally receive from the sun or normal ambient conditions (mirroring the language nuclear power's proponents marshalled in the 1950s and 1960s, see Chapter 1). This is occupational intimacy in a very literal sense, as the radiation that fails to be contained by the safety procedures enters into the bodies of workers, constructed by ALARA as its willing recipient in a world where risk and safety tenuously coexist. Chen, however, points to how exposure or "intoxication... is not voluntary, is potentially permanent" and "produces an altered affect that may not register its own pleasure or negativity in recognizable terms" (Chen

2012, 198). Choice, then, is not simple in nuclear nature, and exposure can generate numerous affects and attachments with its sources. Liv, George, Pete, Ed Houser, and I occupied (and still do) nuclear spaces and in turn are occupied by them, sometimes willingly and aware, sometimes by necessity, and other times because the sheer number of exposures can be simply too overwhelming to attempt to control or contemplate.

### **Domesticating War**

Carl leads me to the dining room table in their one-story ranch house. I had been here before a few months earlier to drop off a meal with my mom after his wife's knee surgery. At that time, his wife, Ann, was in her Lazy Boy lounge chair, just a few feet away from the front door, so she could reach over to open it without having to get up. Her scooter was parked neatly to her left. Ann was wearing a pink floral skirt and black lace covering that was traditional for some communities of Mennonites in the area, so I was surprised later when she pulled out an iPhone to show us a picture of her friend's leg. She had had seventeen screws put in. Ann had three. *It's just nice to know there's someone more 'screwed' up than I am*, she said.

I offered to take the food into the kitchen but worried about tracking dirt onto the thick carpeted floors and began to slip off my boots. *Oh, don't bother. I hate this carpet. The way I see it, carpets are made to be walked on.* Ann and Carl live directly across from TMI in a small community of homes just three streets long built in the 1970s for workers of the fledgling plant. They had chosen the carpet when they moved into this rancher in 1974 when Carl got his job at TMI. Ann didn't care for the carpet's appearance, but she also worried how the carpeted floors posed a challenge for her daughter, who has multiple sclerosis (MS), and has difficulty moving the walker she sometimes uses over them. Her daughter was just over forty, and I thought

immediately of how she would have been born just several months or years after the TMI accident. But like other times during fieldwork, such as with Liv, I tucked these thoughts away. It felt invasive to draw these connections for other people, especially because it was clear that Ann did not believe the accident and her daughter's chronic health conditions were related. Carl was just beginning his career as an engineer at the plant during the accident, and they had stayed when MetEd told its employees everything was under control. But even if radiation was not their concern, MetEd could not protect them from the deluge of reporters that knocked on their doors for days and weeks following the accident, hungry for stories from the locals that chose to stay and remain in their homes quite literally across the stress from a nuclear power plant recovering from a partial meltdown whose full scale remained largely unknown.

Ann wheeled us over the soft carpeting and into the kitchen. I bent down to put the chicken in the oven to keep it warm. Bible verses clung to the fridge. *Well, I guess I will go and sit back down. Unless,* she added enthusiastically, *You'd like to see my sunroom.* She led us through two white French doors into a blue room with large windows, a skylight, and an easel next to a gas fireplace. The French doors and the mantle were from the farmhouse she grew up in, painted white so they would blend into their current home's midcentury interior. Just next to the fireplace was an artist's painting supplies. She spent a lot of time in this sunroom painting and much of the art on the walls was hers.

I stopped in front of one of her many paintings on the wall; this one was called "Fruit of the Spirit," a painting of nine apples in various states to symbolize the Christian values. One apple was carefully peeled just short of the stem to show the peeler's circular technique. "Patience" was written underneath it. "That does take patience," I noted and gestured to the apple. Ann looked at the painting and smiled, *My grandfather always would tell us to be patient*

*when we were waiting for him to peel the apples—we didn't eat the skin back then. So, I painted it that way.* I asked why they didn't eat the skin and she laughed, *I don't know because it was bad, I guess!* I wasn't sure whether Ann meant "bad" in terms of the pesticides Liv was concerned with or in terms of the rotten flesh and holes that such pesticides prevented. As we talked about what was bad, what was good, what was virtuous, and what was harmful, I looked out their back windows. The sunroom faced northeast, away from TMI and towards the farm fields in the back.

We wheeled back to the living room, and she sat down again in her lazy chair by the window that looked out over the cooling towers of the plant where her husband had worked for forty years. I mentioned my project, and she said Carl would be happy to talk with me. "But you'd be a great perspective too," I tried to encourage her. I was actually specifically eager to talk with her as someone who lived right across the street from the plant, raised a family in its shadows, and saw her husband go to and from work each day. She laughed, *Yes, I guess a lot of my life has revolved around TMI.* But I wouldn't talk to Ann again. When I came the second time, Carl whisked me past Ann in her easy chair to the dining room table where we sat down to talk about his career as an engineer at TMI since 1974. Like most industries, men are the alleged experts. Women are merely there to ensure the house runs smoothly in their absence. These gender roles were not remade by nuclear technology's domestication, but reinscribed.

Several months after the accident at an NRC hearing, Joyce, a woman who would go on to become one of the area's primary reluctant activists was told to go home and bake cookies and let the all-male team of government officials and nuclear experts handle the particulars of clean-up. The moment has become almost legendary among the area's activists (it was recounted to me by several people on separate occasions). Rather than a concerned citizen, Joyce was slotted into

the domestic, a trope of the demure, white, small town housewife who should leave matters of nuclear technology to the all-male group of politicians and representatives making up MetEd, the NRC, and local offices. But Joyce remembers retorting, *that's what I was doing when you had this accident on me.*

The domestication of nuclear energy required an enormous amount of propaganda and government investment to rebrand nuclear technology as a safe, civilian energy source. Like Pete, Carl was excited to work with an energy form that was carbon-free and green, and we spent quite a bit of time talking about how dirty, inefficient, and harmful coal was compared to nuclear energy. Coal took up more space for less energy and blanketed the area in soot. When he said this, I thought about the man who always came to the Middletown library to use the computers and told me that his mother could not hang out white laundry because it would be black by the end of the day. Coal had a visible sprawl, while nuclear seemed neatly contained to its midcentury futuristic buildings.

But if nuclear power depended on government and industry schemes to make the weapon of war appear not only safe but also safer than other energy sources, its domestication also appeared in more subtle, yet ubiquitous ways. The living room in Ann and Carl's house, like the other houses on their side of the street, looked out over the cooling towers. People living within a ten-mile radius received the Exelon emergency planning brochures and taped them to the inside of their kitchen cabinets. In my conversations with people, regular household objects or processes came to stand in for nuclear technology. Carl, for instance, grabbed his thermos sitting to the left of him to model the fifty feet-high cylinder-shaped generators that produces the plant's iconic steam, and George compared his proceduralized duties to cooking spaghetti with a highly technical recipe. The home became a site through which my interlocutors would describe their

experiences with nuclear technology. In part, this was due to Covid and the security surrounding the nuclear industry necessitating that many of my interviews take place with people in their homes either in person or over the phone. But the process of domestication I want to describe is not a mere metaphor or convenience; it is something very literal and embodied. Much like cancer treatments, commercial-use fertilizers, and other wartime technologies, nuclear power wove war into Americans' everyday life. Masco argues that the nuclear bomb ushered in a new apocalyptic sensibility, priming Americans to "live on the knife's edge of total war" and do so "in perpetuity" (109). Even divorced from its wartime origins, nuclear power continues this process of blending war with life, of bringing war *into* the home. In this sense, the nuclear industry was not merely a weapon of war domesticated to civilian uses; it also promised to power people's homes and lives. Nuclear power's domestication was achieved not when the first atoms split apart in a civilian reactor, but when people like Carl and Ann and other Americans hosting the industry would come to *feel* at home with it, to feel safe living alongside it.

At its heart, this process of domestication is an intimate encounter. TMI makes up the material and affective ambient conditions of everyday life of my interlocutors. For Ann, it was the view from her living room, as well as a strange node around which her adult life unfolded. For Liv on her homestead just a few miles from the plant, it was yet another risk that she negotiated in the everyday, even by trying not to think about it. For Carl, George, and Pete, TMI was a source of pride, workplace camaraderie, and a livelihood. But TMI did not simply provide livelihoods—it provided an occupation, a relation of living between messy, porous, easily transgressed bodies and their risky environments.

Both MetEd and its successor Exelon nurtured this form of domestication. Exelon strived to garner a reputation as a community-minded company, a strategy to alleviate the fears of and

counteract criticism from locals concerned with a nuclear power plant in their backyards. The company donated millions of dollars over the years to local charities (such as the computers in at the library in the previous chapter) and hosted several annual charity fundraisers. But more practically, it also paid taxes, offering a tax break for local residents. It was these things that the area's pro-nuclear or pro-TMI advocates would remember when they lamented the loss of the plant after 2019. Exelon carved out a space for itself in the community that worked to transcend the nuclear industry's origins of war and apocalypse.

For his part, Pete volunteered through TMI to go into elementary schools to explain nuclear power to the kids. Like many of the employees I interviewed, Pete was proud of the work he did and believed nuclear power was a safe, efficient, and green energy source, and he was anxious to educate the next generation on its benefits. He would wear a hazmat suit and even let the kids try it on. *They loved that*, he told me one day as we stood on his stoop. In addition to the suit, he would pass out small cards with a one centimeter tall simulated uranium pellet that students could interact with, hold in their hand, and keep after his lesson ended. One way to make nuclear energy—so powerful in its strange-making abilities—more familiar was through these small, mundane interactions. Much like George and other nuclear employees, students could experience the technology through bodily activities: Putting on a hazmat suit, cupping a plastic cylinder in their palms. These interactive activities domesticated the technology, to render the sprawling temporal and spatial reach of radionuclides and its global geopolitics down into a simulated pellet that a schoolchild could hold in his/her hand. The small plastic pellets were meant to represent the small footprint of nuclear fuel compared to 2,950 thousand pounds of coal, 236 gallons of oil, and 311 gallons of gasoline. The card states, “Using many of these pellets, TMI-1 (871 megawatts) produces enough electricity for 860,000 average homes and each

year saves our nation 2.5 million tons of coal or 482 million gallons of oil” (GPU Nuclear, n.d.).

When a student would turn the card over, they would find a picture of a half-operating plant: Two of its cooling towers with exuberant steam and the other two empty and inactive. It was, unintentionally, a visual cautionary tale. TMI embodied the two sides of nuclear nature: The working, proceduralized, and stable Unit 1, on the one hand, and the consequences of the technology’s instability, on the other, seen in the lifeless cooling towers of Unit 2.

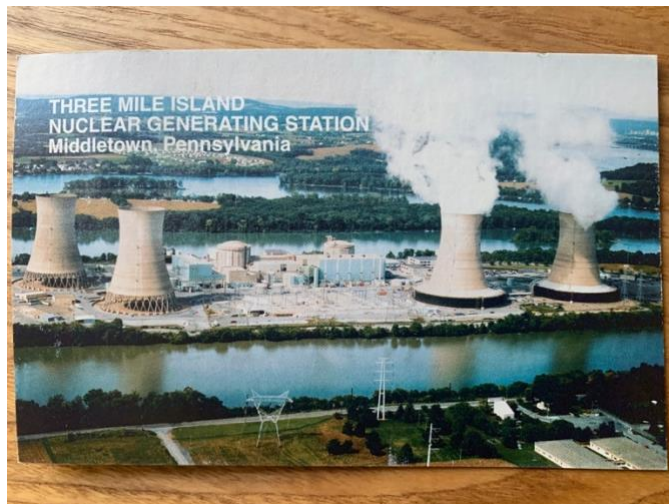
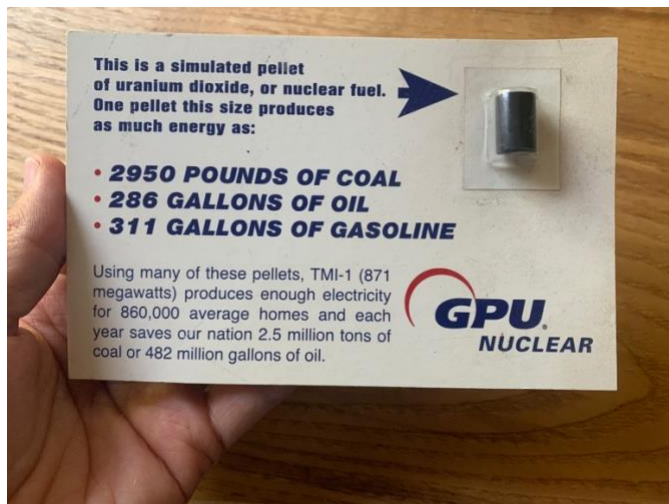


Image 18: Front- and backside of the simulated uranium pellet card that Pete would bring into students. Photo taken by author.

## **Skeleton Crew**

When I last saw Pete, he was mowing his lawn. He whipped his zero-turn next to my car in his driveway to greet me in his shorts and muscle tee. *I love cutting grass*, he told me, *I've thought about getting a job at a golf course. But I don't want the commitment of going in every day. I'm retired. I don't want that. What I should do is tell them I'll be on call. But even that....* He trailed off. I couldn't blame him for wanting his own schedule after years of working a swing shift. I asked him if he misses the work, and he told me he doesn't—it became too paper-driven. But he misses the people. *We grew up there together*, Pete explained to me. His colleagues were with him when he and his wife had their two sons, when those sons grew up and got married and had families of their own.

*We are like family.* Nearly every employee told me this when I interviewed them. Retired employees got together at a local diner once a week, and when Covid hit, they moved their weekly catchups to Zoom. It is not rare for coworkers to form close relationships with their colleagues, and indeed for companies, like Exelon, to even encourage and exploit this form of camaraderie. Yet it was another way through which the plant and the home, life and work blurred, a relation of occupational intimacy that emerged around nuclear technology's domestication.

George told me proudly that his crew, his “work family,” was voted the top performing team at the number one plant in the country by the International Atomic Energy Agency. At the time we spoke, they had not had any errors in 380 days, from major mechanical oversights to properly circling every step. “Yeah, it's an accomplishment and something that we're very proud of. And yet they don't, they don't publicize those kinds of numbers because no, not every plant cares.” A common theme throughout my interviews with employees was that Unit 1 was an

exceptionally safe plant, in large part, because the Unit 2 accident placed the Island at the center of public scrutiny. It was another source of pride for the employees and kept them motivated on the job. When Exelon announced its decommissioning, worker morale took a hit. But, at the time we spoke in 2019, George's crew was trying to persevere, "We're all family, you know, we all have families that are relying on us." It is this dual form of family loyalty that keeps them tied to the dying plant and, in turn, keeps the plant and public safe.

Yet the reality of decommissioning meant that the work family is broken up and reduced to a skeleton crew. Far from the thousands of employees that allowed for the softball league that Pete participated in, TMI's staff during the first years of decommissioning was a mere 125 employees, mostly security. George told me that one day the Exelon CEO showed up to the plant, flying in on a company helicopter, and told workers everyone who wanted a job, could keep a job with Exelon. Many employees opted to switch to Exelon-owned Peach Bottom Nuclear Power Plant, thirty miles downstream on the Susquehanna River. But George told me that these employees, despite their experience, were started as new hires at the lowest pay and benefit-bracket. Like many other senior staff, Pete took a retirement package offered to him by the company. But George still had a young family to support and, using his seniority, opted to stay on at the plant for three more years. After that, he wanted to try his luck in the South, where he felt the industry is more regulated. "We're aiming for Tennessee." His wife was ready to move. Like George, she felt disenchanted with Exelon. They both felt like Exelon over-promised its workers, only to leave them at the losing end of decommissioning. For older employees, who spent decades experiencing corporate whiplash as TMI's ownership shifted from MetEd to GPU to other utilities, Exelon was just the newest player. The occupational intimacy that nuclear

workers developed with nuclear materials, the plant, and their crew might have been encouraged by corporate culture but was ultimately formed in spite of it.

Yet the three years that George stayed on were not easy. The schedule was tedious. Three of four weeks for him were nights and weekends. And work was slow, “We just sit around and find stuff to keep us awake,” he wrote to me a few months after decommissioning had begun. Before retiring and when decommissioning was just around the corner, Pete had already experienced the gradual slowing pace of his work. The lack of work was one reason that Pete decided to retire. It felt so different from the excitement and novelty that initially drew him to the nuclear industry during the aftermath of the accident and Unit 2’s clean-up.

Covid introduced another layer of tedium and insecurity for workers. Although never implemented, at the start of the pandemic, rumors circulated among workers and nuclear activists that to ensure that no one got sick and to maintain the skeleton staff, the nuclear industry was contemplating contingency plans to “sequester” employees, like George, for fourteen, even thirty days. Such plans would ensure that workers remained safe and, by extension, the plant would be able to legally and safely carry out its decommissioning operations. But it also would mean that workers like George would not be able to leave the plant for any reason nor would they be able to go home and see their families. Other employees voluntarily self-quarantined from their families before the introduction of the vaccine. The husband of one of the library front desk workers lived in a rudimentary fishing cabin on Shelly Island right next to Three Mile Island in the Susquehanna River to avoid spreading the virus to his teenage daughter undergoing chemotherapy. Like Ed Houser, he was scared to bring his work home.

Covid had created a microcosm of the rationalized occupational safety procedures in the nuclear industry, in which the NRC and owner companies negotiated worker safety, on one hand,

and public health and safety, on the other. Exceeding such cost-benefit analyses were the very human facts of worker burnout and morale. In a strange union between anti-nuclear activists and nuclear employees, people worried on one hand, if plans were not implemented, then could the plant safely continue its daily operations. On the other, they worried that such schedules would lead to fatigue, burnout, and greater risk of human error. To my knowledge, these plans were never implemented at TMI. But masks, mandatory vaccination, and Covid-safety training became additional occupational safety measures to control for yet another unseen threat, like steam or radiation, in the nuclear industry and to safeguard decommissioning plants with dwindling staff and vulnerable stored spent fuel.

## **Conclusion**

The NRC promised in sixty years, at the completion of decommissioning, Three Mile Island would be so safe, so clean, the county could build a park or elementary school of it. The park and the elementary school came to stand in as the ultimate symbols of successful remediation, a promise meant to assuage fears that TMI would remain radioactive and dangerous, a forgotten waste storage site. Belying these promises was the assumption that TMI, a private, male-driven site built of concrete and steel, was antithetical to a site that was public, pristine, nature-filled, and family-focused. As I hope this chapter makes clear, such dichotomies are largely illusionary. Instead, nuclear nature is an arena in which bodily and spatial boundaries are continuously negotiated and transgressed creating an intimacy between the plant and workers, as well as the area's residents.

I have described a process in which work bleeds into life and life bleeds into work, and I would be remiss if I did not mention the ways in which an anthropologist is not herself

intimately aware of this fact, this condition of living. Throughout this chapter, and this dissertation at large, my life and work are entangled, and in turn create new, but familiar forms of occupational intimacy with my interlocutors and my field site that I was not always sure how to negotiate myself. Sometimes this occupational intimacy meant my mother or my father would accompany me to my interlocutors' houses. This would occur either organically because I lived at my parents' house for much of fieldwork, and I would run into people when out running errands with my mom, including delivering a meal to Ann after her knee surgery. Other times, it was because people were eager to see them again, such as Pete who made me promise to bring my dad at least once. When I listen to my recordings with Pete, I hear my dad's laughter when Pete tells a joke and his soft, yet firm voice asking questions and clarifying, often in places where I was too concerned of coming across as uninformed. Throughout fieldwork, this occupational intimacy made me uncomfortable. I feared I would not be taken seriously with a parent in tow. But I also was generally uneasy about mixing my work, something I had largely kept separate, with my family. Yet the very nature of doing fieldwork in America and at a site I had grown up occupying had already entangled the two spheres.

The move to understand the proceduralized, male-dominated nuclear world as one of intimacy and domestication is born from this very lens of my own occupational intimacy. However, feminist and queer scholars provided a vocabulary for articulating the ways in which boundaries are not only established (sometimes helpful, sometimes harmful) but also continuously becoming undone (Haraway 1985; Mol 2002; Alaimo 2010; Barad 2003; Franklin 2003; c.f. E. F. S. Roberts 2017) and for describing the emergent forms of intimacy that develop in the process (Chen 2012). Occupational intimacy is not meant to romanticize this boundary transgression that, in the case of nuclear workers, often results in chronic, low-dose exposure and

radiogenic injury. Nor is it meant to make the claim that measures of containment are wholly ineffective or futile. Yet what it does allow is for seemingly incompatible states to coexist—not always necessarily neatly—in relation with one another: The pride and enjoyment a worker feels in his workplace that coexist alongside systemic industrial harm; the ways in which safety procedures meant to contain, also encourage the collapsing of boundaries between body and plant, life and work; and how a technology of war comes to be experienced in and through the home. “Intimacy names the enigma of this range of attachments, and more” according to Lauren Berlant (1998: 283). This chapter describes an (often ambivalent) condition of living in postindustrialism, one in which our occupation—of places, jobs, homes—always already materially and affectively occupies us and generates new modes of bodily, material, and affective intimacy.

### **Interlude: 4 a.m.**

Bill Zewe, the shift supervisor and a retired US Navy reactor operator, looks over paperwork in his office adjacent to the TMI control room. He is halfway through the 11 p.m. to 7 a.m. graveyard shift on March 28, 1979, and Unit 2 is running at 97% capacity with sixteen men overseeing and managing its operations. Zewe's second in command, Fred Schiemann, had just gone into the basement to oversee the routine maintenance on the condensate polisher tanks that remove impurities from the water feeding into the steam generator.

Peering into the viewing port of one of the tanks, Schiemann pauses and notices that the plant had gone deadly quiet. Instead of the ever-present sounds of roaring water, Schiemann hears nothing but the eerie swinging of pipes overhead. A loud click, metal grinding on metal. Schiemann notices the feed pump that supplies water to all eight condensate polisher tanks is dislodged. The prior shift had failed to notice a leaky one-way check valve, allowing water to press up from the condensate polisher tank into the airfeed line. With the polisher tanks completely shut down, the secondary cooling loop loses its water, causing the main feedwater pump to trip, followed by the turbine, and finally the generator just seconds after 4am. A hissing pop reverberates overhead, loud enough to be heard from miles away, as the plant's safety valve opens and evacuates the excess non-radioactive steam through the cooling towers and into the air over the Susquehanna Valley.

In the control room, over 100 alarm horns sound at once, and Craig Faust and Ed Frederick, the operators, watch as lights begin flashing on the control panel. The water pressure in the reactor vessel is climbing rapidly. Faust and Frederick are not too concerned. The plant was designed to deal with this problem. And indeed, the plant's computer takes over. It initiates

the pilot operator relief valve to open and drain coolant out of the reactor at one hundred thousand pounds an hour. Yet the pressure continues to rise. The computer takes its second defense and scrams the reactor. Control rods drop down into the reactor core, causing the nuclear reaction to stop. The pilot operator relief valve indicator flashes green to signal it has closed, and Faust and Frederick sip their coffees.

Although nuclear fission is no longer creating heat, decay heat is continuing to circulate through the core. Just two minutes later, the emergency core cooling system activates, and the high pressure injection pump begins to dump 1,000 gallons per minute of cold water into the reactor core. This automated response from the plant is not something Faust and Frederick had expected. According to their instruments in the control room, the water level in the pressurizer was rising, which indicated that there was enough water in the reactor to cool it without the need for the emergency cooling system to turn on. They turn off the high pressure injection pump, overriding the plant's automatic safety programming.

At this point, Zewe joins his team in the control room. The plant's computer's response was puzzling. The water level in the primary loop had continued to rise, but the pressure is steadily dropping—risking this water boiling and inhibiting its ability to cool the fuel rods.<sup>51</sup> Zewe suspects the pilot relief valve might actually be stuck open, which would require initiating the block valve to stop the leak in the system. The operators check the temperature of the water: 228 degrees Fahrenheit. It is borderline. The manual instructs anything over 220 degrees Fahrenheit indicates that the valve is open. They decide not to initiate the block valve.

---

<sup>51</sup> The plant did not have an instrument to detect the amount of water in cooling the reactor itself. Instead, the crew was trained to monitor the water level in the pressurizer, which, their training dictated, would correlate with and allow them to infer the reactor water level.

The floor in the control room begins to vibrate underneath their feet. The pumps below the men were not just transporting water, but turbulent steam. After fifteen minutes, they shut down the first set of pumps, then the next, and finally the next. At 5:30 a.m., no coolant was circulating through the reactor core. Without coolant, the water level surrounding the reactor dropped below the top of the core, and the zirconium coating surrounding the fuel rods and containing the uranium pellets began to rupture. Radiation starts to leach its way into the containment building.

George Kunder and Gary Miller, the station manager, are called in and join a conference call with Rogers, the site representative for Babcock & Willcox, who asks if the block valve is shut. The control room operators promptly close the block valve and seal the leak in the system at 6:22 a.m.. However, while shutting this valve two hours ago would have sealed the leak, now it captures the heat in the overheating core entirely. The core's heat rises exponentially. The top of the core collapses, and by 7 a.m., two-thirds of the core is uncovered.

At this point, the core is hot enough to melt both the zirconium and the uranium in the fuel rods. The radiation alarm in the containment building sounds. 800 rem per hour is being released. Miller declares a "general emergency" at the plant at 7:24 a.m., "an incident which has the potential for serious radiological consequences to the health and safety of the general public." Chaos ensues in the control room and finally a decision is made to turn the high pressure injection pump back on to cover the core with water, and by 10:30 a.m., MetEd and the NRC report that the primary accident sequence had ended. The leak had been contained.

## Chapter 4: Embodying Dose

But to enter these worlds our keys are  
not distance and analysis but intimacy and respect.

-Aileen M. Smith (1989)

Joyce's father built her childhood home. As an adult, she stayed on the five-acre property in Middletown and raised her own family there, using the expansive space to garden and even run a daycare. In March 1979, she was working at her in-home daycare when she got the news of the TMI accident and within days was faced with the decision to evacuate this multigenerational home with the uncertainty of ever returning to it. I had gotten Joyce's name from one of her friends, Paula, both founding members of the grassroots activist group Concerned Mothers and Women of Middletown, which formed in response to the accident. I called Joyce a few weeks into the start of the pandemic, and before we started talking about her history with TMI, we talked about the stress of not knowing what was safe, where to go, and how to maneuver in this new world Covid had created for us. "We see what happens when you are limited. When you have no ability to move," she told me.

Joyce remembers feeling grateful that her family did have mobility the week of the accident. They evacuated to her mother's home 35 miles upstream from Middletown after Governor Thornburgh issued the evacuation orders for pregnant women and families with young children. When they arrived, they were glued to the TV, hungry for any updates about what might be happening to their beloved home and neighborhood. As they were watching, her eight-year-old son tapped her on the shoulder. *Mom, I threw up.* Thinking it was stress that was

upsetting him, she tried to comfort him. *No, Mom, you have to come see this.* Before they left Middletown, he had been outside, rolling down a hill at recess. Joyce followed him to the bathroom and remembers it was not food, but “a vile green slime.”

My heart  
sank,  
you know?  
And then  
you know,  
I checked the temperature,  
everything seemed fine,  
no eyes dilated,  
nothing,  
none of that.  
I called my pediatrician,  
and he said to me,  
*you know, Joyce,*  
*I honestly don't know.*  
*I honestly don't know.*

At that moment, Joyce was faced with the possibility that the radiation dose was neither insignificant nor innocuous and had already leached its way into the bodies of her family, including her oldest son. At the same time, everything she saw and read on the news reported that the experts had the incident under control, everything was contained, and very little radiation had escaped into the atmosphere. Yet, even forty years later, Joyce remains convinced that the accident had more detrimental effects than what the NRC and MetEd were leading the public to believe.

A few months after Joyce evacuated her family and had returned to her family home, a Japanese doctor traveled to the area and began interviewing residents. Joyce agreed to talk with him on one condition: He would need to answer her question about what happened to her son. At the end of the interview, she remembers he pulled out a ring holding several tiles all various

shades of green. *Pick a color*, he told her. After Joyce had selected one, he nodded, *classic case of radiation sickness*. Like Joyce, other residents reported symptoms of metallic taste, reddened skin, nausea, vomiting, diarrhea, and hair loss. Others reported that their pets or farm animals became ill, died, or spontaneously miscarried (Del Tredici 1980). Despite these accounts, government reports concluded that radiation-induced illnesses or symptoms due to the accident were impossible. The dose of exposure was simply too low.

In response to these government reports, citizen science sprouted up around Three Mile Island in the years following the accident, creating a patchwork of “popular epidemiology” (P. Brown 1992). Activists received funding from the lawsuit to set up independent radiation monitors around the surrounding counties to have a non-industry or -government source of monitoring. Residents went door to door to collect health data. And a filmmaker sent around a health survey to people in the area to collect data for a documentary. Mary Osborn collected, dried, and preserved hundreds of mutated plants in the years following the accident—now preserved in the basement of the Smithsonian. Mitsuru Katagiri, a social psychology professor from Kyoto, and his wife Aileen Mioko Smith, a Japanese journalist who had previously published a book on industrial mercury poisoning, conducted 250 interviews with residents around the TMI. All these methods seek to crystallize and localize the various temporalities and scales of exposure in an attempt to track the days, months, and years in which the body itself (of humans, plants, and animals) became a technology that both senses and measures radiation.

Smith and Katagiri wanted to capture residents’ experiences the days of and immediately following the accident. They traveled to Middletown with an unlikely team: two lawyers, a student, and a radiation research scientist, who interviewed Joyce. As they talked with people around the area, their accounts troubled their initial understanding of the accident as basically

contained and releasing only a negligible amount of radiation. They returned seven more times throughout the 1980s, including a ten-month stay in Middletown and stayed a mere five miles from the reactor site. Residents reported to them symptoms of metallic taste, skin burns, nausea, tingling extremities, hair loss, diarrhea, and headaches.

Other people they interviewed described dead farms animals, cows miscarrying, or coming home from evacuation to find their beloved family dog and four cats dead, all their “eyes were burnt white.” One woman complained that there are no birds, no robins (though the squirrel population seemed just fine). A veterinarian described how for two years following the accident, he saw a rise in stillbirths among pigs: “I’m not saying that all the sows delivered dead pigs. Not by a long shot. What I’m saying is there were too many that did” (9). A few years later, it was cancer—in goats, mules, dogs, and ponies. Prior to the accident, he claims, he never saw a cancer in a mule or a goat. If animals’ lifespans are shorter than humans, he speculated to Smith and Katagiri, “what about people ten years down the road?” Some animals that were found dead immediately after the accident were taken to the Department of Agriculture, but when the veterinarian went to the lab to pick up the report, there was nothing on record.

In a report titled “Three Mile Island: the People’s Testament,” Smith published the team’s findings as interview transcriptions in Japan and sent an English version to a local activist group in Harrisburg, TMI Alert. I had read about the research in archives (before they were shut down due to Covid), so when the president of TMI Alert emailed me a copy a few months later, I eagerly read it. Only a few brief yet impassioned paragraphs bookend what is otherwise large blocks of transcriptions from their interviews without any scientific analysis punctuating them. Smith was convinced that “had [the press and politicians] asked about what [residents] *physically* noticed, our understanding of the accident might be radically different today.” In the same vein,

“if we valued our surrounding natural environment more, we would listen closer to its quiet testimony” (A. M. Smith 1989). The people and environment around TMI had the final voice.

The result is arresting. The interviews do not read so much as narratives, but attempts to make sense of something formerly unthinkable, even nonsensical—to trace the outlines of radiation’s inchoate and sprawling form. Phrases are choppy or repeated over and over, much like the response Joyce received from her son’s pediatrician. And when narrative did not suffice, people reached for metaphor and poetics to make sense of their body’s utterly foreign experience and encounter with nuclear technology. Medical anthropologist and psychiatrist Laurence Kirmayer argues “The body’s influence on thought is more presentation than representation, given in substance and action rather than in imagination and reflection” (Kirmayer 1992). States of illness and disease elide rationality and control and often render the body and people’s conceptions of it incoherent, forcing them to rely on different linguistic tools to verbally present their experience. Metaphors are fundamentally grounded in bodily experience, mediating the body and the social. They are tools for working with experiences, expressing something the body knows and transforming it into a cognitive, linguistic concept that creates meaning. For the people in Smith and Katagiri’s survey, metaphors became the clumsy, yet profound tools they wielded to make sense of radiation’s disorienting sensations and experiences.

This chapter maps the various and contested attempts to make sense of the scale and impact of the accident.<sup>52</sup> In particular, it examines the modes through which radiation became

---

<sup>52</sup> In bringing together various knowledge-making practices to create a dialogical rather than univocal narrative, I pull from Bakhtin’s theory of multivocality and feminist STS scholars’ readings of it (see Haraway 1991). According to Bakhtin, multivocality is “constructed not as the whole of a single consciousness, absorbing other consciousnesses as objects into itself, but as a whole formed by the interaction of several consciousnesses, none of which entirely becomes an object for the other” (M. M. Bakhtin and Emerson 1984, 18; see also M. Bakhtin et al. 2011). Ethnography is well suited to tracking the plural voices that made up the epistemic milieu around TMI.

visible in the bodies of my contemporary and historical interlocutors in the form of radiogenic injury even as government reports systematically obscured those effects through appeals to accident-related stress and a reliance on uncertain metrics. After Three Mile Island experienced its partial meltdown, government and industry sources were able to capitalize on inconclusive short-term data to champion the safety of the plant.<sup>53</sup> The result was that some residents living around TMI believed that the true effects of the accident were never uncovered in labs, statistics, or peer-reviewed studies but in their physical bodies. This chapter traces the public health debates following the accident and places them alongside the stories I gathered from my interlocutors and archival research. While government and industry sources attempted to quantify and bound the accident, residents' embodied effects defied this narrative of containment and instead indicated a much more significant release of radiation. Rather than quantifiable metrics, the body itself became a technology that sensed radiation, and my interlocutors reached for the poetic to make their radiogenic injury legible.

Katagiri and Smith's interviews form the parallel narrative of this chapter, punctuating the public health debates that relied on quantitative rather than qualitative evidence. In keeping with the initial spirit of Smith and Katagiri's, I repeat some of these interviews here with minimal analysis, supplying context when appropriate.<sup>54</sup> But I format selected quotes to emphasize the unique discursive structure of their interlocutors' stories and to highlight the body's suspension in the interstitial space between the everyday and the unthinkable, the

---

<sup>53</sup> This ultimately led to the reopening of Unit 1 in 1985 despite the public's majority vote to keep the plant closed.

<sup>54</sup> I find it useful to dwell on their data at such length because of immediacy of their research. That is, they were able to reach people in the months and years directly following the accident, unlike the oral histories I was recounted in my conversations with people forty years later. Of all the material I encountered in the archive, these interviews have haunted me the most, in large part, because the only evidence their interlocutors pull from is their embodied experience and the accounts suggest the body received a much higher dose than conventional understandings of the accident.

believable and the fantastical and the attempt to make sense of something that disorients the senses in the moment. The repetition of words and phrases in these accounts not only reflects their importance to the people speaking them, but insists on the reality of them.

## **Snow**

Clair and Ruth Hoover, husband and wife dairy farmers who moonlighted as a truck driver and waitress, experienced a sharp, bitter taste that they described as “numb[ing] the senses in the mouth.” Someone handed Ruth a glass of milk, and she thought it was spoiled. “It was on your lips,” Ruth explained, “So I knew there was something in the air.” On Friday morning, the police closed down the restaurant where Ruth worked, Clair came by in his red pick-up to drive her home. “It’s snowing out there,” she told him, even though it was fifty degrees out. Clair looked out, “It looked like there had been a bonfire somewhere and there were flakes of burnt paper or something.” Ruth described it like “burned paper”:

...but it was really fine.

It was real small and white.

It looked like real fine snow

coming down.

It was white or grayish.

Kind of a grayish-white.

All I know is that I saw it.

I looked out and

it was just like it was snow,

but I knew it wasn’t snow....

My daughter had stayed home from school that day and I just said to her,

*“Look at that Ruthie. It looks like fine snow coming down.”*

When they got home, she panicked. Within minutes, she had gathered the kids’ pillows and sleeping bags and then drove to a hotel 35-miles away. Despite the advice they saw on the news

to shower if they thought they had been exposed, they were too drained from the day. Later that night, they had “little red spots on our arms where we didn’t have sleeves” (A. M. Smith 1989).

A day or so later, “people from Three Mile Island came down and said ‘No, you didn’t see anything. That’s all imaginary’” (A. M. Smith 1989). But they talked to other neighbors and residents across the river who also had seen the strange, fine ash floating down. They claimed the NRC called them “whackos,” setting the stage for the stress-disaster research that would follow in later decades. “As long as I live, you’re never going to tell me I didn’t see it coming down,” Ruth said. And then a little later, “But time will tell if anything happens to us.” The Hoovers passed away within a year of each other, in 2009 and 2010, at the ages of 62 and 66.

### **Mind over Matter**

Several weeks after the accident in 1979, President Carter organized a commission to investigate the impact and damage caused by the partial meltdown. In late October, headed by chairman John Kemeny, mathematician and President of Dartmouth College, the Commission sent a report to the President detailing the accident’s causes and effects. According to the report, “most of the radiation was contained” (Kemeny and et al. 1979b). The public’s exposure to radiation was less than the average annual background level which would contribute a “negligible effect on the physical health of individuals” (12). The NRC conducted its own investigation and came up with similar conclusions. In fact, according to these reports, the concern should not be about radiation, which according to their findings was quite low, but stress: “We conclude that the most serious health effect of the accident was mental stress, which was short-lived” (13). The Kemeny Commission outlined reasons for this stress, stating that it was most acute for families of pre-schooled aged children in a five-mile radius. It also implicated

the utility and the NRC in “raising anxiety” by failing to effectively communicate to the public the plant’s changing status and circulating incorrect, often contradictory information, particularly in regard to the necessity and scale of evacuation (13).

Building on the Kemeny Commission’s findings, researchers flocked to Middletown, Pennsylvania, and, at the time, TMI became one of the best-studied cases of psychological response to disaster and evacuation. Rather than studying radiation releases or doses—which were deemed insignificant—these peer review articles chronicled the chronic stress of the population near the plant, which “persisted beyond the physical presence of the stressor” (Baum 1990). The accident had allegedly ended, it had been contained, but the stress-symptoms—including hypertension, cardiovascular symptoms, and sleep disturbances—remained (Baum 1990; Baum, Gatchel, and Schaeffer 1983; Baum, Fleming, and Singer 1982; Davidson, Fleming, and Baum 1987).

Investigating the rise of cancers in the area, government-funded epidemiologists drew on the Kemeny Commission and NRC reports citing negligible dose exposure and the disaster-stress link the above research established. Population dose estimates based on the atomic bomb victims in Hiroshima and Nagasaki predicted that the accident would result in one, maybe two cancer deaths in the lifetime of the residents living 50 miles from the plant (Hatch et al. 1990). However, residents continued to voice concern that the accident was causing an increase in cancers in the area. The TMI Public Health Fund, which was set up on court order to investigate the health effects and funded by the nuclear industry, supported epidemiologists at Columbia University to investigate these claims in a 1990 study. Led by Maureen Hatch, the researchers found there was a rise in cancers associated with low-dose radiation, including leukemias, lymphomas, lung, and colon cancers. Using hospital records, the researchers found that new

cases of cancer had risen in the area by 64 percent, from 1,722 cases in 1975 to 1979 to 2,831 cases in the same span of time in 1981 to 1985. Arguing that the dose residents were exposed to was too low and too recent to explain the pattern, the researchers speculated that “such a pattern might reflect the impact of accident stress on cancer progression” (Hatch et al. 1991). Increased concern could have led to increased screening. Or residents could have turned to cancer-causing habits such as smoking or alcohol. Or stress depressed the immune system making the body more vulnerable to cancers. No matter the exact mechanism, stress—not radiation—was the cause. The study’s results circulated widely, not only in peer reviewed journals but also national and local newspapers, taken as evidence that the accident did not cause any long-term, serious health damage to the public.

The Columbia study divided the 10-mile radius around the plant into sixty-nine test blocks, assigning radiation dose estimates based on topographic data tracking the radioactive plume. Yet the rise of cancer cases did not follow the pattern predicted by the earlier stress research concluding that those within five-miles of the plant experienced the most acute stress. Taking note of these inconsistencies, a husband and wife research team, Marjorie and Norman Aamodt, went door to door, listening to stories of metallic taste, vomiting, and hair loss in the days and weeks following the accident. At the time, the couple had been living in Chester County, Pennsylvania, 45 miles away from the plant on a 300-acre organic farm for over a decade. As an experimental psychologist, Marjorie brought methodological expertise to her husband’s background as a physicist and engineer. Together, they “uncovered a rate of death from cancer which was ten times the expected rate for those townships” (Aamodt 2009).

The Aamodts reached out to Steve Wing, an epidemiologist at University of North Carolina, Chapel Hill. Dr. Wing was initially reluctant and worried how becoming “involved in

any professional capacity would expose [him] to ostracism and loss of scientific credibility” (2008: 1811). He had heard of members of scientific community voicing concerns and publishing work on low-dose radiation exposures, only to lose their funding, labs, or even jobs. However, he was “impressed with the intelligence and humanity of the Aamodts” and agreed to help (Wing 2008). Wing reevaluated the data the Columbia team had gathered, and found a positive relationship between accident dose estimates and cancer rates, particularly leukemia, which is commonly associated with high-dose exposures and appears sooner than other cancers (S Wing et al. 1997). He cited the unreliability of dose measurements at the time of the accident due to faulty instruments, as well as the time and placement at which these measurements were taken. Instead, his research team compared chromosomal aberrations, a dosimetric method borrowed from research on the Chernobyl liquidators. Unlike previous work on mass hysteria which pointed to a contagion-like effect of panic and the resulting symptoms in public, Wing found that most of the symptoms reported after TMI were by people who had not been in public. Indeed, some were not even aware there was an accident at the onset of their symptoms. Wing argued that the Columbia study presumed that only low-dose radiation had occurred, therefore, precluding the study from objectively investigating the relationship between radiation-dose and cancer rates (Wing 2008).

In the 1981 court case against MetEd,<sup>55</sup> Wing offered his testimony and argued that while he could not prove whether radiation was a primary or secondary cause (that is, whether it directly caused the cancer or depressed the immune system, allowing carcinogenic cells to

---

<sup>55</sup> Represented by David Berger, a Philadelphia law firm, residents filed a class action lawsuit against MetEd based on 15,000 claims for residents and business within the 25-mile radius of TMI. The settlement set up a \$25 million trust fund at the expense of the owner utility and builder of TMI. \$20 million was went towards economic losses to over. The remaining \$5 million comprised the TMI Public Health Fund and funded the Columbia study and other public health research (Marshall 1983).

grow), the area's residents were likely exposed to radiation doses significant enough to cause damage. Historian Mary Mitchell demonstrates how the series of court cases following the accident generated a new "cosmology of evidence," in which activists' and publicly engaged scientists' acted on biological witness, or an understanding of the body and the environment as modes of evidence, that juxtaposed with the hard, algorithmic approach of the defendants. The result was two models of evidence: "One based heavily in the life sciences and one in the physical sciences; one based on the testimony of objects and algorithms and one on the testimony of living organisms" (Mitchell 2021, 24). Ultimately, the court ruled that there was insufficient evidence to prove that the area suffered from radiation-induced cancers and other physical consequences. Instead, it followed the government studies and ruled that stress was likely the major health outcome of the accident.

It is not coincidental that stress as a scientific and medical object grew out of an industrializing milieu. Prior to the 1930s, stress received relatively little attention from medical scientists. Endocrinologist Hans Selye introduced the general term "general adaptation syndrome" in his landmark 1936 article to describe an organism's initial alarm phase, followed by resistance or adaptation, and ultimately exhaustion and death (Selye 1936). Selye's research built on work at the turn of the 20<sup>th</sup> Century across Europe and America examining the exacerbating effects of industrialization's rapid pace on health (Beard 1881; Jackson 2013).<sup>56</sup> By emphasizing adaptation to one's environment and health, this research not only creates a relationship between the environment and bodies but also an individual's responsibility. That is, in this early research, the environment got into the body and it was a maladaptation of the individual to his/her milieu which led to disease (Bernard 1865; Canguilhem 1989).

---

<sup>56</sup> For an overview of the history of scientific stress research, see *The Age of Stress* by Mark Jackson.

In the 1950s, the nuclear program depended on the fear it both elicited and encouraged through propaganda (Orr 2006). Masco (2021) argues that the introduction of nuclear technology changed the relationship of the state to the citizen. No longer able to protect citizens from the damaging effects of radiation, the state sought to normalize them. Nuclear fear hung in a delicate balance between systematically minimizing the physical effects of fallout after the Nevada tests in the 1950s and stoking fears of preeminent nuclear attack. The technology had to be perceived as both apocalyptic but necessary. Like Joyce and my interlocuters, citizens were told “the central problem of the nuclear age was just in their heads” such that “fallout was officially converted into a question of emotional self-control” (Masco 2021, pg. 166). The state had manufactured not only a new weapon of mass destruction but an onus on the individual to remain calm and prepared in case of emergency, like Keenan, George, and Ed Houser in the previous chapter. Stress was not only a biological response to one’s environment, it was one’s subjective assessment, and, therefore, an individual responsibility (and increasingly a female one) that precludes responsibility of the state.

The NRC and industry’s mobilization of stress as a symptom, diagnosis, and catalyst for radiation-induced illness was not something that emerged spontaneously post-accident. Nor was it unique to TMI. It has also occurred in nuclear sites around Fukushima and Chernobyl and was one of the main reasons grassroots activists took to measuring their own food and water sources (see Kimura 2016). In the US, radiophobia, a fear of radiation that nuclear technology’s proponents claim overstates its harm, features prominently in public and political nuclear debates in which industry proponents mobilize it to justify the safety of nuclear power and dismiss fears of it as unwarranted hysteria. One Harvard scholar, for example, claims that “fear of radiation is more dangerous than radiation itself” (Ropeik 2017). Citing evidence from Chernobyl and

Fukushima, the author claims evacuations posed potentially fatal risks to the elderly, whose mobility was limited, and dislocation could contribute to a rise in anxiety, depression, and PTSD in people leaving behind their homes to navigate a new place or worry about the unseen, imperceptible risks of radiation. Furthermore, less reliance on nuclear power due to public fear increases dependence on polluting energy sources, such as natural gas and coal, and in turn harms the planet and the bodies inhabiting it.

These industry and government concerns about radiophobia, stress, and mass hysteria around nuclear power obscure the biological and physiological realities of the elements of fallout and how they adhere and accumulate in the bodies of individuals and environments. In drawing attention to the psychological effects of nuclear terror, these sources also effectively sidestep the more difficult questions that would potentially implicate the government and the industry. The nuclear industry does not emerge as blameless in the Kemeny Commission, but nor does it have to take full responsibility for the potentially fatal effects of the accident. Instead, the report, and the studies following it, bracket the accident as a discrete period of stress, even if the symptoms lasted for several years following. Yet crucially, radiation resists containment of this sort. Prior to the accident, the bodies of Americans were already irradiated from the Nevada test program fallout. Around TMI, the scale of exposure was extended during the years of clean up following the accident that involved the removal and transportation of radioactive waste to Idaho (see Chapter 1) to its now present decommissioning. The nature of fallout is neither localized nor isolated but cumulative, showing up in the bodies of my interlocuters years later (Masco 2015).

## **Metal**

Jim Gushall, a Shell gas station owner a few miles downstream of the plant, remembers a metallic taste that lingered for three days and started before they announced the accident. “The taste was enough to make ya sick. I mean physically sick. It gagged ya.” The taste would ebb and flow, getting worse the closer he was to the reactor. Like Jim, others remember a “strange taste” but for them it lingered for days or weeks after the accident, sometimes coming back episodically throughout the clean-up. People described “Like a metallic type taste almost like, um, if you’d stick a penny in your mouth or something maybe” or like “an old utensil that the coating or plating had been worn off of” (A. M. Smith 1989). Radiation had a taste, and to describe it, people reached for the familiar: An old spoon or a penny. But Molly Reinhart, 39-year-old housewife from Harrisburg, did not mince words, laughed, and told Katagiri and Smith it simply tasted like:

Metal.

Now, how would I know what metal would taste like?

I have no idea.

Metal.

That’s the only word I can use.

## **Measuring Dose**

Radioactive isotopes are invisible to the human senses, but their effects show up in the body. At an anatomic level, when radioactive isotopes are ingested, inhaled, or absorbed, it creates a cascade of microscopic interactions by depositing an enormous amount of energy in a small area, where it then breaks down cellular bonds. Through the interaction of the isotope and the tissue, the particle deposits energy that has the potential to either kill or mutate the cells, depending on which type of ionizing radiation it is. Rather than a static entity then, radiation is a

relation between the outside world and the body. As a result, modeling radiation exposure as something discrete is complex at its best and misleading at its worst.

Dosimetry, the measurement of radiation dose, poses several challenges. First, when an individual is exposed to radiation, its ionizing effects are not distributed homogeneously across the body, and US guidelines permit different levels of dose for each part of the body with areas closer to bodily organs warranting lower dose thresholds than distal areas, such as hands and feet.<sup>57</sup> Furthermore, different isotopes localize in particular areas of the body; for example, strontium is a bone-seeker, iodine concentrates in the thyroid gland, and cesium distributes throughout the soft tissues of the body. Third, ionizing radiation appears in four forms—alpha, beta, gamma, and neutron—with different capacities to penetrate the body and thus require different monitoring. Most of the radiation released during the accident was gamma particles, according to the Kemeny Commission (although in a later section I detail a study that suggests other forms were also released). Unlike the fast and concentrated dose administered through alpha and beta particles (such as in biomedical technology), gamma particles deposit energy slowly and do not immediately kill the cells. Instead, the cascade of interactions the gamma particle triggers causes the cells to slowly mutate, becoming carcinogenic and resulting in cancers that show up ten, twenty, or even forty years later. As a result, measuring radiation dose requires a close attention to time and accounting for how long a particular area of the body was exposed. Finally, radiation is not absorbed equally across different bodies. One's size, age, sex,

---

<sup>57</sup> For example, the NRC reports that one TMI worker (likely Ed Houser from the previous chapter) “received a total body dose of 4.1 rem (the regulatory limit is 3.0 rem), an extremity (finger) dose of 147 rem (the limit is 18.75 rem) and skin dose to the top of the head of 13 rem (the limit is 7.5 rem)” (1979 Annual Report, 20).

and background can all contribute to varying levels of susceptibility (Cram 2015).<sup>58</sup> The result is that structural inequities contributing to radiogenic injury are overlooked and erased.

Dosimetry mobilizes the uncertainty at its heart into calculations of probability and risk that render the biological effects of radiation visible in ways that are both scientifically legible and politically useful. Shannon Cram traces the emergence of “permissible dose” thresholds in US nuclear programs and offers two definitions of dose. On a surface level, dose as “numerical values that represent the biological impact of radiation” offers “a common language for articulating exposure, for measuring the amount of radioactivity each body has received, and for expressing the relative probability it will result in injury” (Cram 2016). On the other hand, dose is also “a calculated dispensation of exposure over time that seeks to forestall the inevitability of harm” (3). That is, dose is not an innocent measurement. Instead, it belies the political and ethical assumption that some exposure is reasonable, even necessary to reach a common goal (i.e. national security, economic gain, etc.). Dose then becomes a metric to mitigate, and Cram argues obscure, those unavoidable effects. The result is not only what dose is permissible, but the very act of defining life itself, determining the livability of current conditions, and normalizing radiogenic injury. As Cram claims, “it is this simplicity—this abstraction from the lived experience of exposure—that makes the nuclear body politically useful. Nuclear standards must make radiogenic injury generalizable, translating data from diverse and often incomplete sources into explicit statements of cause and effects” (2015: 7). While Cram points to what quantification in this realm erases, Michelle Murphy draws attention to the “extra-subjective affective

---

<sup>58</sup> Rem itself stands for Roentgen Equivalent Man; a measurement used to account for the effect of an absorbed radiation dose in the body. Such a body does not reflect individuals but a standard. Cram (2015) examines the sexed and raced nature and peculiar history of how such standardized bodies come to stand in for populations.

dimension to quantification,” modes whereby numbers become “enriched with affect, propagate imaginaries, lure feeling, and hence have supernatural effects in surplus of their rational precepts” (Murphy 2017b). Many of the numbers produced around nuclear power not only erase harm but also create a sense of calm, control, and stability—of containment. Cram and Murphy point to how various numbers and measures obscure and naturalize the types of violence involved in not only making them, but their force in the world at the level of everyday life.

A few factors specific to TMI compound the issues Cram reveals in her work. First, through interviews with TMI employees the night of the accident and a review of the plant, the NRC and the Kemeny Commission both document instrument failures and limitations in measuring radioactivity, particularly in the beginning stages of the accident (though the Commission concluded that these readings did not impact their estimates regarding the public health impacts) (Kemeny Commission, 34).<sup>59</sup> The Commission reported that “several instruments went off-scale during the course of the accident, depriving the operators of highly significant diagnostic information.” Although the New York Times reported that “monitoring devices at the Pennsylvania plant had 'peaked' during the accident, preventing officials from determining accurately how much radioactivity had escaped,” not all of these instruments that had reached their maximum reading measured radiation directly (for instance, they measured water temperature and pressure, crucial but indirect ways to diagnose the cause and determining the extent of the accident) (Goodwin 1980). However, these very measurements were used to

---

<sup>59</sup> My physical therapist (who I had started to see while in the field) told me that her husband’s colleague’s father was working the night of the accident as an engineer. He quit several weeks later due to what he felt was a mishandling of the plant operations, equipment issues, and the industry and government sources not being reliable. One of the main issues he cited was that faulty instrument readings were knowingly used to support the conclusion that little to no radiation was released. He pivoted from the nuclear industry to hotel building construction. (This is typically how stories of TMI surfaced to me in the field, friends of friends of friends, one- to two- to three-degrees of separation. TMI exists in multiple registers, including the mythic.)

reconstruct the accident in later studies to assess the damage and possible health consequences, including the stress studies done by the Columbia researchers. Hence, their accuracy or inaccuracy affected not only how the industry, government, and public understood the accident, but also the very possibility of believing Joyce's son was not throwing up from nerves, but radiation poisoning.

Additionally, the population's exposure was not limited to the plume hovering over the area in the hours in which the valve was stuck open. MetEd employees vetted gases building up in the reactor building in the weeks following the accident. Furthermore, on March 29, MetEd received permission from the NRC to quietly start dumping 400,000 gallons of "slightly radioactive water" into the Susquehanna River (Kemeny Commission, 114-115). Because this water was within the permissible dose ranges, the public and press were not notified. Finally, the 12-year clean-up of the Unit 2 reactor building began in August 1979 and ended in December 1993. The Kemeny Commission reported that:

More than a million gallons of radioactive water remain inside the containment building or stored in auxiliary building tanks. The containment building also holds radioactive gases and the badly damaged and highly radioactive reactor core. Radioactive elements contaminate the walls, floors, and equipment of several buildings. Ahead lies a decontamination effort unprecedented in the history of the nation's nuclear power industry -- a cleanup whose total cost is estimated at \$80 to \$200 million and which will take several years to complete (138).<sup>60</sup>

Over 1,000 workers excavated the core, drilling through molten fuel, removing the low-level waste, and shipping it via freight across the country. The accident was by no means contained to the time or space parameters used by the health studies. Clean-up crews sent cameras and machinery to survey the reactor core. Forty-five percent of the fuel had melted, and 20 tons had

---

<sup>60</sup> Clean up alone cost \$973 million. Unit 2's decommissioning will cost an estimated \$1.35 billion.

dropped to the reactor floor—evidence that suggested that the accident was closer to nuclear catastrophe than the experts had initially realized. While the scale of the accident was reassessed within the plant, outside of it, the state-funded public health studies remained stubbornly equivocal.

The uncertainty of dosimetry and the insistence on stress as the primary public health consequence of the accident both exacerbated and mobilized radiation's fraught invisibility. Around Chernobyl, Olga Kuchinskaya (2014) highlights the knowledge politics of "invisibility" and its imbrication in power relations that dictate what is revealed and who has access to information. Like TMI, Chernobyl pushed measurements and tools to their limit. Rather than producing accurate numbers, Soviet government and international agencies alike superseded local Belarusian studies documenting leukemia among liquidators and the deteriorating health of the surrounding population. Even as local populations worked to produce more accurate data, both national and transnational politics inhibited its circulation (Kuchinskaya 2014). Michelle Murphy calls these "regimes of imperception," in which learned inattention produces historically specific "terrains of invisibility" and a "purposeful production of uncertainty" (Murphy 2006, 274). The result is not only that radiation operates below the level of human senses, but also below the level of scientific and political legibility. Like other nuclear and toxic sites, the TMI accident's scale rendered it invisible and illegible to the methods of dosimetry or public health studies, methods of containment. In fact, measures attempting to contain the accident through statistics and public health research further obscured its sprawling scale.

More than quantitative measurements, the knowability of invisible harm hinges on the body's vulnerability to it. Drawing from phenomenological studies of embodiment and affect theory, Nicholas Shapiro argues that somatically apprehending toxicity, or bodily reasoning,

depends on “less nameable and more diffused sensory practices” (Shapiro 2015, pg. 375). Radiation is below the level of the human senses proper—taste, sight, smell, and sound—but because radiation is fundamentally a relation between a toxic isotope and a body, it shows up in subtle, often more disorienting ways that resist the parameters of quantification and instead reach for the register of the poetic. Around TMI, these more inchoate senses are a way in which radiation is apprehended by the bodies of both the human and nonhuman. The body itself becomes an epistemic and sensuous technology that apprehends and renders it visible to the willing observer.

## **Ash**

Across the river, Ella Gladfelter’s daughter was home from school after a tonsillectomy. She and her husband owned a store several miles south from TMI and lived in an apartment around the back. When she heard about the accident, she sent her daughter with her brother to evacuate, but she stayed with the shop to protect it from vandalism (a concern for many residents and shop owners at the time). Thursday or Friday of that week, she remembers:

Ash was on the sidewalks.

I couldn’t imagine why it was.

Where it came from.

It was gray and it was  
very, very powdery, very fine.  
It was more gray than white, what I saw....

I’ve never seen an ash like that before.

It made a layer.  
It made a coating on the sidewalk.  
A thin coating.

In between customers at the store, she got out a broom and started sweeping, “I wasn’t gonna let that stuff be drug in” (6). But the powder was so fine, that the slightest movement would cause it

to stir. “It would rise up. When you tried to sweep, you had to be easy with the broom or it would fly all over the place.” After taking care to sweep up as much as she could, Ella threw it in the garbage.

I realize now that I should have saved it.

But then

would I have been putting my family in jeopardy through keeping something like that around?

I didn’t wanna do that either.

I was thinking about

cleaning up the mess

so it don’t get drug in the house.

After I swept ‘em,

I hosed ‘em down.

I scrubbed those sidewalks.

So, you know, there probably wouldn’t be anything there anymore.

I just wish I had...

well, you can’t go back and do it over (6).

Her husband’s health, already shaky before the accident, declined significantly following March 1979. A few years later, he passed away from fibrosis of the lung. She thought about joining the lawsuit, but like many residents at the time, did not feel like her husband’s case could reasonably be proven to be connected to TMI. Ella did not live to see the settlement in 1996, when Judge Sylvia Rambo dismissed the lawsuit in favor of the defendants. She passed away in 1990 at 61.

### **Bodies of Evidence**

I knew it was Beverly, even from a distance. She was standing on the sidewalk, wearing a pink short-sleeved T-shirt and capris. In her hand, was a small orange sign in the shape of a nuclear cooling tower with “TMI” written on the front. I walked towards her and waved,

introducing myself. I asked if she had it from protests or activism around the plant, she laughed and said *No, just to make finding me easier*. We walked down towards the water. It was a beautiful spring day, and we chose a bench where we could socially distance and overlook the Wrightsville Bridge, spanning across the Susquehanna River to connect Lancaster and York counties, where Beverly was from. Canadian geese filtered in and out as we talked, and a fishing boat with two men casting lines passed by. It was peaceful to hear the plunk of the bait meeting the water. And strange to think that we were just fifteen miles downstream from the plant that Beverly feels caused her thyroid cancer.

Forty years ago, Beverly was living and working in York at a paper mill owned by her husband's family. Her family made plans to evacuate, but like many people in York County, they never did. She did not know at the time that she was pregnant. One month later, she miscarried. Despite being scared at the time, Beverly became less concerned as TMI slowly began fading from the news and public awareness six months after the accident and she became pregnant again. *I guess that became my whole mindset*. As she raised her family and worked, TMI faded into the background. I asked her in the years since if she has thought about TMI, and she laughs, "I really thought about it because three years ago, I had to have my thyroid removed." When she was in the hospital, she had a nurse in his 50s who told her *you wouldn't believe the thyroid cancers; I think it's TMI*. Three years later, at the start of Covid in 2020, she had cancerous cells in her lymph nodes removed. When we met in April 2021, she was cancer free, but she still lives with the effects of her surgeries and takes daily synthetic thyroid hormone. Her hearing has worsened, something her audiologist said could have been due to her surgeries. She is always hot and has trouble with regulating her metabolism.

Beverly connected her thyroid cancer to TMI through embodied rather than statistical evidence that originated from both lay- and medical experts. Thyroid diseases and cancer were one of the most common ailments people in the area identified in relation to TMI, and some claimed that their doctors were the first to introduce them to TMI as a possible cause or catalyst for their disease. The prevalence of thyroid cancers among members of TMI Survivors<sup>61</sup> reflects how the area's thyroid cancer rates have tripled since the 1980s, outpacing national averages (Bann et al. 2014), a statistic many residents and local researchers attribute to the ongoing effects of TMI's accident. Absent from the cancer studies done around TMI in the 1980s and 90s, thyroid cancer takes an average of thirty years to emerge after radiation exposure (Kikuchi et al. 2004), but it can develop in as little as five or ten years, particularly in children (Iglesias et al. 2017; Williams et al. 2004). The thyroid greedily absorbs iodine particles gathering in the air, streams, and food making up the area's farmland. However, studies attempting to document a causal link between cancer and radiation exposure must control for various individual variables. For instance, in addition to having thyroid cancer and living within a ten-mile radius of the plant, the patient must also have lived there continuously since 1979 and not previously moved or lived in another area for an extended period of time.

Nonetheless, one local physician and researcher at Penn State Hershey Medical Center, David Goldenberg and his colleagues examined the tissue samples of 44 lifelong central Pennsylvania residents and divided the cases into an "at-risk" group and a control group. The researchers considered at risk residents who were diagnosed between 1984 and 1996. Cases that were diagnosed before 1979 or after 1996 were sorted in the control group. They then examined

---

<sup>61</sup> A private Facebook group with over 4,000 members. I discuss it more in the introduction and the following chapter.

the tissue samples for tumor gene characteristics associated with radiation-induced thyroid cancer, drawing on evidence from research done on Chernobyl and Hiroshima survivors. Like these survivors, the at-risk cases were significantly less likely to exhibit single nucleotide oncogenic driver mutations ( $p = 0.04$ ), indicating that the tumors displayed radiation-induced characteristics. Like other toxic exposures, radiation-induced cancer was not evenly distributed. Beyond its major findings, the study's data belied a trend that thyroid cancer was more likely to show up in women than men and that an earlier age of exposure correlated with increased risk. The researchers cautioned that “although our data show an altered mutational profile for thyroid cancers that developed during the expected latency period following the TMI accident, we cannot definitively establish that this effect is due to the TMI accident” (Goldenberg et al. 2017). The researchers stopped short of a causal link between the rise in thyroid cancers in the area and TMI. But for some of my interlocutors convinced that TMI caused their cancers, it was the proof they had been looking for since their diagnosis.

My interlocuter Julia took the Goldenberg study as the “golden egg” that would finally make the world—and by extension, the industry and the government—listen. An author and filmmaker, she's written several books, directed some films, and was now in the decade-long process of trying to secure funding to make a documentary to shed light on the health effects from the 1979 accident that she was seeing sprout up in her childhood community. The protagonist in her film is based off of her own health: “My story is everyone else's story.” Like Beverly, Julia grew up in York, Pennsylvania, across the river from the plant and was a teenager in 1979. At the time of the accident, she was at outdoor track practice and went straight to her paper delivery route when it finished. Three decades later, she was diagnosed with a benign brain tumor and had surgery to remove it in 2012. Although she is healthy now, she noticed on trips

back to Central Pennsylvania from the Pacific Northwest, her now home, old friends and community members were increasingly being diagnosed with cancer. The sheer number of accounts she heard catalyzed her advocacy work around TMI.

Julia had been in contact with Dr. Goldenberg, and when he had finished the study in May 2017, he called her from his home in Pennsylvania to ask for her help “to get the word out” about his study. Dr. Goldenberg explained to her how he was receiving “push back” from Hershey Medical Center, affiliated with Penn State University, claiming their PR department “kept watering down the verbiage, so not to accuse TMI of causing the thyroid cancer despite his evidence,” she told me. A day before Goldenberg’s study was published in *The Laryngoscope*, on May 30, 2017, Exelon issued a press release announcing that TMI’s Unit 1 would close (a decision that was not finalized until two years later). Julia, and allegedly Dr. Goldenberg, felt that the timing of the press release was not a coincidence—it was a strategic move to “usurp” the study’s findings and saturate media channels with the news of TMI’s closing.

After he asked for Julia’s help, Dr. Goldenberg abruptly hung up. His daughter had died in a boating accident in the Everglades a few days before, and he said he needed to plan the funeral. Several weeks later, Julia called him back to tell him she had other people who are willing to sign off on the medical release forms for their tissue samples to be used in further studies, but he maintained he had never said that the study concluded TMI was a cause or that Hershey Medical Center was watering down the findings. “They shut him up,” Julia told me definitively and followed up that her husband is a hunter—they sleep with a gun under their bed. I did not immediately understand what she meant, nor who “they” might be. It was not until later in our conversation that she brought it up that I started to understand what she was claiming. “So, you do not think his daughter’s death was accidental?” I asked her. “It was *not* accidental. It was

*so suspicious,” she immediately responded. She sent me five articles and the links to dozens more after we spoke, reporting on Dr. Goldenberg’s daughter’s death and the rare nature of the accident. It was not past the nuclear industry, Julia alleged, to resort to deadly means to maintain the illusion of its safety. Certainly, nuclear technology has a history of being shrouded in secrecy (Masco 2006; Kosek 2006), but what Julia was claiming was something else entirely.*

Earlier in our conversation, Julia shook her head and told me that the industry “[gets] away with murder.” She was referring to chronic low-dose radiation exposure, but in this case, Julia is speaking to murder in another register. If nuclear technology was deadly, was it such a jump to imagine that the industry itself was murderous? Julia’s line of thinking then rescales the narrative of a wartime technology’s apocalyptic potential (so loved in movies and pop culture) and distills it into a story in which “they”—the industry or government or simply the powers that be—are not only responsible for unnarrated mass death but also the systematic and murderous silencing of its opponents.<sup>62</sup> Indeed, it was this fear that caused Wing to worry how his involvement with the TMI case could jeopardize his career and lead to a professional death of the sorts that scientists faced in the 1950s and 60s who spoke up about the dangers of nuclear fallout (K. Brown 2013). But moreover, Julia’s allegations mirror the public debates following the death of Karen Silkwood in 1974 in a one-car crash. A technician at a plutonium plant who had complained to the Atomic Energy Commission about unsafe working conditions, Silkwood was on her way to meet with a union representative and a New York Times reporter with documents

---

<sup>62</sup> Viewed through Lepselter’s theorizing of conspiratorial thinking, Julia’s beliefs do not simply link up to fears of an industry but larger class- and race-inflected narratives of power which have their origins in the US’s history of enslavement and settler colonialism. “Free-floating after images” gather in “distorted forms in discourses from people with no direct birthright to those traumatic histories” (Lepselter 2016). Julia’s idea that the industry “shut up” Goldenberg by staging the accidental death of his daughter seemed fantastical to me, but it resonates with a working-class white community’s felt sense of betrayal that the government was backing an industry that the accident proved to not only be negligible but harmful.

to prove the plant was acting negligently. No file, however, was ever recovered from the wreckage. Her death sparked national rumors that the nuclear industry was responsible.

At the time, Julia's claim that the nuclear industry was responsible for Goldenberg's daughter's death shocked me. However, whether it is true or not, it communicates something important. There were people that not only believed that the accident's health impacts were being systematically covered. For a small contingent of these people, such as Julia, the industry would resort to deadly means to keep the full scale of it buried.

## **Blue**

Marie Holowka, a dairy farmer across the river, was out milking cows when she heard a rumbling underground. Her younger brother, Paul, thought it was an earthquake "And I said [to her brother] 'I think something happened at Three Mile Island.' Then we kept milking." A little after 7 o'clock in the morning, Mary looked outside, "It was so blue! It was so blue! I couldn't see ten feet ahead of myself! I got scared." Her brother had already gone inside to check the radio. She quickly left the barn and started on the stone walk to the house. But she collapsed. She couldn't get up. She finally stood, walked forty feet, and collapsed again. And again. And again. "I said, 'Must I really die at Three Mile Island?'" Each time, she described it as her strength completely leaving her. Later in the interview, she described it as an awful feeling "just like a pinching feeling going through you... I was just something like a drunk." And she couldn't see anything: "It was just heavy blue all that time." When she finally made it to the house, none of her family had heard any news. Despite the unseasonal heat, they closed the windows and stayed inside. She remembers the radios never offered any news; they only played Dolly Parton.

"Everything was blue. Everywhere was blue."

Marie recounted to Katagiri and Smith a disorienting, looping narrative: collapsing, struggling to get up, thinking it must be the “poison gas,” making it a few feet until the whole bewildering and dangerous cycle starts again. She repeats the same phrases and words (blue, poison gas, couldn’t get up, weak), mirroring the looping effect of her body in her speech. The experience as a reader is equally disorienting and uneasy, a sense of falling and never quite getting your footing back. Following the accident, Marie was diagnosed with thyroid cancer and was receiving chemotherapy in 1986 when the Smith and Katagiri interviewed her in 1986. At 77, Marie passed away in March 1992. She is buried in a cemetery in York, Pennsylvania, next to her brother, Paul, who died two years later.

### **An Elementary Error in Calculus**

Almost 70 years earlier, another Marie successfully isolated and distilled a concentrated solution of radium and placed it in a small vial. It emitted a soft blue light, so beautiful, the French scientist kept vials in her pocket and even slept with one under her pillow, taking it out in the dark of her room to watch the way it danced across her ceilings and walls. Radium was added to the periodic table, and Marie Curie, who was awarded the Nobel Prize for her work, did not investigate the source of the blue light that would ultimately kill her (Cantrill 2018).<sup>63</sup> In 1958, Soviet physicist Pavel Cherenkov patiently irradiated various liquids with gamma rays from radium to discover the nature of the faint blue light that had captured Curie. In what would

---

<sup>63</sup> Radium would go on to be used in tonics, lipstick, chocolate, and perhaps most famously watches (K. Brown 2019). Dexterity and precision were crucial to paint the small numbers and designs on watch faces in the early twentieth century; the young women hired for the job were told to use their mouths to point the tip of the brush. Every few minutes, they would ingest small amounts of radium. Ten years later, the Radium Girls were struck with mouth cancers—their jaws disintegrated as tumors grew around the healthy tissue. A documentary, *Radium City*, shows an old man with a Geiger counter picking up radiation near their graves years later (Orci 2013).

become known as Cherenkov radiation, a charged particle travels faster than the speed of light in air or water, producing a faint blue glow.<sup>64</sup>

Scientists went on to detect Cherenkov radiation around constellations and the nuclear employees I talked to saw it in the water flowing around spent fuel pools. In pre-Covid times, I sat at a bar elbow-to-elbow with friends playing trivia in Lancaster, a city downstream from Three Mile Island. We teamed up with the two people sitting next to us. One of the men had a job that took him to various energy plants, including TMI. When he heard about my research, he asked me if I had ever been inside the plant. When I replied no, I asked him to describe it. *It's creepy, man. The spent fuel pools are blue, like a shocking blue.*

The blue glow that Marie Holowka experienced was one of the reasons former NASA engineer, Aaron Datesman, decided to pursue the questions surrounding Three Mile Island. The accounts in the Katagiri and Smith indicate that much more radiation, particularly Xenon-133 if Cherenkov radiation was observed, was released than government and industry experts claimed. Furthermore, it was difficult to ignore the rise of breast and lung cancers, heart disease, and early mortality in the area. In an independent study in 2020, Datesman examined the discrepancies between the results from the Chapel Hill and the Columbia studies and noted a paradox: While the physical dosimetry methods utilized by the Columbia team estimated a negligible exposure of only 2 mSv,<sup>65</sup> Wing and his colleagues used biodosimetry to measure chromosomal aberrations and estimated that the exposure was closer to 600- 900 mSv, which result in much more profound acute and chronic health consequences. According to Datesman (2020), the

---

<sup>64</sup> Much like when a plane crosses the sound barrier, its vibrations are detected before its sound.

<sup>65</sup> In the SI system, a millisievert (mSv) is defined as "the average accumulated background radiation dose to an individual for 1 year, exclusive of radon, in the United States." 10 mSv is equivalent to 1 rad, the amount of ionizing radiation absorbed by the body, which is equivalent to 1 rem, the effect of the absorbed radiation dose in the body.

inconsistency lies in the methods and “reveals a fundamental oversight in the health physics body of knowledge”: physical dosimetry, which uses meteorological reports and dosimeter readings to reconstruct the accident, fails to account for the temporal distribution of energy deposited by ionizing particles. In the case of TMI, a plume of xenon-133 was released into the air. A person exposed to this noble gas, would inhale it into her lungs, which would pass it to her blood through the same pathways as oxygen and carbon dioxide are exchanged. Her blood then circulates it through her entire body where, if exposure is long enough, it accumulates in the fatty tissues with a half-life of roughly six hours. Datesman estimates that exposure lasted roughly 40 hours, twice the amount of time needed for the accumulation of Xe-133 in the fatty tissues of bodies of residents. Throughout its journey through the body, Xe-133 decays and releases energy from both gamma rays and beta particles. Gamma rays, photons composed of pure energy with no mass or charge can travel 500 feet before losing half their energy and are only stopped through thick materials, such as aluminum or lead, allowing them to easily penetrate through skin. Beta particles, on the other hand, have a mass and negative charge, and can travel only a few yards through the air. If someone is close enough, they can penetrate and burn the skin, but more likely they are inhaled and absorbed into the body, where they can result in the lung cancers Wing and his colleagues detected. Yet physical dosimetry only accounts for the first part of this process: The absorption of the gas into the lungs through gamma rays. In doing so, it excludes the energy deposited by the beta-emitting radionuclides, which are reflected in the biodosimetric reports. Adjusting for the time-release of Xe-133, Datesman establishes “reference doses to the most-exposed population near Three Mile Island in the range from 820 to 1,700

mSv.”<sup>66</sup> Datesman concludes that the conventional conclusion that TMI did not cause significant health effects are based on “the failure to apply elementary calculus” (Datesman 2020).

If Datesman’s calculations are correct, they pose major implications for both residents around TMI, as well as nuclear safety. The new dose range validates and makes legible residents’ complaints of both acute radiation sickness and cancers following the accident. But it also undermines government and industry claims that nuclear energy in the US is safe and reliable, by exposing a fault line in the methods used to measure the very parameters of safety itself. If physical dosimetry does not fully account for the temporal character of ionizing radiation, then many of the industry’s safety guidelines, particularly for workers and occupational safety, are based on real-time radiation monitoring, including dosimeters and Geiger counters worn by employees and located around the plants, that renders latent radiogenic injury illegible.

The TMI accident compromised the reputation of safety the nuclear industry’s reputation was cultivating throughout the mid-twentieth century. Compounding the shock of partial meltdown, the misinformation and chaos in the days following the accident did little to bolster the public’s confidence in the NRC and the industry’s experts. Much of the industry’s recovery hinged on the image of TMI as a successfully contained accident, due to human failure rather than equipment. However, if exposures from the 1979 accident were greater than originally assumed in the 1980s and 1990s, it would profoundly challenge this image. And indeed, TMI was not the first or last nuclear accident or incidence of nuclear injury in the United States’ nuclear power program (K. Brown 2013). But it was perhaps the best studied. If the industry’s

---

<sup>66</sup> Datesman uses shot noise statistics to determine the energy dissipated into tissue due to radioactive decay, a novel way of accounting for the temporal characteristics of radionuclides.

most publicized accident's health consequences went underreported, then other lesser known incidents and their effects on public health are unlikely to even be investigated.<sup>67, 68</sup>

## The Uncanny

One of the last interview excerpts Smith includes is not from a central Pennsylvania resident, but a quote from a book entitled *Enola Gay*, the name of the plane that dropped the atomic bomb on Hiroshima:

Every man in the Enola Gay saw the light and was overwhelmed by its intensity. Nobody spoke.  
[Colonel Paul] Tibbets could taste the brilliance. "It tasted like lead."

*Could taste the brilliance.* In the nuclear world, light has a taste. Lead a mouthfeel. And quiet, a new intensity as the US soldiers on the plane watched a 9,700 pound bomb descend down on a Japanese city filled with Japanese people and Japanese buildings to generate a violence formerly

---

<sup>67</sup> The assumption that only a low dose was released also led to a lack of the sort of mathematical investigation Datesman carried out. It is notable that one of the studies on the TMI accident that he cites as foundational to the approach he utilized (the FISH method for chromosomal aberrations) was carried out by the Russian Academy of Scientists, who had previously used these methods on people exposed by the Chernobyl accident.

<sup>68</sup> A few months after reading Datesman's paper and meeting him through one of my advisors, he contacted me over Facebook. He and another researcher were trying to recruit participants for a pilot study, in which they would analyze blood samples from people who had lived in the area since the accident and analyze them for cancer markers. Datesman asked if I knew of a nurse who would be willing to draw the blood samples for an IRB-approved study. His colleague had already contacted me a few weeks prior to ask if I knew anyone within their parameters who might be interested in participating. I hesitated. On the one hand, their work was important and resonated with some of my interlocutors' desires to have statistical proof of their injury. On the other, I felt protective of my other interlocutors, many of whom felt very comfortable with the conventional conclusion that the radiation released during the accident was not sufficient to cause significant health effects. Particularly in the wake of national Covid vaccine debates and my more conservative interlocutors' skepticism towards science, I doubted many of them would be interested in submitting bloodwork for research, in general, let alone one attempting to connect cancer with TMI through their samples (Datesman's colleague assured me that everything would be kept anonymized and confidential, and participants would never know their individual results). At that moment, I felt torn between my interlocutors convinced that the truth of TMI had yet to be divulged and my interlocutors content with living in the plant's shadow, however uncertain the length of that shadow might be.

unthinkable. Masco (2006) argues that the introduction of the bomb introduced a new kind of “apocalyptic sensibility” or “nuclear phantasmagoria” in which wartime overstimulation of sensory experience reorders it and, as a result, brings about new psychosocial realities and experiences of the everyday.

For Smith and Katagiri’s interlocutors, the struggle to make sense of the strange-making power of nuclear technology as it is felt and experienced in their physical bodies requires a poetic register. Grayish white ash falling from the sky that looks like snow against a red pick-up, little red bumps on one’s skin that show up in a roadside motel room after evacuating, the burning and coppery taste of metal, the overpowering blue light between the cow barn and the farmhouse while Dolly Parton plays on the radio all speak to uncanny events that not only punctuate the ordinary but are seen through the fractured lens of it. The result is something intimately grounded in the everyday, even as it disrupts it. The parallel register of the ordinary and the extraordinary and the repetition of words and phrases is not only an attempt to make sense of the aftermath of the accident, but to insist on the veracity of the body’s reasoning. Hovering in the background of these accounts is the attempt of a white, working-and middle-class community to reckon not only with the extraordinary events they witnessed, but also a government that failed them and refused to believe them.

Susan Lepselter (2016) points to how “on the sliding American uncanny landscape, the real is not what you can finally prove but what you *just know*” (43). Like the people Katagiri and Smith spoke to, my interlocutors struggling to make sense of the cancers and illnesses showing up in their bodies decades after an accident that was “contained,” live on the borderlands of the uncanny. According to Freud, the uncanny is a psychic state when sensory experience is disoriented so much so that it becomes untrustworthy and triggers an urge to return home.

Building on this psychoanalytic theorization, Masco argues that the nuclear uncanny “render[s] everyday life strange” and shifts “how individuals experience a tactile relationship to their immediate environment” (2006, 33). Radiation is senseless—it lacks a clear sensory feeling and temporal logic. As a result, it reorients experiences of and to the quotidian.

The uncanny is not only a psychosocial process; it is, as this chapter has demonstrated, also essentially an embodied one.<sup>69</sup> The body is ultimately the medium that senses, expresses, and knows what cannot necessarily be proven in epidemiological, public health, or dosimetric studies. Radiation defies tidy quantification and clear lines of cause and effect—the elements that generate narratives of containment. Instead, tracing radiogenic injury requires more careful attention not to what can be proven but what is known, however uncertain or unreliable such knowledge may appear. It requires more careful attention to what exceeds efforts to contain—seen here as public health studies and dosimetry practices—and instead to examine containment beyond its often leaky contours into the blurry, unsettling territory of the uncanny. Containment is not only a process of boundary-making but a process of exclusion, and, in this case, an exclusion of certain forms of evidence that preclude the possibility of radiogenic injury.

This chapter has not sought to prove or disprove the competing research following the accident but to describe the sense-making efforts of my historic and contemporary interlocutors. It has pulled together multiple narratives to show how knowledge-production efforts following the accident entangled people and myself in unexpected ways—Wing and the Aamodts, Julie and Dr. Goldenberg, Joyce and a Japanese researcher, Columbia researchers and the NRC. Sometimes these efforts occurred in response to, in collaboration with, or parallel to one another.

---

<sup>69</sup> For Masco, the uncanny is deeply connected to bodily experiences, and he notes that radiation “powerfully affects how people experience their own bodies over time” (2005, 32).

There is no tidy resolution to these competing claims. However, to understand the full scale of the accident as it has come to live on in the bodies of the people residing alongside the plant, it would be a mistake to prioritize one over the others rather than attending to them in their entirety.

### **Interlude: Nava To'i Jiya**

In New Mexico, juniper bushes and wildflowers cover the valley at the foot of the Valles Caldera, a dormant volcano that erupted 1.25 million years ago and created the 13-mile wide cauldron-like depression. It is revered ground for the Tewa people, an ancestral land for hunting, fishing, and gathering. It was this land, rich in life and sustenance, that the US government chose as the empty, unpopulated space for Los Alamos National Laboratories in 1943. The lab infamous for constructing the nuclear bomb also buried more than 21 million cubic feet of toxic waste in the Valles Caldera (Singham and Weisburd, n.d.).

Beata Tsosie-Peña, founder of the Tewa Women United, saw the violence against the Tewa's ancestral land as analogous to the government's treatment of Indigenous peoples, who are disproportionately affected by climate change and industrial and governmental waste practices. "As Indigenous people we hunt, we fish, we grow our own food, we harvest rainwater, we collect clay for our potteries," says Beata. "All of these things set us up for increased exposures just because of our traditional ways of life" (Singham and Weisburd, n.d.).

Part of Beata's work at TWU to liberate and restore Indigenous lands has been to advance a new standard for environmental protection: Nava To'i Jiya (Land-Worker-Mother) (Singham and Weisburd, n.d.). Rather than a hypothetical, standardized androgynous person (see Cram 2017), Beata and her colleagues argue the government should craft environmental protection regulations around the pregnant Pueblo woman working the land.

Nava To'i Jiya embodies the intersectional risks of environmental injury that is diffuse, often delayed, and not evenly distributed. The effects of chronic exposure from the development

of nuclear, oil, gas, and fossil fuel industries are more likely to show up in female rather than male bodies, more likely to affect indigenous groups and communities of color, and less avoidable for groups of people whose way of life depend upon intimate, daily encounters with the land as a source of work, leisure, and sustenance. Finally, Nava To'I Jiya also represents a pregnant body, a site of radiogenic harm not only in the childbearing person's lifetime but also intergenerationally. The model redefines the scale of exposure. Temporally, Tsosie-Peña's work moves beyond single episodes of exposure in one's lifetime and instead moved towards questions of ongoing, intergenerational harm. Spatially, it moves beyond accounts that focus solely on environmental harm or biological harm to encompass a comprehensive analysis of radiation as a threat to planetary health that entangles human and non-human life alike and implicates overarching relations of power. It is a model that does not only account for the ongoing effects of the US nuclear complex, but also its mutated futures.

## Chapter 5: Mutated Futures

In 1980, Lorna's water breaks in the parking lot of a billiards bar. Several hours later, she will be rushed to the OR for an emergency cesarean section due to the breech position of her infant daughter, Kate. In 1992, Kate, at twelve-years-old, will walk through the county fair hand-in-hand with her mother, Lorna, and double over in pain. Kate will vomit in the car on the way to the hospital where doctors will perform exploratory surgery and discover that one of Kate's fallopian tubes is twisted. Two years later, her mother Lorna will have her thyroid removed where doctors find nodules swelling along its surface and diagnose her with Graves' disease.

These moments, dispersed in time, make up the mutated futures that first led Lorna to suspect TMI, to furtively research what she called "TMI Babies," children in utero during the accident. Lorna grew up in Maytown, Pennsylvania, ten miles from TMI. A small town of 4,000 people comprised of one main intersection with a street leading out to the Susquehanna River two miles away. It's these events that led Lorna to the private Facebook group, "TMI Survivors." Like Lorna, several of my female interlocutors who were pregnant or in utero in 1979 felt that TMI had caused their or their daughters' breeched births, mutated reproductive organs, and unexplained infertility. I met the women in this chapter through "TMI Survivors," founded in 2016 by two people from the central Pennsylvania area. Over the years, it has grown to over 4,000 members. I joined the group in 2019 when I began this research, answering the screening questions by explaining that I was a graduate student interested in the decommissioning and also that I was from the area originally and had Hashimoto's thyroiditis, an autoimmune condition in which the immune system attacks the tissue of the thyroid. Thyroid disease and cancers were the

most common among the members, but others, like Lorna, were concerned with fertility issues and intergenerational radiogenic injury. Most of the members were alive or born shortly after the accident, and many of its most active members, including its two founders, still live in the area. Others are researchers, like me, who recruit or post new studies. Still, a large contingent of the members are “lurkers,” as one of them self-described himself.

TMI Survivors serves as a space to both connect and keep up-to-date on happenings at TMI, including the Unit 1 and 2 decommissionings. At the start of Covid when people were sheltering inside and unsure about which activities were safe and which were contaminating, it became a space for members to share how this experience made them feel like, as one of the founders put it, they were “reliving the disaster in ’79.” She encouraged them to “be strong stay safe and most of all know you are not alone.” But the majority of the posts are on health and links to local and national news articles on the consequences of radiation exposure. People post health conditions that they have been diagnosed with, which often prompt them to join the group, and ask if others have experienced or know of anyone who has experienced anything similar. The threads form and bind a network of people, who despite never meeting face-to-face and likely never will, connect with one another through shared bodily experiences. Members come to intimately know one another’s medical and family histories. Unlike other Facebook health groups, members do not offer therapeutic advice nor is there much talk of organizing or activating against nuclear technology. Instead, the posts center on finding people with similar conditions, and by extension, finding answers to sometimes decades-old questions.<sup>70</sup> As previous

---

<sup>70</sup> It is significant that this is a virtual community in several respects: First, the networks the group forms map the diffuse and often latent nature of radiation-induced illness, allowing people who have moved away to connect with one another. Second, in an area comprised of mainly small towns, each with their own unique version of community, members reach for the internet to find one another rather than neighborhood events, church, or other in-person platforms. TMI is not a normal part of daily discourse;

chapters have demonstrated, TMI does not come up often in everyday concern, speech, gossip, or storytelling. If everyday life around the plant offers a suspension or normalization of nuclear threat, “TMI Survivors” offers a space for its members to examine it, implicate it in their own bodies, and carve out networks locally and nationally with others who share embodiments and understandings about TMI.

Both TMI Babies and TMI Survivors do not so much provide a conduit towards biological citizenship (Petryna 2013) but a site of closure amid the uncertain consequences of the 1979 accident. That is, members do not so much want recognition from the state to gain rights, but a place to piece together a fragmented timeline, the mutated nuclear future coming to bear on their bodies in the present. This chapter tracks a subset of this group, particularly where stories pool around one of the body’s most materially and symbolically porous areas: the womb. The focus on the womb here is not only because it neatly encapsulates nuclear technology’s intergenerational biological and psychosocial effects, but also because of its association—however fraught—with futurity, broadly, and the link between social and biological reproduction, specifically. As Chapter 1 argued, nuclear power promised a teleological, heteronormative vision of the future that would power the white, middle-class home. This future never arrived; instead, its mutations linger and materialize in the bodies of my interlocutors. What is the aftermath of a future that forecloses what is for some the most precious, central fantasy of this vision: reproductive futurity?

In what follows, evidence piecing together these timelines is collected, carefully catalogued, lost, forgotten, or burned. In the process, the teleological future-building project of nuclear power opens up into a series of uncertain exposures, relations, and temporalities, or what

---

hence a designated virtual space to talk about it is useful for people reckoning with its impact on their bodies.

I term “mutated futures.” I use the word mutation here to describe these futures that proliferate in nuclear worlds because it describes well the unchosen intergenerational material and psychosocial effects of nuclear technology (see Masco 2006). Mutation occurs when cells do not die from radiation but are instead reorganized to take up a new form. As cells replicate, these new cellular reproductive outcomes proliferate. The result could be an adaptation, an injury, or an effect that does not emerge until future generations. This cellular process can be induced by radiation, but it is always occurring in humans’ genetic structure and a necessary part of evolutionary change.

Mutation is a space of both aberration and potential. It produces a change, a break with a past form that reinvents the future, and this change engenders not only harm—the doubling over of pain at the county fair or the emotional pain of unexplained infertility—but also new forms of life and relatedness. It is a relation of suspended time that engenders experiences of anxious waiting and uncertainty, or what Michele Murphy categorizes as the not-yet potentiality of “latency” and Lochlann Jain calls “living in prognosis” (Murphy 2013; Jain 2007) The unfinished trajectory of mutation is a space in which a symptom may materialize in the near or intergenerational future “that can only point retrospectively and conjecturally to possible harm” (Murphy 2013). For both Murphy and Jain, along with other feminist science and technology scholars, this openness carries a politics and collective ethics that can engender new forms of life, relatedness, and kinship (Haraway 2016; Murphy 2017a; Agard-Jones 2013); along this line, for Tsosie-Peña who opened this chapter, mutation is a lived part of daily life that necessitates new metrics of radiogenic harm.<sup>71</sup> Yet Lorna is not offering a redemptive or radical reading of

---

<sup>71</sup> The result is an inter-scalar effect, in which the body becomes a space of cellular transformations, as well as a site of uneven relations of colonial and postcolonial power. These theorists are committed to exposing uneven power relations and imagining a life and ethics lived alongside toxic harm as a human

this mutated future borne of uncertain harm among a predominantly white demographic, nor does the category TMI Babies disrupt the hegemonic ideologies ungirding it.

Instead, I want to argue that Lorna's category of TMI Babies, and even the virtual community of TMI Survivors, further entrenches fantasies of reproductive futurity, meliorism, and closure that are not only rooted in the teleological future the nuclear industry promised, but also reproduce logics of containment that obfuscate ongoing harm. Chapter 4 examined how public health research published after the accident contained the material and affective impact of the accident and rendered radiogenic injury illegible; this chapter turns attention to how the very categories of TMI Babies and TMI Survivors also reproduce this logic of containment to bracket harm to the past. Let me be clear, it is not my intention to undermine my interlocutors' claims to unrecognized radiogenic injury. Instead, I want to trace the political ideologies undergirding categories such as TMI Babies and examine what social forms are reproduced, eradicated, or transformed as infrastructures are dismantled, plants shutter, and futures promised never arrive but instead are foreclosed.

### **TMI Babies**

Cigarette smoke wafts out as Lorna opens the purple door to her small apartment. She ushers me into her living room, small and cluttered with furniture and knickknacks. Unsure where to stand, I try to stay out of the way, but struggle to find a place to maintain a polite and Covid-safe distance. Hopeful, I ask if she wants to sit outside as she and I originally planned. *Oh, it's too cold*, she tells me and waves her hand. I nod, though it is 80 degrees and her apartment is stuffy without the AC and with the cigarette smoke.

---

condition. It is a radical lived and theoretical project to move beyond what Michele Murphy calls damage-based analyses (Murphy 2017a).

I had walked to her house. I lived just a few blocks from Lorna in the small city of Lancaster, thirty miles from TMI. She had been over to my street for a locally famous and much anticipated yard sale that takes place every summer. Lorna never made it all the way up to my block. She had taken her purchases and crossed the park bordering the college campus where I taught and walked the few blocks down her street of row homes to her beloved purple door. So, even though we lived in proximity, our paths had only virtually crossed on the Facebook group, TMI Survivors.

Lorna hikes up her jeans, directs me over to the kitchen table, and sits down in the chair next to me. I set my notebook and recorder down on the white, floral tiles of the table. She peers at the recorder with suspicion. *Who's going to read this stuff?* She was one of only two of my interlocutors who preferred not to be recorded. I stuff the recorder back in my bag and open my notebook next to the two books she has waiting for me on the table: Ernest Sternglass's *Low Level Radiation* and *Before the Big Bang*. She taps each book with her index finger. *I talked to him. He details everything in these books.* She picks one up and starts to rub the price tag off of it with the back of her thumbnail. *I haven't read them yet,* she tells me sheepishly.

Lorna tells me she has been anxious to talk with me, and perhaps like most stories, she begins in the middle. She takes me through her history of thyroid disease, her daughter's birth, and her daughter's subsequent reproductive anomalies. She tells me how in 1994, she developed an asymptomatic thyroid nodule. At her yearly physical, her doctor noticed her neck was swollen. An endocrinologist found the nodule and biopsied it, but it was inconclusive. Still, she opted to have her thyroid removed. *I guess I was proactive,* she told me. Later, she was diagnosed with Graves' Disease, an autoimmune disorder in which the immune system attacks the thyroid and causes it to become hyperactive. As she is talking, I ask Lorna if she has any

family history of thyroid disease. Although prior generations did not have a documented history, her mother also had her thyroid removed following the accident. Unlike Lorna, however, she does not believe her thyroid issues were connected to TMI. Lorna, on the other hand, made sure the doctor noted the connection to the plant, *TMI is in my chart now*.

For Lorna, her thyroid issues were simply another piece of embodied evidence. In March 1980, a little less than a year after the accident, she gave birth to her daughter via emergency cesarean. It had been a normal pregnancy, but when she arrived at the hospital, the doctors discovered the baby was breech. While she recovered from her challenging labor, she found an article in the Lancaster newspaper detailing how low-level radiation was being released from TMI and that there was a rise in deformed animals, cesarean sections, breech births, and miscarriages. Lorna had been in the area on March 28, 1979, but here she was indicating a broader scale of concern, one that encompassed when her daughter was in utero the following summer. The TMI accident was not simply confined to a few, precarious early morning hours or even the chaotic week events following, but ongoing low-dose exposure that continued for months following the loss of coolant accident. I try to get her clarify precisely what she means, since it is not the conventional view I encountered in my interviews. Most people understood the accident as being contained, whether that meant narrowly avoiding nuclear catastrophe or a radiation release within a particular span of time. Very few people I encountered were concerned with the plant emitting low-dose, chronic radiation for an extended period of time.

*So, when do you believe there was low-dose radiation emitted? I ask.*

Her shoulders stiffen, *I know there was low-dose radiation. It's documented. It's in the papers. There's proof.*

*Right, I mean what was the window of time the exposure took place?* I try to word this question carefully. I do not want her to think that like so many other people, I too was not believing her.

*Oh, it had to be into the summer of 1979 and later because that was when I was pregnant.*

Later in my field journal, I would write about this exchange in particular, how her conviction startled me. *I know*, she told me. I was used to encountering some degree of uncertainty. Even for folks who felt like TMI had caused radiogenic harm, the full scope remained blurry. But it was also how she visibly bristled at my question, like it had put her on edge or on the defense—she had had to answer these questions before and hadn't been believed.

As Lorna became more convinced that low-level exposure caused labor issues, she struggled to find support. At the time, she had moved back home with her parents in Maytown, only a few miles from the plant. Five people on one block of that small town died of cancer, she told me, but no one ever blamed TMI. I ask why, and she shakes her head, gives me sad smile. *Denial*, is all she replies. Lorna was not connected with the other activist groups that were forming to protest the plant at the time, nor did she indicate that she went to any of the local or national demonstrations. Her parents and family did not believe her. The lawyers who brought the suit against MetEd did not take her case because it was not directly traceable to the day of and labor difficulties and radiation were not as cleanly correlated as other ailments, like acute radiation sickness and cancer. She had even gotten the number for a journalist at the New York Times, but they never did a story on how the accident impacted reproduction.

Then in 1992, she and her then 12-year-old daughter were at the Ephrata Fair when her daughter doubled over in pain and started vomiting. She was rushed to hospital where they did

exploratory surgery and discovered her fallopian tube was twisted. The doctor said the problem probably happened in utero. Lorna was convinced it was due to TMI and that, in fact, a whole generation had been silently affected by the accident. *I call them TMI Babies*, she tells me, and tears form in her eyes, *they didn't know—they couldn't control what was happening to them*.

Lorna's concern for the now-adult "TMI Babies" is a grown-up version, in a literal sense, of local activism's focus on the unborn following the accident. In her historical analysis of TMI and the rise of conservatism nationally in the 1970s, Natasha Zarestky examines how the area's activists in part gained legibility through appropriating liberal activists' calls for bodily vulnerability. Rather than the 1960s antiwar focus on the prisoner of war, however, central Pennsylvania's activists concentrated on the bodies of mothers, children, and the unborn. Despite its liberal origins, this preoccupation fit well with the area's conservative politics and soon the fetus became a key feature in the area's gendered activism. Through this activism, Zarestky argues on both a local and national level "the unborn was thus an atomically charged figure before it became caught up in the coming abortion war" (38).<sup>72</sup> However, Lorna's focus on the unborn was less a product of dichotomous partisan politics (indeed, Lorna had voted Democratic previously) and more reflective of the Cold War era's emphasis on the vulnerability of the child, as well as environmental activist calls that took up the unborn as a symbol of multigenerational harm.<sup>73</sup>

Fetology boomed in the early 1960s when sonogram technology borrowed from submarine warfare allowed obstetricians and their patients a window into the womb (Petchesky

---

<sup>73</sup> While marking reproduction as a privileged site of environmental activism, these often woman-driven initiatives obscure the risk and environmental burden placed on women themselves and instead casts them as passive carriers or worse the very source of harm.

1987). Echoing the Cold War culture of militarism, *Life*'s 1965 photographic essay, "A Sonar 'Look' at an Unborn Baby" described how the technology "is bombarding her with a beam of ultra-high-frequency sound waves" (qtd. in Petchesky 1987, 276). The new visibility offered by sonograms juxtaposed with radiation's invisibility. While mothers, residents, and nuclear experts could not immediately see inside TMI Unit 2's reactor to determine the extent of the damage, the fetus was becoming an "object of intensified visual and legal scrutiny" (Zaretsky 2018, 38). Central Pennsylvania obstetrician offices were overwhelmed by calls from concerned mothers and childbearing persons wondering how the accident had impacted their unborn fetuses. On a national level, the American College of Obstetrics and Gynecologists and the American College of Radiology issued a joint press release to discourage women from terminating their pregnancies. The accident had unlocked both national and local fears around mutation and the "weirded" reproduction contained within it.

And indeed, the government was not unconcerned about the reproductive futures of central Pennsylvania's predominantly white mothers. The state government and government-sponsored researchers called mothers pregnant in 1979, like Lorna, for years inquiring about the health of their children that were in utero at the time of the accident. Some of the women I spoke with remember these calls only occurring for a few years and then gradually tapering, others remember them occurring every year until their child turned eighteen, at which point they abruptly stopped. For some women, it would leave them with a lingering feeling of concern, like they had only narrowly avoided something that was nonetheless still unfolding. But for others, it was simply a routine part of living alongside the storied plant. I was always surprised that no one could remember much about these calls—what questions were asked, who called specifically, etc. Yet the impersonality of the calls, chilling in retrospect, also bred this incuriosity. The calls

were episodic, isolated, and one-way—an unknown bureaucratic source collecting information, the use of which remained unclear. They acknowledged the specter of harm hanging over the families, but they also encouraged many people to ignore it. The women I spoke to rarely had anything at the time to report. This, they felt, was at least encouraging, and surely the calls also meant the government was, in some way, looking out for them. The click on the other end of the line signified the call's end, and the women, like Lorna, were once again alone.

Alone and trying to figure out what happened, Lorna worked on her own to trace the network of TMI Babies. Without support from the more organized grassroots activist movements that were happening around the plant, she looked through local newspapers' birth announcements in later 1979 and early 1980. Then she started knocking on doors. *Erin Brockovich is my hero*, she smiled, referring to the environmental activism and legal action spearheaded by a woman in California against the Pacific Gas & Electric Company.<sup>74</sup> Lorna cannot remember how many doors she approached, but she remembers talking to many women who had struggled with labor or who had daughters who were having issues with fertility, miscarriages, painful periods, etc. *Always the daughters, never the sons.*<sup>75</sup> She eventually came across Earnest Sternglass's work and felt certain that he provided the scientific evidence for what she was discovering in the bodies of herself, her daughter, and her neighbors. She collected all her research, including data from the State Health department on miscarriages and breast cancer rates, in manilla envelopes.

---

<sup>74</sup> Like Lorna, Brokovich was an unemployed, white single mother who in 1993 used neighbors' accounts to build case against PG&E and expose the contaminated groundwater in her community. Her story is immortalized by a movie starring Julia Roberts who plays who TV Guide calls the "sassy divorcee" and won an Academy Award.

<sup>75</sup> While Lorna was concerned with female reproduction more than male reproduction, there was some concern in public and scientific circles about the impact of radiation on sperm production.

*I wish I could find my manilla envelopes.* She gets up from the table and goes to her living room for fifteen minutes, and I hear the opening of drawers and the shuffling of papers. While I wait, I page through the Sternglass books and notice one's arresting cover: flowers laid in front of a headstone intercepted by a model of a futuristic power plant in the background—the ever-present threat of a future promised that only brings death. When Lorna returns, she is holding a folder with her medical records. She opens it to a few pages detailing her emergency cesarean section and hands it to me. I take the folder but am embarrassed to look through it closely. The top page has her social security number and other information about her hospital stay. There is of course no mention of what could have caused the labor issues. She shakes her head, *I must have thrown [the manila envelopes] out when I moved last year. I didn't think I needed them.* Because no one believed her, she did not see a point in keeping them.

In the absence of her lost evidence, she turns her attention to the books. *He knew Einstein.... He details everything in this book. Everything he said came true here.* And she again taps the book *Low Level Radiation* with her index finger.

\*\*\*

Ernest Sternglass did in fact know Albert Einstein, but before Sternglass had gained a reputation as a controversial nuclear critic. The preeminent scientist invited Sternglass to his home in 1947 shortly after Sternglass graduated from college to discuss the young student's work on secondary electron emissions (a technology the military was interested in for seeing in dim or dark areas). In the 1960s, following his PhD at Cornell University in engineering physics, Sternglass became increasingly interested in the impact of low-dose radiation exposure on developing fetuses. Following studies documenting the increased incidence of early childhood cancer amongst infants exposed to X-rays in utero (MacMahon 1962, Stewart & Hewitt 1965),

Sternglass marshalled public health data to trace the effects of nuclear fallout that were diffuse, dispersed, and showing up in the bodies of those he saw as the nation's most vulnerable. He gained a national and controversial reputation, advocating against aboveground and proposed underground nuclear testing (Sternglass 1972). Most notably, he testified at the congressional hearings that led to the Nuclear Test Ban Treaty in 1963, where he cited evidence of increased childhood cancers in Troy, New York due to alleged fallout from the Nevada nuclear tests in the 1950s (Lapp 1962).

Sternglass's work is concentrated around three main statistics: infant mortality, childhood leukemia rates, and SAT scores. Just as utopic as Seagram's projection for nuclear power (referenced in the first chapter), Sternglass's prophecy was equally dystopic:

It was only too evident that if the radioactivity in the environment led to early infant mortality, childhood cancer, thyroid damage, and underweight births, then also the learning ability of the surviving children might never develop its full potential. And it would be the steady decline in the ability to read and reason and not so much the rising cancer rates in old age that would be the real seed for the self-destruction of a modern technological society. The children that could not read or cope with mathematics and science would drop out of school and become permanently unemployable. And these young people would feel increasingly resentful toward those whom they blamed for their failure: their teachers, their parents, and their political leaders. Even worse, they would blame themselves and suffer from low self-esteem.

Many of the unemployed and discouraged young people would drift into crime, vastly raising the level of violence and fear in the cities. Not knowing what caused their problems, they would increasingly resort to drugs and alcohol to overcome their sense of failure and hopelessness, raising the rate of juvenile suicide and crime still further (E. J. Sternglass 1981, 193–94).

*Children might never develop to their full potential.* He goes on to describe healthcare, insurance, educational, and economic systems buckling under the weight of managing the consequences, which would result in fewer workers and US-made commodities and ultimately inflation. His work discusses the consequences of nuclear power not in the immediate present, but, like Seaborg and nuclear technology's proponents, the near-future. For Sternglass, nuclear

technology was not the epoch of modernity but its downfall. His focus on the unborn and younger population is in part due to their increased vulnerability, but also a conventional, even eugenicist, view of reproductive futurity. Nuclear power threatened “the biological survival” of the human species precisely because it endangered children (E. Sternglass 1980, 12).

After hearing about the TMI accident, Sternglass traveled from the University of Pittsburgh, where he was faculty, to Harrisburg to take part in a press conference. He brought with him a Geiger counter, and as he flew over the plant, landed at the Harrisburg airport three miles from TMI, and took a taxi to the press conference, he measured the radiation levels. Unlike MetEd and NRC’s reports, Sternglass was measuring doses four to fifteen times higher than normal (E. J. Sternglass 1981, 204–5). At the press conference, he raised concerns about the area’s pregnant women and children and advised them to avoid drinking local water and milk. Like the Nevada nuclear test statistics, Sternglass became increasingly convinced that the NRC and the utility were not supplying the public with accurate information regarding the accident. “It was as if an iron curtain had descended around the Harrisburg area” that kept local residents from realizing the significance of the low-level radiation doses they received over the course of several days to weeks (251). Sternglass closely followed the effects of the accident and after analyzing the public health data in Pennsylvania and upstate New York in the direction of the plume, Sternglass found an increase in infant mortality in the spring and summer months following the accident. He postulated that doses of 200 to 1100 mrem to fetal thyroid glands slowed lung development in embryos, leading to a rise in infant deaths either at birth or shortly thereafter (E. Sternglass 1980, 3).

Sternglass presented these findings at an international conference in Tel Aviv in 1980, six years before the accident at Chernobyl. There, he predicted a rise in childhood cancer and

leukemia in the area in the next ten to fifteen years and argued this latent impact would result in “many thousands” of deaths over the next ten to twenty years, comprising the “largest death toll ever resulting from an industrial accident” (E. Sternglass 1980, 12). Sternglass ended his talk with a warning: “It would seem prudent to apply future technological efforts to the more forgiving sources of energy that do not threaten the most precious of our nation’s resources: the physical and mental well-being of our children for generations to come” (16).

The future that Sternglass imagines is one in which surviving children never develop “to their full potential,” and central to Sternglass’s concern about the biological survival of the human species is an almost eugenicist emphasis on stunted potentiality. Karen-Sue Taussig, Klaus Hoeyer, and Stefan Helmreich point to how “in biomedical practices, potentiality indexes a gap between what is and what might, could, or even should be” (Taussig, Hoeyer, and Helmreich 2013, S5). The potentiality of the fetus has always been exceptional in the social imaginary and has been taken up as a figure that indexes broader social concerns. Tine Gammeltoft argues “perhaps more than other social figure, the fetus embodies the possible, the tentative, that which is not yet fully there” (T. Gammeltoft 2014, 235). Around TMI, the specter of the fetus was layered with the community’s anxieties and worries about the unseen, latent effects of chronic, low-dose radiation.

Like most of the epidemiological data around TMI, the evidence for TMI Babies is murky. Pennsylvania Governor Dick Thornburgh organized a commission to investigate the effects of the accident. Like the Kemeny Commission’s findings that stress rather than radiogenic injury was the primary consequence of the accident, state researchers found that there were “no significant physical health effects” (Goldhaber et al. 1983; Tokuhata 1984). One of the primary variables that the health commission investigated was infant mortality rates, the number

of infant deaths within one year of birth per 1,000 live births. The researchers analyzed the health data of 4,000 infants within a 10-mile radius of the plant. They hypothesized that because fetuses are most vulnerable to the radioactive isotope iodine-131 during the first and second trimesters, infant mortality would increase in the third and fourth quarters of the year, continuing to rise nine months after the accident.

During the first two quarters of 1978, the year before the accident, the infant mortality rate within a ten-mile radius of Three Mile Island was 8.6 and 7.6 per 1,000 live births, respectively. During the first quarter of 1979, following the startup of Unit-2, the rate jumped to 17.2; it increased to 19.3 in the quarter following the accident at TMI and returned to 7.8 and 9.3, respectively, in the last two quarters of 1979 (Macleod 1982). Although the Governor's Commission concluded that these patterns followed the opposite trend of what would be expected—that infant mortality should steadily increase into the third and fourth quarters—other public health officials and experts argued that the jump in the first two quarters of 1979 could indicate that radiation was released from the accident-prone plant before the 1979 accident even took place. Outside of these inconsistent infant mortality studies and some congenital thyroid disease research, very little to no published work has investigated the long-term effects of TMI on people in-utero at the time of the accident. Furthermore, the TMI Babies Lorna is concerned with are not so much infants who passed away or miscarried fetuses but now adults living—sometimes unknowingly—with the effects of the accident in their very bodies, an embodied mutated future.

In the work I read of Sternglass, he does not mention the breech births or reproductive abnormalities in women with which Lorna is most concerned. He mostly comes at the issue at the macro-level, focusing on statistics such as a cancer rates and infant mortality rather than the

particularities of how and when births occur. However, there is a correlation between irradiated pregnant women and breech births; cancer patients who underwent radiation treatments were more likely to struggle with subsequent fertility and pregnancy issues, including a malposition of the fetus (see Wo & Viswanathan 2009). Unlike Lorna, I found myself wary of Sternglass's work, and various nuclear experts advised I *stay away* from his research due to his alarmist rhetoric and questionable methods. Although his conclusions seemed quite possible and indeed important, his methods did give me pause. Particularly in his studies of education, he seemed to collapse complex social phenomena such as class, race, access, and even exposure to other harmful chemicals into overly capacious variables. The result were generalizations of possible correlations rather than definitive proof of radiogenic harm. It is what earned him the reputation of being an anti-nuclear alarmist. At the same time, however, his work brings important focus on the effects of low-level radiation exposure that often go unexamined by researchers due to the difficulty in establishing any sort of causal link. As one scientist put it (whom Sternglass quotes in his book): "The evidence is not sufficient to prove Sternglass is right. The essential point is that Sternglass may be right" (Sternglass 1981, 98). When the scale of nuclear devastation is immense, tracing fallout's effects requires an innovative calculus. And perhaps the real question is less whether Sternglass's numbers are valid and instead *what if they are?*

### **Baby Teeth**

In a St. Louis suburb, Dr. Louise Reiss's household mailbox was overflowing with baby teeth. By 1962, the internist was receiving nearly 750 teeth a week. Dr. Reiss collected the teeth from her mailbox and brought them to her kitchen table, where a group of female volunteers sifted through and categorized the samples to ship to Washington University School of Dentistry

for analysis. The women were part of a citizen scientist group that brought together residents and scientists called the Citizen's Committee for Nuclear Information (CNI), and Dr. Reiss was the director of the Baby Tooth Survey, one of the largest and most influential surveys of the midcentury. From 1958 to 1970, the study collected over 320,000 teeth from children in St. Louis to examine the levels of strontium-90, a bone-seeking isotope.

Atomic weapons testing at the time was generating fallout across the entire country and unleashed radioactive isotopes—cesium-137, strontium-90, tritium, xenon-133, and iodine-131 to name only a few—into the environment and the atmosphere, where they mixed with water molecules and eventually fell as radioactive rain. The temporal and spatial characteristics of fallout made it an especially elusive form of slow violence (Nixon 2013). Temporally, each isotope had a different half-life that determined whether effects would manifest in the bodies years or decades after exposure. Spatially, fallout's spread was totalizing but also asymmetrical, affecting the population collectively but not homogeneously: the Indigenous groups residing in what the US military deemed the "empty" testing and "sacrifice zones" bore the majority of the burden of living and dying in fallout's wake. Scientists warned of the uncertain, potentially enormous public health risks atomic testing could produce from sicknesses and cancers, as well as the contamination of the environment and food. But they also risked career-ending criticism from the atom's proponents who viewed the technology as the key to protecting and advancing America and capitalism-at-large.

Hence, when Dr. Herman Kalckar proposed a study of baby teeth in 1958 article for *Nature*, he was cautious. "Without expressing here any opinion concerning atomic weapons test programmes," he told readers, "I wish to suggest a scientific study which would at the same time have educational values in its practical demonstration of the peacetime value of atomic research"

(Kalckar 1958, 283). Baby teeth, which absorbed high levels of strontium-90 during their formation, were an ideal tool Dr. Kalckar argued to track the absorption into and path through the human body through time. They could, in short, pin down fallout's elusive temporal and spatial path and scale. Strontium-90 levels in milk spiked in April 1957, as cows grazed on fields sowed with fallout (*New York Times* 1957). In a nationwide study, the Public Health Service claimed these results were well within the threshold level of lifetime exposure (Jack and Steinhardt 2014). Comparing the "milk teeth" from children in utero before and after the US atomic weapons program, Kalckar hypothesized, would reflect how contaminated breast or cow's milk accumulated in the bodies of America's youngest generation. And indeed, the group that scientists were most concerned about at the time were fetuses in utero and children, whose delicate and developing tissues, bones, and organs absorbed more radioisotopes than adults and increased their radiosensitivity.

Kalckar's proposed method inspired CNI, which secured a grant from the United States Public Health Service to actualize the study. The large-scale study required an enormous amount of community support from the St. Louis area to obtain sufficient sample sizes. It was an ambitious effort that built on the postwar era's optimistic relationship with science. The study ran television, newspaper, and radio advertisements with pictures of white children missing their front teeth encouraging their parents to donate their baby teeth to science. St Louis Mayor Raymond Tucker even declared a Tooth Survey Week to garner support. To meet the exuberant support, tooth collection areas were set up in libraries, schools, dentists' offices, and drugstores. Parents and their children would simply place the baby tooth in a preaddressed envelope, along with an information card asking for the child's birthdate and sex and the year the tooth was lost. Mothers would fill out information regarding where they lived during the last six months of their

pregnancy, where the child lived during the first year of their life, how long the child was breastfed and what other types of milk or formula (if any) were used and how long. Once collected, volunteer dentists would examine the teeth for cavities or other conditions and then mail it to CNI office. In return, children would receive a membership card for Operation Tooth Club and a button that proudly displayed “I gave my tooth to science” (Jack and Steinhardt 2014).

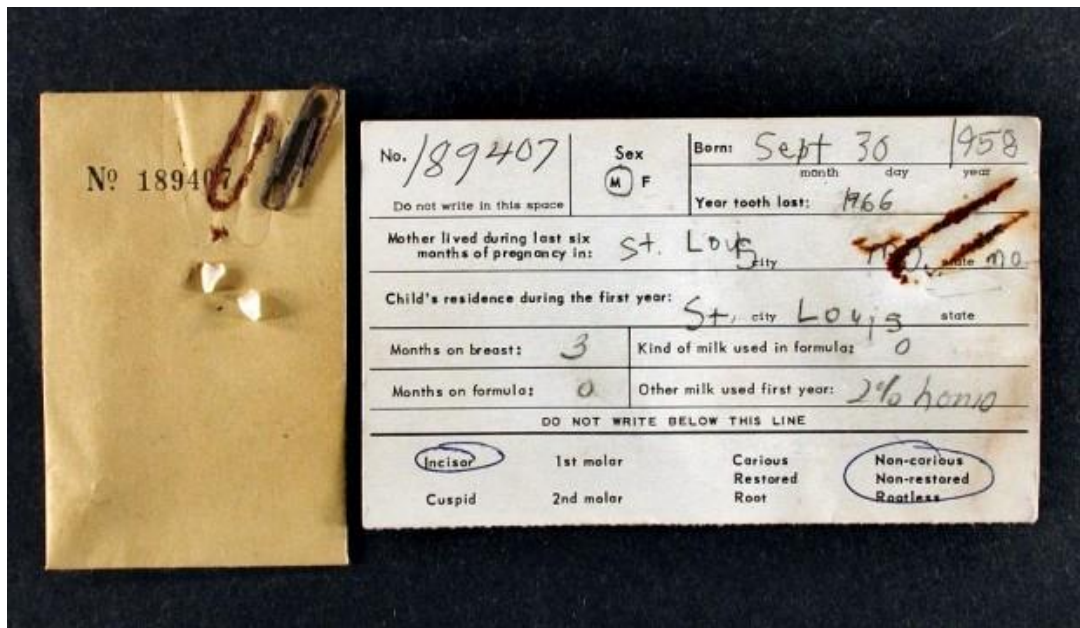


Image 19: An example of a completed card that accompanied a baby tooth donated to the Baby Tooth Survey. Image courtesy of St. Louis Post Dispatch / University of Washington at St. Louis via The Appendix.



*Image 20: A 1962 photo of Kim Garber and Russell Schrier smiling with missing front teeth that they donated to the St. Louis Baby Teeth Survey. (AP Image Archive photo).*

The light-hearted tones of the collection belied the darker questions guiding the study. Namely, was the government endangering its citizens, particularly children, in the name of national security? In 1961, after three years of collection, Dr. Reiss published the study's initial results. The research team had found that the levels of strontium-90 of both formula and breast-fed babies born in 1951 were lower than those born in 1954, when the atomic weapons testing in the Pacific atolls was underway (Reiss 1961).<sup>76</sup> The results were far-reaching. In August 1963,

---

<sup>76</sup> As I was reading the study, I was surprised that these results are merely gestured towards in a graph with little explanation. All Dr. Reiss wrote was “the upward trend with time may be correlated with increasing dietary concentrations of strontium-90” (Reiss 1961, 1670). Instead, most of the article is dedicated to understanding why breast and formula fed results did not differ more (perhaps, Dr. Reiss speculated, this had to do with the short duration of breast feeding) and statistically proving that bone and teeth took up strontium-90 at the same rate, making baby teeth an appropriate substitute for bone samples. I wondered if Dr. Reiss's reticence was merely due to scope of scholarly expertise—a doctor at Isotopes Incorporated Laboratory in New Jersey had run the analyses—or a reflection of the inhospitable climate at the time towards scientific critique or evidence against atomic weapons.

Dr. Reiss's husband, Eric Reiss, testified at the U.S. hearings to determine the necessity of a limited test-ban treaty that would stop aboveground atomic tests. After President John Kennedy signed the legislation into law, he reportedly called the Reiss's home. The Survey continued through the '60s, showing strontium-90 levels peaking in 1964 at 20 times higher than 1951, until their rates, along with cases of childhood cancer, steadily declined following the Test Ban Treaty (Gould et al. 2000).

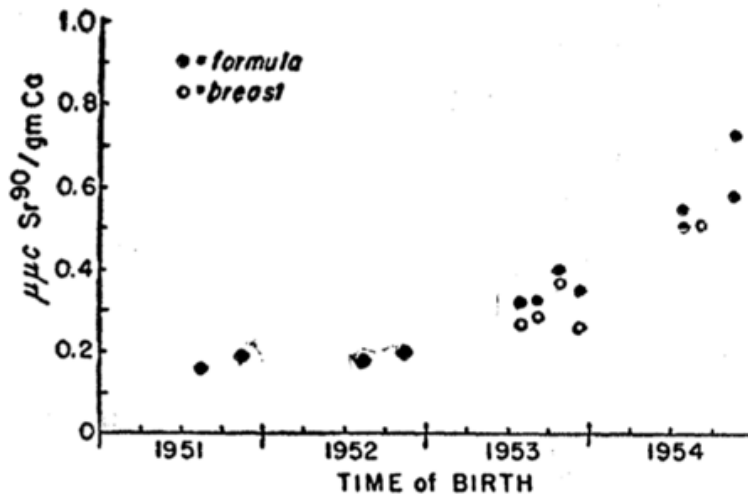


Fig. 2. Early time course of deposition of strontium-90 in deciduous teeth. The unexpectedly small difference between findings for teeth of formula-fed and teeth of breast-fed children may reflect the relatively brief period of breast feeding in some samples.

Figure 1: The table Reiss and colleagues used to show the comparison between strontium-90 levels in formula and breastfed babies from 1951 to 1954.

At the start of the US nuclear program, the white, middle-class child became the ultimate symbol of vulnerability and innocence that demanded, even required, the construction of the US

nuclear arsenal (Stephens 1997; Zaretsky 2018). Both the “specter of white, middle-class children” and the “sanctified, feminized domestic realm,” Zaretsky argues, laid at “the heart of Cold War ideology” (33). Yet by the late 1950s, national attention was increasingly focused on how both the home and the child were potentially endangered by the slow violence of atomic weapons testing, constituting “a graver threat to Americans than any Communist enemy” (33). One *Newsweek* reader wrote, “once upon a time, war affected only those in the line of fire, now it reaches into the third and fourth generations” (40). People across the nation were reckoning with the US nuclear program’s intergenerational toll.

This dual symbolism of the child—as both the protected and the endangered—placed children at the center of knowledge production around nuclear technology in the 50s and 60s. In part, this focus is due to their increased radiosensitivity as developing tissues absorb more radioisotopes than mature bodies. Yet it also introduced a new way of conceiving of radiation dose beyond just how much exposure a body received, but *when*. Scientists, like Sternglass, worried about the cancerous effects of radiation on children as cases of childhood leukemias and other cancers emerged. Others worried about the reproductive and fetal health beginning in the womb. For example, Linus Pauling, a chemist and nuclear critic, estimated that atomic weapons testing could lead to fifty-five thousand “defective births” and one hundred thousand stillbirths. Other studies circulated on the traumatic, psychosocial effects of the Cold War on America’s children (Beardslee 1986). The realization that children may be more sensitive or at risk than other age groups catalyzed news articles with titles that echoed the growing national worries: “Our Irradiated Children” and “Radioactivity Is Poisoning Your Children.” The specter of the child hanging over radiation science reflects a cultural way of understanding futurity not only in terms of technological progress but reproduction and a preoccupation with safeguarding

generational health, safety, and abundance in American life for the country's children (Edelman 2004; L. Berlant 1997). The technology that promised the future in terms of stunning innovation and scientific revolution also threatened the reproductive futurity so many Americans held so dear.

More broadly, both the midcentury studies taking up the question of multigenerational health and Lorna's concerns decades later reflect nuclear power's domestication as a process that not only attempted to harness a wartime technology but also one that wove war into everyday life (see Chapter 3). A central argument of this manuscript has been that domestication was not only a technical process, but also a cultural one which separated nuclear energy's promise from the violence it caused to both white and non-white groups in its production, testing, and development. In place of this history, nuclear power propaganda painted the technology as a channel to white, middle-class consumerism and abundance. As the atom split and powered the white, middle class home, it picked up the domestic sphere's values of race, gender, and class. As a result, the specter of the white child hanging in the balance of nuclear harm was a mutation of the future promised. Mel Chen analyzes how the lead panic around toys imported from China in the early 2000s was laced with racialized discourse that perpetuated a narrative of an outside (Asian) threat encroaching into and endangering the (American) domestic sphere. Chen describes not only a story of xenophobia and domestic, childlike innocence but also the obfuscation of lead's impact on black children and China's labor economies. In the process, "the image of the vulnerable white child is relentlessly promoted over and against an enduring and blatant background" that obscures the racialized harm and labor involved in a commodity's production (Chen 2012, 173).

Nuclear power's journey into the home was much the same in its power to sanitize past and ongoing harm, but it carried a crucial difference: The atom was thoroughly nationalized to the extent that it could not be considered an external threat but a domestic one. While folks in central Pennsylvania perhaps saw the photographs and news coverage of the bombing of Nagasaki and Hiroshima, these horrific images were strategically buried underneath the industry's "Atoms for Peace" rebranding (see Chapter 1). Additionally, many of them were simply unaware of the violence wrought by the US nuclear weapons program on the Pacific atolls and US Southwest. The blatant mutation of the US nuclear industry's promise to ensure white, middle-class security was precisely what shook central Pennsylvania residents. Rather than a teleological path towards a future promised, the 1979 accident had created a divergent, open-ended series of mutated futures that only time would unfold.

### **Nuclear Family**

A few weeks after I talked with Lorna, I received a message from her. She wanted me to talk to a woman she found, a TMI baby. Megan, now in her early 40s and Lorna's physical therapist, tentatively reached out to me on Facebook to see if I wanted to set up a time to Zoom. A few weeks later, she was on my screen, sewing her daughter's stuffed blue bear whose nose had been mutilated by the family dog. Most of the time we spoke, her hands moved steadily off camera. She had on a black T-shirt with "MOM" written in bold, colorful letters. She admitted that she did not know how helpful she would be. "I'll be honest, I'm not as passionate [as Lorna]."

Megan was born in the nearby small town of Elizabethtown on November 24, 1979, eight months after the accident and less than six miles from the plant. Despite her family's proximity

to the plant at the time of her birth, TMI did not figure prominently in her childhood. Her family moved when she was young to a county 100 miles northwest, and she had only moved back to the area sixteen years ago for a job. She just remembers that “they followed me for years.” Like Lorna, her mother would receive phone calls every year until Megan was 18, inquiring about Megan’s health. “Who are they?” I asked. “I don’t know,” she replied, “I was under the impression it was a government or health agency.” Like Lorna, Megan does not recall her mother being overly concerned about these phone calls, and nor was she. In fact, she does not remember really thinking about TMI until talking with Lorna one day. Lorna was sharing about all of her and her daughter’s health issues and her belief that they were linked to TMI. Megan laughed when she told me she remembers thinking, “Hey! That sounds like me.”

Megan shared with Lorna how she had a chronic, intermittent cough that would last a few months for years. She would go to the doctor, get antibiotics, and it would gradually go away. In 2011, a doctor palpitated her neck and detected an enlarged thyroid. She was diagnosed with thyroid cancer a few weeks later and had it removed. A few years later, Megan had an emergency cesarean to deliver to her second daughter due to a breech position, and the obstetrician discovered she only had one ovary and “a weird misshapen tube.” “Lorna was worked up about it,” Megan said, and asked her if she was also born via emergency cesarean due to a breech position. “And I was.”

Despite the connections between Lorna’s daughter and herself, Megan told me she does not really see any of it “chang[ing] my life.” She is thankful she had two daughters easily and is relatively healthy now. “It just really wasn’t important to me” to pursue the details of how and why. Her time since her conversation with Lorna had been consumed with family. She had had multiple family deaths and a family member with Covid. But she wanted to be of help if she

could to me and admitted she did find the connections Lorna made intriguing. She was curious what I had found. I was always hesitant to say too much at these moments, knowing my sample size was limited to make any sort of epidemiological conclusions. But I did think of Courtney also born during that time, or who Lorna would call a “TMI Baby.”

When I talked to Courtney, she was anxious to hear if I had met “anyone like her.” At the time, a sunny and warm day in April 2021, I hadn’t. Courtney had become increasingly convinced that TMI played a significant role in her “unexplained infertility.” Like Megan, she was in her early 40s and was born on July 2, 1979 in Elizabethtown. At the time of the accident, her mother was just about to enter the third trimester of her pregnancy. Courtney told me her mother remembers being livid that she didn’t know about the exposure sooner. She didn’t evacuate and was given potassium iodine that she was too afraid to take while pregnant.

Today, Courtney lives in my hometown, just eight miles from the plant, with her parents and husband. I had grown up not even a mile away from the fixer-upper home they received from a couple at church. When I arrived at their home to meet with Courtney, they were in the midst of redoing the kitchen and knocking down the wall between it and the living room. When she opened the door, Courtney wasn’t wearing a mask, and I felt a sense of obligation to remove mine, so she could see my face. It felt asymmetrical—like she was being more open with me than I was with her. But I slipped it back on as we walked through the living room to the kitchen and out to the patio. Courtney slid on sunglasses to cover her blue eyes and led me to a table between the beds of daffodils and forsythia. I could hear neighbor children playing.

Like Megan, Courtney admitted she had not thought about TMI much growing up in the area until she was trying to conceive. When Courtney was twenty-two and trying to get pregnant, she brought up the possibility of TMI to her doctor, but he was “closed-mouth.” Reflecting on

his reticence now, she told me people are afraid of “opening a can of worms.” Later after the recording turned off, she said she feels like TMI has a shield of protection around it—a host of apparatuses (government, industry, and medicine) that keep the full story from that day from coming out.

Courtney and Megan are now adults, no longer occupying the role of the unborn or the child in the nuclear imaginary; instead, they embody the mutation of this potential and the promise of nuclear energy. This potentiality is an embodied relation of time, a teleological future that maps a linear path towards progress. In her work on the technological promise of cochlear implants to create a normal sensory future for deaf children in India, Michele Friedner argues that this horizon towards becoming normal constrains rather than opens up possibilities (Friedner 2022). And indeed, the mutated futures of nuclear power generate a series of multiple, open-ended futures that are now coming to bear on the bodies of my interlocutors, even as they reproduce the fantasies this linear future promised.

Put differently, the mutated futures represented and embodied by TMI Babies continue to cling to features of the nuclear industry’s midcentury teleological vision of the future, even as this future is foreclosed by the very technology that promised it. More specifically, they continue to privilege white harm and are primarily concerned with reproductive futurity not only as a mode of biological reproduction, but also the social reproduction of the white nuclear family. Malinowski originally introduced the idea of the nuclear family as a universal institution, in which nurturing and intimacy were the function of a unit of clearly bounded kin that lived in a definitive home sphere for childrearing. Feminist anthropology pushed against this idea of the nuclear family as a natural human arrangement and instead highlighted it as an ideological construct that privatized the home space, divorced the home from market relations, and further

entrenched public and private divides. In later decades, feminist scholarship on assisted reproductive technologies (ARTs) showcased the complex interaction between nature and culture in producing kinship systems (Strathern 1992). Yet even as ARTs challenge conventional accounts of kinship that privilege blood-relations and introduce new forms of relatedness, they also further naturalize the desire for the normative heterosexual nuclear family (Charis Thompson 2007; Carsten 2004) and an able-bodied child (Kafer 2013; T. M. Gammeltoft and Wahlberg 2014). In contrast, in what she calls postmodern kinship, Sarah Franklin argues that even as nature is decentered as the defining feature of relatedness, “the postmodern turn does not require abandoning belief in progress, nature or scientific authority, it merely requires the acquisition of an additional layer of doubt concerning their effectivity” (Franklin 1997, 213). Franklin points to how although ARTs often result in reproductive failure rather than success (a viable embryo), they do not destabilize the hope in the technology. Similarly, TMI Babies embody the limits of the future promised by nuclear power, even as the category conserves the cruel optimistic attachment to the modes of a life it promised—a nuclear powered good life (Berlant 2011).

Lorna’s category of TMI Babies—and TMI Survivors more broadly—brings Lorna, Megan, Courtney, and even Ernest Sternglass in relation to one another. Yet, in what I have described, their experiences of infertility and reproductive abnormalities are worked out on an individual- rather than collective-scale. Indeed, with the exception of Lorna and Megan, none of these people had interacted at the time I spoke with them. Additionally, the maternal politics represented here mainly come to bare on their individual experiences. The value of the network did not lie so much in the new forms of relatedness or kinship it opened up to, but the possibility

to classify the cause of uncertain harm and fix the ongoing nature of mutation—the possibility for closure.

### **Closure Stories**

A few weeks after we first met, Courtney called me and said she had some old newspapers I might be interested in. I eagerly accepted and drove back over to her home to pick them up on my way to the grocery store. Her mother-in-law and husband were there. Her husband stood up from the couch as I lingered by the door to tell me *I think it's really neat what you're doing*. He seemed much more adamant than Courtney that “her” unexplained infertility was caused by TMI. He reiterated how they had brought TMI up to their doctors, and Courtney took a hand to her lips and mimed zipping them. *They're tight lipped*, she added to the gesture.

She handed me the newspapers. They had gotten them from someone who needed to get rid of them. They were burning them while camping when then started to read through and thought to save them. *We probably burned some things we shouldn't have*, Courtney said, *before we realized*.

Like they had for Lorna, the newspapers provided important evidence for Courtney. However, unlike Lorna who wanted to collect evidence to bring a case against the government and industry, the newspapers evidentiary nature lay in their personal explanatory power for Courtney. She told me that thinking about TMI as a cause has given her a “sense of closure.” Her unexplained infertility had a possible explanation. But she doesn't have “hard feelings” towards the plant now “as long as they plan to be safe” nor does she identify as anti-nuclear.

Even among my interlocutors content to be suspended in uncertainty, I noticed a tendency towards closure in a different sense. When Liv in Chapter 3 told me she and her family

had thought *maybe* TMI caused her father's cancer and Megan says she is not really sure whether TMI explained her missing ovary, they are occupying another sort of closure story, in which the inexplicable is never worked out but uncertainty is simply an accepted part of the human condition. For them, knowing the cause simply did not inform how they navigated the world, nor did it inspire action. Indeed, Liv had told me she tries not to think about what she cannot control. Instead, Liv and Megan compartmentalized the potential harm and, unlike Lorna, bounded it off from further reflection or investigation.

I felt a pang of guilt as I was leaving Courtney's house. Her husband seemed so excited about my work, and I did not think my ethnographic research would amount to the closure they desperately sought. Throughout fieldwork, I often felt a sense of ethnographer's guilt that I could not offer the concrete evidence my interlocutors were hoping my research would produce. At first, I felt like this was because of my methods: My ethnographic method and sample-size for interviewing was so small and broad compared to a tightly controlled epidemiological study investigating one or two variables. However, as I delved into the public health research around radiogenic injury, my guilt took on a new shape. Even these studies, or perhaps better put, especially these studies, struggled to track radiation's sprawling form and path through the body. Instead, they gestured towards without addressing mutation's unfinished trajectory, one that is not easily encapsulated within the bounded constraints of epidemiological studies. What did Courtney's closure look like in the context of mutated futures?

The term "closure" exploded in pop culture and media in the 1990s. From sitcom break ups to making sense of the violence wrought by school shootings, the Oklahoma City bombing, and 9/11, TV characters, talk show hosts, trauma survivors, and journalists alike employed the term to explain the desire for a sense of resolution following a loss, trauma, or break. However,

prior to this period, closure was a little known research term in Gestalt psychology to refer to the brain's tendency to group objects as a whole rather than conceptualizing them as individual parts, driving people to subconsciously fill in missing information to complete an image. In the 1990s, social psychologists attempted to categorize and quantify people's "need for closure," mapping it on to other personality traits, such as a preference for order, predictability, and security. Following the school shootings and terrorist attacks at the turn of the 21<sup>st</sup> century, "closure" became a hallmark sign of progress in grief and mourning (Berns 2011). Closure, in short, is a teleological ending, as well as an internalized, individual process.

After the stillbirth of her infant son, sociologist Nancy Berns traced how closure became a dominant frame for grief and loss in the US. In her analysis of the victim's rights movement, public mourning around 9/11, and other major national events in the 1990s and early 2000s, Berns argues that closure has been both commodified by the funeral and self-help industries as well as politicized to garner support for causes ranging from capital punishment to abortion bans. As it travels through these cultural spaces, closure takes on a range of meanings from remembering, to forgetting, to knowing, to reaching "a 'satisfying end' to something. A sense of finality" (Berns 2011, 21). Ultimately, Berns argues "closure is entrenched in our popular culture not because it is a well- defined, understood concept that we *know* people need but rather because it is a useful way to tell stories for many people" (13).

It is precisely closure's narrative usefulness that I want to examine here. When I talked with my interlocutors who felt that TMI had caused their cancers or unexplained infertility, I began thinking about them as "closure stories," in which multifaceted illnesses or bodily experiences are understood in terms of a singular cause rather than an interplay between multiple environmental, genetic, and biological factors. Particularly in the environment of late capitalism

and industrialism in which exposures and risks are ubiquitous and multivariant, closure stories are compelling in that they contain risk to the past and preclude it from reoccurring in the future. In doing so, it transforms the latent and diffuse effects of something like radiation into something containable and short-lived. For some of my interlocutors, this narrative of containment was valuable, particularly after something like the TMI accident which exposed the radical uncertainty of the future.

Closure stories are therefore similar to Arthur Kleinman's illness narratives that the chronically ill craft to "make over a wild, disordered *natural* occurrence into a more or less domesticated, mythologized, ritually controlled, therefore *cultural* experience" (Kleinman 1988, 48). Illness narratives and closure stories not only bring meaning to one's experience, they *domesticate* the fear and uncertainty engendered by it—they offer a coherent and stable structure of containment to a set of past events that otherwise appear disparate and meaningless. For Kleinman, illness narratives are powerful—if not undervalued—therapeutic tools that patients not only craft but clinicians can attend to and thereby offer better care. In the context of closure stories and unknown harm, such narratives are useful not only in their ability to bracket harm but also in their potential to implicate the source of it and expose the culpability of the government or industry. Yet it is crucial to note that, in this context, closure is not being used in a way that would hold the government or the industry responsible, but instead to make sense on an individual-level what happened.

Operating at this individual-level, there is something inherently conservative about these closure stories against a backdrop of uncertain and unchosen harm. The logics underpinning closure are precisely the ones that isolate harm to the past and thereby render chronic, ongoing exposure invisible. (Hence, in my conversations, my interlocutors focused more on the accident

than decommissioning.) To be a TMI Baby is to live in and embody the suspension of this uncertainty and its disorientation, whether vomiting in the backseat of a car or tracing an explanation for one's unexplained fertility. As people who start to radically interrogate the world from the vantage of their particular standing within it, the women in this chapter are in some ways what Antonio Gramsci would call an "organic intellectual" (Gramsci 1971). But it is a domestic radicalization that stays at the level of abstraction of the individual who senses through her twisted fallopian tube or breech birth that something is wrong and never reaches the level of revolutionary collective action.

Closure stories provide a seductive promise that past wrongs can somehow be made right. For the women in this chapter, this meliorism looked like gathering evidence to reveal the truth, compartmentalizing the potential for harm, or bracketing this harm to the past rather than reckoning with its ongoing consequences. In contrast, Tsosie-Peña who opens this chapter in the interlude—and Indigenous and Black studies scholarship and activism as a whole—have been urging us to think how the world and its distributions of risk were never "right" to begin with.

I came across Tsosie-Peña's work through a conversation with Arjun Makhijani, the President of the Institute for Energy and Environmental Research, who has spent several decades pursuing answers to questions around reproduction, fallout, and environmental health. During the 1980s lawsuits against MetEd, Dr. Makhijani was approached to serve as an expert witness regarding the validity of the Kemeny Commission Report. Ultimately, he and his research partner declined due to the scant monitoring at the site making it difficult to prove the epidemiological extent of what had happened. *The uncertainties are huge, he told me, It's very difficult to say anything definitive.* Yet what my interlocutors were experiencing was not impossible. There is very little research geared towards understanding the intergenerational

effects of radiation, but Dr. Makhijani noted that *we're discovering that the range of impacts is vast.*

These uncertain intergenerational effects, or mutated futures, are what spurred Tsosie-Peña's model of the Land-Worker-Mother. I think of Tsosie-Peña's work now whenever I see pictures of the "I survived TMI" signs and t-shirts that became a type of pop culture reference after the accident. Following the accident, "I survived TMI" was a light-hearted mantra taken up not only by local residents sporting dark humor t-shirts, but also by folks on "TMI Survivors" with the very real fear that TMI caused their cancers, autoimmune disorders, infertilities, and other ailments. Borrowing from both natural disaster remediation projects and cancer discourse, "I survived TMI" was used in various registers. It was a reflection of a dark humor born of mutual fear and fascination around nuclear technology that circulated before and after the accident (see Chapter 1). It was a statement of pride, a reaction to overcoming something, despite its attempts to ruin the body. But it was also said as a shrug, "I survived TMI... I guess." The spoken and more oftentimes unspoken ambivalence of the true uncertainty of whether you actually survived or were irredeemably altered by it.

The claim I "survived TMI" profoundly differs from the work Tsosie-Peña and her colleagues are performing as an act of survivance, that ongoing state of maintaining an "active sense of presence" and a "renunciation of dominance, tragedy, and victimry" (Vizenor 2008, vii). Spearhead by Gerald Vizenor, Indigenous scholarship has worked to resist passive surviving against settler colonial violence for an active continuance of traditional ways of life, Indigenous languages, and native stories. It is a lucid and agentive plea born of intergenerational trauma.

In that sense, it is easy to parse out how white middle America might be using survivor in ways that operate fundamentally differently from Tsosie-Peña and other Indigenous scholars and

activists. “TMI Survivor” speaks to a radically different temporality—its own myth of containment. To be a survivor implies that you outlived and overcame something or someone. The term operates in the same logic as the research laid out in the previous chapter that claimed the accident was a bounded event: It contains harm to the past and implies that closure is possible in the future. Yet, in the context of decommissioning, TMI is far from over. Rather it is ongoing. It elides a linear narrative with a clear beginning and end. Closure stories might be a convenient narrative form, but they are not always the most applicable. And indeed, tracing the root of exposure doesn’t necessarily protect one from the fallout.

The mutated futures that my interlocutors embody make closure elusive, and as people who live in the interstitial space created by nuclear technology, they were not unaware of closure’s inadequacy, even as they reached for the tidy stability it offered. Courtney wanted the newspapers, and the physical evidence they provided, back. When I went to drop them off at her house, she was out. Instead, I talked with her husband in the doorway. He asked if I had seen the documentary on Netflix yet, and I sheepishly told him I hadn’t (for no other reason than to stave off the anxiety and insomnia that felt inevitable after a late-night binge of my research topic). He shook his head when he replied that he did but was disappointed. *It didn’t deal with people like us*, he told me. *People living with the health effects of the accident*. Instead, the documentary had followed the events of the accident sequence itself and the activism surrounding it. Like I had seen so often throughout fieldwork, the documentary had created an event, a bracketed episode of harm. Instead, Courtney’s husband spoke to a more chronic condition, a living with toxic harm that was both unchosen and unavoidable and had foreclosed their vision of the future. What Courtney’s husband was coming up against was the limits of closure stories and their sometimes

useful, other times unsatisfying explanatory power to reckon with the inherently unfinished trajectory of mutation.

The mutated futures I have sought to describe here extend beyond the residents of central Pennsylvania and encompass the entire globe, a network of what Masco calls “post-nuclear creatures”:

In other words, since 1945 human beings have become post-nuclear creatures, marked with the signatures of nuclear weapons science. What is in question is not the material fact of radioactive fallout or exposure but rather our perception of its effects and implications. This lag between the environmental event and the recognition of its long-lasting effects is a major psychosocial achievement of the industrial age, where in the name of commerce or security, consequences are loaded into a uncertain future and thus expelled from the realm of formal political discourse (Masco 2015, 153–54).

What Masco describes as the lag between the event and its fallout is a closure story told on a grand scale, one that makes it impossible to talk about ongoing harm. But tools like Tsosie-Peña’s Land-Worker-Mother model—that are highly localized yet maintain a planetary and collective scope—get us closer to tracking, measuring, and combatting ongoing, intergenerational radiogenic injury. As we work towards more collective visions of the future that rely less on conserving cruel attachments to things that harm, we need tools like these that account for rather than erase nuclear technology’s role in broader systems of inequity—such as settler colonialism, extractive capitalism, and militarism.

In this chapter, I have documented the ways in which my interlocutors think about reproductive and intergenerational harm in terms of a bounded accident-event that radically altered their bodies but not their orientations towards the future. I want to acknowledge the reality of this harm, but I also want to point out the ways in which it is imagined as localized and individuated rather than global and ongoing. In the face of mutated futures, my interlocutors crafted closure stories that were sometimes useful, sometimes unsatisfying. But this inclination

towards closure reproduces logics of containment that bracket radiogenic injury to the past and make it impossible to talk about ongoing, diffuse, and often gendered and racialized collective environmental harm.

What, then, would it look like to move beyond closure?

## **Epilogue: Beyond Closure**

We have, in a sense, come full circle here; and we may choose between remaining in that circle...and stepping outside it into the swirl of history, all unstable, incoherent, and open-ended as it is. The circle has its psychological comforts as well as its aesthetic charms, but once we have felt the tugs and seen the perimeter grow faint and troubled, the security it otherwise offers has, in any case, been compromised. The circle, it seems, is broken; one might as well walk over to the rim and take a look at what lies beyond it.

-Barbara Hernstein Smith (1968, 260)

In 2079, Three Mile Island is a park where people can canoe out and have a picnic lunch, spreading their blanket across the grass-covered grave of a nuclear cooling tower.

In 2079, Three Mile Island is a nuclear waste site. Low-level waste storage sites in Idaho and Utah, overwhelmed by the nuclear waste from the various plants decommissioning, refused to take any more spent fuel decades ago. With no other options, the new owner of the plant decides to bury the waste on the Island.

In 2079, Three Mile Island is still decommissioning. The process has been pushed back due to a change in owner company, an unhealthy economy, and a drying up of the trust fund.

In 2079, Three Mile Island is once again in operation thanks to a renewed interest and public and private investment in nuclear power as an alternative energy source.

In 2079, Three Mile Island is not really an island at all. But 100 years after its 1979 partial meltdown, throughout its life cycle, its remnants have spread across the country—in the freight containers transporting Unit 2's molten core; in Pennsylvania-grown food that has

traveled to supermarkets and restaurants along the East Coast; in water from the Susquehanna that flows into the Chesapeake Bay; in the bodies of residents who have died of cancers.

With the exception of the last one (which has become my own way of thinking about TMI through this project), these were the few visions of the future I heard throughout my fieldwork, mostly from industry representatives or government officials. 2079 is the projected date for the completion of TMI's sixty-year decommissioning. In a poetic turn, it will also be the centennial anniversary of the 1979 accident. And perhaps all closure is more poetic (in this colloquial sense) than actual, more of a narrative device than a lived condition. Because no matter the vision of the future, Three Mile Island Nuclear Power never really closes. Decommissioning is a closure story that offers a tidy resolution, carrying an affective pitch towards progress that remains even as it becomes ever less practical.

When I entered the field, I expected to track the futures that must surely be bundling themselves around a site of nuclear technology, like TMI, even if they were not the future originally promised in Chapter 1. Instead, what I found were mutated forms of that future that materialized in the work, lives, and bodies of my interlocutors. Much of my fieldwork, and as a result the preceding pages, has revolved around the slow unbuilding and disillusionment with nuclear futures, even as my interlocutors remain attached to the forms of life the industry promised. What makes us cling to closure stories and narratives of containment against a backdrop of ever-mutating risks, bodies, and futures? Why is it easier to imagine and believe in closure—even as the evidence in the form of nuclear waste, abandoned industrial sites, and cancers literally piles up around us—rather than reach for a new set of ethics and care, a more collective vision of the future?

In her seminal analysis of poetic closure, Barbara Herrnstein Smith, argues that a sense of closure depends on an interaction between the reader and the poem, in which the structure appears closed “when it is experienced as integral: coherent, complete, and stable” (Smith Herrnstein 1968, 2). It is not so much finishing a sequence of events but the reader seeing that the poem was “an integral design” (36). Smith understands the gratification the reader receives from poetic closure in terms of psychology, but as an anthropologist, I am more inclined to think about it in terms of culture.

The reader, in Smith’s analysis, is active in co-constituting closure, even if they are not aware of the individual steps taken to reach it. Similarly, in the process of domestication, residents come to perceive TMI as safe, contained, and closed even if they are not aware of the state and government apparatuses that worked to create this illusory sense of stability and integrity. This manuscript has attempted to trace the atom’s path to power the white, middle-class home as it is typified through the life cycle of Three Mile Island Nuclear Power Plant. In doing so, I have understood domestication not only as a technical process that harnessed a weapon of war as a peacetime energy source, but as a cultural and material process through which Americans would come to feel at home with nuclear technology in ways that occluded the violence it had caused white and non-white groups in its mining, production, and testing. Domestication, I have argued, was achieved in a culturally specific way, that relied on the Cold War era technocratic fantasy of strict boundaries between the bomb and the atom, the domestic and the foreign, capitalism and communism, and the home and the power plant. Yet in the process of domestication that I have described, these boundaries are always already coming undone.

As a result, this manuscript has, in part, been concerned with what Smith would call “false closure.” False closure employs effective poetic devices to compensate for or obscure the structural inadequacy of the conclusion (212). It is anti-climactic and disappointing, even if it is initially seductive. It merely provides an illusion. Like the midcentury promise of nuclear technology, false closure employs the elements of containment but unsuccessfully so that the hopes and desires present at the onset remain unfulfilled and untenable even as we still attach ourselves to them. Lauren Berlant calls this affective attachment when we long for what is harmful “cruel optimism” (2011). Throughout this manuscript, I have documented numerous cruelly optimistic attachments that bundle themselves around the unfulfilled promise of nuclear power and its fantasies of the good life, containment, closure, and a safe future.

Yet with feminist STS scholars, I do not want to collapse the foreclosure of a hegemonic, heteronormative vision of the future as the foreclosure of all futures. To develop tools that map and counteract large-scale industrial harm, we also need to shift how we think about the temporality and spatiality of such harm in ways that take into account the intersectional vulnerabilities of chronic exposure. Resisting closure stories, embracing mutation, and acknowledging chronic exposure as a condition of everyday life are a few ways we can go about achieving this imperative. In that sense, it might be more useful to think not of futures, but in terms of collectivities and the ways in which the temporal and spatial reach of industrial harm demands a new ethics.

As I write about the false closures my interlocutors encounter, negotiate, see through, or even engineer themselves, I have tried to write in such a way that is committed to what Smith would call “anti-closure.” Rather than work to “convey authority, secure conviction, emotional containment, and brusque dismissal, the open-ended or anti-closural conclusion will convey

doubt, tentativeness, an inability or refusal to make absolute and unqualified assertions” (1968, 233). In this spirit, it is hard to know how to end. Anti-closure is both a politics for me, as well as description of my own fieldwork experience. I never really entered nor left the “field.” I grew up in Central Pennsylvania and upon “finishing” my fieldwork, I chose to stay, with all the ambivalence that comes with writing about and from home.

As I was thinking about what to write to close an ethnography that asks readers to think beyond closure, I was helping my mother clean out my grandmother’s house to prepare for her move to a retirement community. We packed up boxes and sifted through the objects, papers, books, and magazines that had accumulated in the 65 years she had lived in the brick four-bedroom, two-bathroom suburban home that housed her life. My grandparents lived a version of that elusive white, middle-class American good life that my interlocutors in Chapter 2 talked about so fondly. They purchased the house for \$3,000 in 1956. My grandfather drove the family Chevrolet to his chemical engineering job at Armstrong Flooring, a local business with a national scale, manufacturing the materials that made up thousands of homes across America. This is where the two met. My grandfather came up with the chemical compounds to make linoleum floors durable, stable, and timeless, and my grandma worked as a secretary. After they married, she stayed home to raise their four children, who played in the suburban streets with other neighborhood children whose parents also worked at one of Central Pennsylvania’s regional industries or even ran their own small business. In 2022, Armstrong would declare bankruptcy, and like the decommissioning of TMI, lead to hundreds of people losing their jobs.

I should say, my grandma doesn’t want to leave. She has to. The house has become too much for her to handle. But also that middle-class midcentury lifestyle did not pave the way for security in her older age. After years of working with the chemicals that built the middle-class

American home, my grandfather developed Alzheimer's disease that debilitated him, and his care quickly ate up their savings.<sup>77</sup> My grandma is preparing to move to the non-assisted living portion of the retirement community where my grandfather lives behind the locked doors of the memory care unit. She has to move now before the retirement community reconsiders her dwindling finances and she no longer financially qualifies.

Like many people born during the Great Depression, my grandparents kept everything, convinced that it might come in handy at some later date. For my grandfather, this mentality translated to stacks and stacks of magazines—collections of *National Geographics*, *LIFE*, and *Time*. My mom found an issue of *LIFE* from May 1979, a blue cover with barely perceptible outlines of cooling towers coming into focus in the background. “Judgment Day for Nuclear Power,” the cover ominously announces, a nod not only to a radical public reappraisal but nuclear Armageddon. In place of steam, hovering above the empty cooling towers of Three Mile Island are the questions: “Is public confidence gone forever? Are the newest plants safe to open? Can the problem of toxic wastes be solved?”

---

<sup>77</sup> Like my interlocutors in Chapter 5, my family members reached for an explanation for my grandfather's illness in an attempt to make sense of it; for many of them, the chemicals my grandfather painstakingly measured, tested, developed, and patented seemed a likely target. For my mother and my aunts (and even myself, if I'm honest), this closure story makes a terrifying disease with a hereditary link feel more isolated and situational. But also, in the closure story they tell, the blame is put on the chemicals rather than the lack of industrial safety regulations. This subtly shifts responsibility away from the company and onto the worker in the very logic of the nuclear industry which assumes that some exposure is a necessary part of the job (see Chapter 3).

# LIFE

## Judgment Day for Nuclear Power

- Is public confidence gone forever?
- Are the newest plants safe to open?
- Can the problem of toxic wastes be solved?

May 1979/\$1.50



**Cooling Towers at Three Mile Island**

Image 21: The cover of the May 1979 issue of LIFE Magazine. Photo taken by author.

With the luxury of hindsight, some of these questions have been answered. The nuclear industry undoubtedly suffered. At the time of the 1979 accident, the US had 72 nuclear power plants in operation and 124 plants under construction or in the planning stages. From 1979 through 1988, sixty-seven planned builds were canceled. Following the long and expensive permitting and building timelines of nuclear power plants, some plants that were under construction in the 1970s came online in the early 1990s (Mobilia 2017). But no new construction permits were approved until 2012, on the heels of Fukushima, when the NRC issued final approval for the building of two new reactors at Georgia's Vogtle plant to open in 2016 and 2017 under a \$14 billion budget. Just a few days ago, while writing this in March 2023, Vogtle announced that after ten years and \$30 billion, Unit 3 would come online in May or June (Clifford 2023; Amy 2023).

But at the same time, public confidence would, if only partially, be restored in the nuclear power industry. Perhaps it had a new layer of doubt, but a faith in progress and American know-how remained enough that nuclear power plants, including the infamous Three Mile Island, could fade into the background of American life. Yes, people across the country activated with increased zeal to boycott the opening of licensed plants in the 1980s and 1990s. But this has not stopped the reality that one third of Americans live within 50 miles of a nuclear power plant and likely are not even aware of it. What this manuscript has attempted to examine and bring attention to are the ways in which nuclear power has become an ordinary, if strange, feature of American life and the ways in which the industry is imbricated in and spun out of specifically white American fantasies of the good life, safety, security, and abundance in ways that make it easy to overlook its risk and acknowledge its harm.

We are, for example, no closer forty years later to answering the last question *LIFE* poses. The US has four low-level waste sites, but nothing for the tens of thousands of tons of high-level waste the nuclear industry and US weapons program has generated. Under the 1982 Nuclear Waste Policy Act, the DOE was tasked with finding and operating a geologic repository for high-level civilian waste by 1998 and created what would become the \$40 billion Nuclear Waste Fund, comprised of nuclear electricity consumer taxes. Through largely political means, Yucca Mountain in Nevada, in the native lands of the Shoshone and Paiute tribes, was identified as a permanent high-level nuclear waste repository.<sup>78</sup> The plan, however, came to a grinding halt in 2010. When Yucca Mountain failed and the DOE fell back on their promise to determine a long-term waste solution by 1998, the utilities sued the government organization in 2008, resulting in over \$9 billion paid to utilities for interim on-site storage costs (Clifford 2021; Jaczko 2019). As Scott Kemp, the professor of the class I audited at MIT, quipped, “This [nuclear waste management] is the future of nuclear.”

The economic costs of managing nuclear waste management are high, as are the ones on environmental and public safety. As spent fuel is kept in spent fuel pools and dry cask storage on-site at both operational and decommissioning plants to slowly deteriorate, it risks leaching into the ground, water, and the surrounding area. At decommissioning plants, this waste is

---

<sup>78</sup> In 1986, the DOE identified three sites for a large underground repository for civilian nuclear waste. These included Hanford, Washington; Deaf Smith County, Texas; and Yucca Mountain, Nevada. Proponents cited Yucca Mountain’s arid and sparsely inhabited desert, as well as its deep and relatively isolated water table, which would allow contractors to build the repository above rather than below the water table without fear of it leaching into larger bodies of water. Critics, on the other hand, warned that the mountain’s layers of volcanic ash would not adequately contain radiation, the tectonic setting carried the risk for earthquakes, and most of the structure would have to be engineered rather than naturally occurring in the mountain itself. Overall, they argued, the government could not guarantee the integrity of such a repository in these conditions for the one million years it would take for the waste to decompose to a safe level. When the site selection was put to a vote in Congress, Yucca Mountain was chosen largely because Nevada, unlike Texas and Washington, had only two Congressional delegates. In 2010, President Obama terminated the project (Clifford 2021; Jaczko 2019; Kemp 2020).

overseen by skeletal crews and diminishing regulations. These plants are not only sites of slow violence, but also national security risks. As the Russian occupation of the Ukrainian Zaporizhzhia Nuclear Power Station, the largest in Europe, has shown, these plants can easily become weaponized. The consequences of their mishandling—in both the unstable times of war and the long *durée* of government and industry oversight of materials and processes that outlive stakeholders—are immense.

The US nuclear complex has produced global problems that require more collective thinking. When I entered the field, I hoped to not only track the impact and unacknowledged harm that TMI had generated on the local community, but also new sets of politics and relatedness that emerge in the wake of late industrialism and late capitalism. I had hoped that TMI historically and presently might act as a sort of radical impetus in a religiously, politically, and culturally conservative area towards more collective visions of the future. Instead, what I found is that most of my interlocutors were still quite enchanted by the nuclear industry's midcentury teleological vision of the future, even if they felt like the industry itself had betrayed them or even radically altered their bodies or hometowns. They could maintain hope and optimism in the fantasies it offered because they saw the harm that the nuclear industry had caused as episodic rather than ongoing, as an accident-bound crisis rather than the rise and fall of an industry that promised the future and failed. A central claim of this manuscript has been that the consequence of viewing nuclear harm through the lenses of crisis or closure is that these are inherently conservative forms through which radiogenic injury with a tremendous temporal and spatial reach that extends beyond national boundaries is worked out not only episodically but locally in ways that occlude nuclear technology's history of engendering violence in both its fast and slow forms at a planetary level.

We may not all inhabit TMI bodies in the way that my interlocutors do, but we certainly all inhabit what Joseph Masco calls post-nuclear bodies complete with their vulnerabilities, sensitivities, and mutations (Masco 2015). These bodies generate new forms of kinship and compel us towards new modes of responsibility and care. Michele Murphy's concept of alterlife encourages us to document the ways of living within the already altered worlds and bodies of late capitalism and industrial production as an ethics and politics of care and responsibility (Murphy 2017a). A toxic relation is a "grand kin of sorts" and demands new modes of collectivity (2017a: 499). The post-nuclear body as a universal condition creates this grand kin of sorts, but we need new ways of thinking about nuclear futures that account for the racialized and gendered harm the technology has wrought. That is, we need ways to acknowledge and counteract the uncertain environmental harm perpetuated by global capitalism, and we cannot achieve this while conserving the categories and logics that uphold it.

The general conditions of exposure and precarity of global capitalism—of which the US nuclear industry is but one facet—require us to think more collectively, but not necessarily homogeneously. Fallout itself is a universal human condition to which all Americans have been exposed, but not symmetrically. Some bodies, namely those of color, have carried the burden more than others. We need to keep a planetary and collective politics and ethics in mind, but such an ethics needs to attend to the ways in which risk is not only diffuse, but not equally distributed. Such politics and ethics, I believe in part, start through rich ethnographic analyses of how nuclear politics are worked out in the local, in the everyday of the predominantly rural communities hosting them. I do not pretend to have answers to the questions that *LIFE* magazine posed in 1979 and what we encounter today with over 20 plants decommissioning without long-term waste solutions. But what I have tried to do is to document my interlocutors' attempts to

live safely, even optimistically, alongside the unbuilding of a future promised and their attempts to cling to features of it.

My grandmother read a draft of Chapter 2 that depicts the decommissioning of Middletown as small town America after its abandonment by numerous industries, TMI being just one. She told me she felt a sense of kinship with and sympathy for John and Jeannie, who like her, felt they lived through the midcentury's golden years only to watch this portrait of the good life crumble. Jeannie had told me that she never imagined her life would look like it did, *living in a town like this*. Jeannie and my grandmother are not the same—they occupy a different class and a different generation—though, as two people who are rare combinations of generous listeners and lively talkers, they would likely get along. I was not surprised then that my grandmother connected with Jeannie. At the same time, I felt a momentary frustration that my grandmother had somehow missed the point of the chapter—to show how industry-fueled promises of the good life were always already coming undone and obscure the harm they produce. I hadn't yet fully learned that people will continue to cling to these promises long after they fray and resist seeing outside of them. While for some of my interlocutors the dominant frame of understanding TMI was that of harm or even ambivalence, for many it was that of loss—of longing for the explicit and inexplicit modes of life it enabled even if the plant contributed to their foreclosure. The sense of kinship that my grandmother felt with Jeannie was borne of fallout, but not the radioactive fallout that has ensured we all inhabit post-nuclear bodies with shared vulnerabilities. I hesitate to say this is a kinship with radical potential because as the calls to “Make America Great Again” that emerged in 2016 and haunt the political backdrop of the community I studied and others like it make clear, people are likely to use this shared abandonment to further divide rather than to reach towards a planetary, collective ethics.

We need ways of thinking about industrial harm then that not only address its biological and environmental consequences, but the ways in which the lived infrastructures these industries build generate affects, propagate imaginaries, and lure attachments that make seeing outside of them feel impossible (Murphy 2017b). Because stepping outside of the broken circle that these industry-powered promises create and looking beyond it towards more collective visions of the future is precisely what is so urgently needed.

## References

- Aamodt, Marjorie. 2009. "Letter to the Chairman of the Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, Meeting #561," April 2, 2009. <https://www.nrc.gov/docs/ML0925/ML092520228.pdf>.
- Adorno, Theodor W. 1981. *In Search of Wagner*. New ed. Verso Modern Classics Series. London ; New York: Verso.
- Agard-Jones, Vanessa. 2013. "Bodies in the System." *Small Axe: A Caribbean Journal of Criticism* 17 (3): 182–92. <https://doi.org/10.1215/07990537-2378991>.
- Ahmad, Hafiz Ishfaq, Muhammad Jamil Ahmad, Farwa Jabbar, Sunny Ahmar, Nisar Ahmad, Abdelmotaleb A. Elokil, and Jinping Chen. 2020. "The Domestication Makeup: Evolution, Survival, and Challenges." *Frontiers in Ecology and Evolution* 8 (May): 103. <https://doi.org/10.3389/fevo.2020.00103>.
- Alaimo, Stacy. 2010. *Bodily Natures: Science, Environment, and the Material Self*. Bloomington: Indiana University Press.
- Allen, Barbara L. 2003. *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes*. Urban and Industrial Environments. Cambridge, Mass: MIT Press.
- Allison, Anne. 2013. *Precarious Japan*. Durham: Duke University Press.
- Amy, Jeff. 2023. "Georgia Nuclear Plant Again Delayed at Cost of \$200M More." *Associated Press*, February 16, 2023. <https://apnews.com/article/georgia-power-co-southern-climate-and-environment-business-3b1d6c65353c6a65b1ccfdede753ab7>.
- Anand, Nikhil, Akhil Gupta, and Hannah Appel, eds. 2018. *The Promise of Infrastructure*. A School for Advanced Research Advanced Seminar. Durham: Duke University Press.
- Appel, Hannah. 2018. "Infrastructural Time." In *The Promise of Infrastructure*, 41–61. A School for Advanced Research Advanced Seminar. Durham: Duke University Press.
- Associated Press. 1993. "14-Year Cleanup at Three Mile Island Concludes." *New York Times*, August 15, 1993, sec. 1.
- "Backgrounder on Decommissioning Nuclear Power Plants." 2022. Nuclear Regulatory Commission. <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/decommissioning.html>.
- Bakhtin, M. M., and Caryl Emerson. 1984. *Problems of Dostoevsky's Poetics*. Theory and History of Literature, v. 8. Minneapolis: University of Minnesota Press.
- Bakhtin, Michail, Michael Holquist, Caryl Emerson, and Michail Bachtin. 2011. *The Dialogic Imagination: Four Essays*. 18. paperback printing. University of Texas Press Slavic Series 1. Austin, Tex: Univ. of Texas Press.

- Bann, Darrin V., Neerav Goyal, Fabian Camacho, and David Goldenberg. 2014. "Increasing Incidence of Thyroid Cancer in the Commonwealth of Pennsylvania." *JAMA Otolaryngology-- Head & Neck Surgery* 140 (12): 1149–56. <https://doi.org/10.1001/jamaoto.2014.1709>.
- Barad, Karen. 2003. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs: Journal of Women in Culture and Society* 28 (3): 801–31. <https://doi.org/10.1086/345321>.
- Baum, Andrew. 1990. "Stress, Intrusive Imagery, and Chronic Distress." *Health Psychology* 9 (6): 653–75. <https://doi.org/10.1037/0278-6133.9.6.653>.
- Baum, Andrew, Raymond Fleming, and J.E. Singer. 1982. "Stress at Three Mile Island: Applying Psychological Impact Analysis." *Applied Social Psychology Annual*, no. 3: 217–48.
- Baum, Andrew, Robert J. Gatchel, and Marc A. Schaeffer. 1983. "Emotional, Behavioral, and Physiological Effects of Chronic Stress at Three Mile Island." *Journal of Consulting and Clinical Psychology* 51 (4): 565–72. <https://doi.org/10.1037/0022-006X.51.4.565>.
- Beard, George M. 1881. *American Nervousness: Its Causes and Consequences*. New York: G P Putnam's Sons. <https://doi.org/10.1037/10585-000>.
- Beardslee, William. 1986. "Children's and Adolescents' Perceptions of the Threat of Nuclear War: Implications of Recent Studies." In *The Medical Implications of Nuclear War*, edited by Fredric Solomon and Robert Q. Marston. Washington, D.C.: National Academy Press.
- Beck, Ulrich. 1992. *Risk Society: Towards a New Modernity*. Theory, Culture & Society. London ; Newbury Park, Calif: Sage Publications.
- Berlant, Lauren. 1997. *The Queen of America Goes to Washington City: Essays on Sex and Citizenship*. Duke University Press. <https://doi.org/10.2307/j.ctv120qtf2>.
- . 1998. "Intimacy: A Special Issue." *Critical Inquiry* 24 (2): 281–88.
- . 2007. "Slow Death (Sovereignty, Obesity, Lateral Agency)." *Critical Inquiry* 33 (4): 754–80. <https://doi.org/10.1086/521568>.
- Berlant, Lauren Gail. 2011. *Cruel Optimism*. Durham: Duke University Press.
- Bernard, Claude. 1865. *An Introduction to the Study of Experimental Medicine*. 1957th ed. New York: Dover Publications.
- Berns, Nancy. 2011. *Closure: The Rush to End Grief and What It Costs Us*. Philadelphia: Temple University Press.

- Brenner, Joël Glenn. 2000. *The Emperors of Chocolate: Inside the Secret World of Hershey and Mars*. 4th repr. New York, NY: Broadway Books.
- Brookhaven National Laboratory. 1957. "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Power Plants." WASH-740. Atomic Energy Commission. <https://www.osti.gov/servlets/purl/4344308>.
- Brown, Kate. 2013. *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters*. Oxford: Oxford University Press.
- . 2019. *Manual for Survival: A Chernobyl Guide to the Future*. First edition. New York: W.W. Norton & Company, independent Publishers Since 1923.
- Brown, Phil. 1992. "Popular Epidemiology and Toxic Waste Contamination: Lay and Professional Ways of Knowing." *Journal of Health and Social Behavior* 33 (3): 267. <https://doi.org/10.2307/2137356>.
- Brubaker, Paul. 2019. "How Did Three Mile Island Get Its Name? It Was Another Mistake!" *Lancaster Newspaper*, March 27, 2019.
- Buck-Morss, Susan. 1992. "Aesthetics and Anaesthetics: Walter Benjamin's Artwork Essay Reconsidered." *October* 62 (Autumn): 3–41.
- Buell, Lawrence. 1998. "Toxic Discourse." *Critical Inquiry* 24 (3): 639–65.
- Butler, Judith. 2004. *Precarious Life: The Powers of Mourning and Violence*. London ; New York: Verso.
- Canguilhem, Georges. 1989. *The Normal and the Pathological*. New York: Zone Books.
- Carsten, Janet. 2004. *After Kinship*. New Departures in Anthropology. Cambridge, UK ; New York: Cambridge University Press.
- Chen, Mel Y. 2012. *Animacies: Biopolitics, Racial Mattering, and Queer Affect*. Perverse Modernities. Durham, NC: Duke University Press.
- Clark, Herbert M. 1954. "The Occurrence of an Unusually High-Level Radioactive Rainout in the Area of Troy, N. Y." *Science* 119 (3097): 619–22.
- Clifford, Catherine. 2021. "The Feds Have Collected More than \$44 Billion for a Permanent Nuclear Waste Dump — Here's Why We Still Don't Have One." *CNBC*, December 18, 2021, sec. Clean Energy. <https://www.cnbc.com/2021/12/18/nuclear-waste-why-theres-no-permanent-nuclear-waste-dump-in-us.html>.
- . 2023. "A New Nuclear Reactor in the U.S. Starts up. It's the First in Nearly Seven Years." *CNBC*, March 7, 2023, sec. Clean Energy.

- Cohn, Carol. 1987. "Sex and Death in the Rational World of Defense Intellectuals." *Signs* 12 (4): 687–718.
- Cole, Sterling. 1957. "United States Joins World Atomic Agency." In *Congressional Record: Proceedings and Debates of the United States Congress*, A6133. United States Congress.
- Collingwood, R.G. 1945. *The Idea of Nature*. New York: Oxford University Press.
- Collins, Bruce, dir. 1984. "Walking Tour of Three Mile Island." Tour- Public Affairs Event. 124769-1. Harrisburg, PA: C-SPAN. <https://www.c-span.org/video/?124769-1/walking-tour-mile-island>.
- Cram, Shannon. 2015. "Becoming Jane: The Making and Unmaking of Hanford's Nuclear Body." *Environment and Planning D: Society and Space* 33 (5): 796–812. <https://doi.org/10.1177/0263775815599317>.
- . 2016. "Living in Dose: Nuclear Work and the Politics of Permissible Exposure." *Public Culture* 28 (3 80): 519–39. <https://doi.org/10.1215/08992363-3511526>.
- Culley, Marci, and Holly Angelique. 2003. "Women's Gendered Experiences as Long-Term Three Mile Island Activists." *Gender and Society* 17 (3): 445–61.
- Das, Veena. 2007. *Life and Words: Violence and the Descent into the Ordinary*. Berkeley: University of California Press.
- Datesman, Aaron M. 2020. "Radiobiological Shot Noise Explains Three Mile Island Biodosimetry Indicating Nearly 1,000 MSv Exposures." *Scientific Reports* 10 (1): 10933. <https://doi.org/10.1038/s41598-020-67826-5>.
- Davidson, Laura M., Raymond Fleming, and Andrew Baum. 1987. "Chronic Stress, Catecholamines, and Sleep Disturbance at Three Mile Island." *Journal of Human Stress* 13 (2): 75–83. <https://doi.org/10.1080/0097840X.1987.9936798>.
- Davis, Lucas W. 2012. "Prospects for Nuclear Power." *Journal of Economic Perspectives* 26 (1): 49–66. <https://doi.org/10.1257/jep.26.1.49>.
- Del Tredici, Robert. 1980. *The People of Three Mile Island*. San Francisco: Sierra Club Books.
- Dietz, David. 1945. *Atomic Energy in the Coming Era*. New York: Avon Book Company.
- Edelman, Lee. 2004. *No Future: Queer Theory and the Death Drive*. Series Q. Durham: Duke University Press.
- Ettlinger, Nancy. 2007. "Precarity Unbound." *Alternatives: Global, Local, Political* 32 (3): 319–40. <https://doi.org/10.1177/030437540703200303>.
- Ford, Daniel F. 1982a. *The Cult of the Atom: The Secret Papers of the Atomic Energy Commission*. New York: Simon and Schuster.

- . 1982b. *Three Mile Island: Thirty Minutes to Meltdown*. Harmondsworth, Middlesex, England ; New York, N.Y., U.S.A: Penguin Books.
- Fortun, Kim. 2001. *Advocacy after Bhopal: Environmentalism, Disaster, New Global Orders*. Chicago: University of Chicago Press.
- Franklin, Sarah. 1997. *Embodied Progress: A Cultural Account of Assisted Conception*. London ; New York: Routledge.
- . 2003. “Re-Thinking Nature—Culture: Anthropology and the New Genetics.” *Anthropological Theory* 3 (1): 65–85. <https://doi.org/10.1177/1463499603003001752>.
- Friedner, Michele Ilana. 2022. *Sensory Futures: Deafness and Cochlear Implant Infrastructures in India*. Minneapolis: University of Minnesota.
- Gammeltoft, Tine. 2014. *Haunting Images: A Cultural Account of Selective Reproduction in Vietnam*. Berkeley, California: University of California Press.
- Gammeltoft, Tine M., and Ayo Wahlberg. 2014. “Selective Reproductive Technologies.” *Annual Review of Anthropology* 43 (1): 201–16. <https://doi.org/10.1146/annurev-anthro-102313-030424>.
- Goldenberg, David, Mariano Russo, Kenneth Houser, Henry Crist, Jonathan B. Derr, Vonn Walter, Joshua I. Warrick, Kathryn E. Sheldon, James Broach, and Darrin V. Bann. 2017. “Altered Molecular Profile in Thyroid Cancers from Patients Affected by the Three Mile Island Nuclear Accident: Altered Molecular Profile in Thyroid Cancer.” *The Laryngoscope* 127 (July): S1–9. <https://doi.org/10.1002/lary.26687>.
- Goldhaber, M. K., G. K. Tokuhata, E. Digon, G. G. Caldwell, G. F. Stein, G. Lutz, and D. Gur. 1983. “The Three Mile Island Population Registry.” *Public Health Reports (Washington, D.C.: 1974)* 98 (6): 603–9.
- Goodwin, Michael. 1980. “New York Nuclear Plant Supervisor Barred for an Alleged Lie on Safety; Utility Can Appeal Order UTILITY AIDE BARRED FROM NUCLEAR ROLE How Fine Was Figured Promoted to Superintendent ‘Security Violation’ Recalled.” *New York Times*, November 28, 1980, sec. A-1. TimesMachine.
- Gould, Jay M., Ernest J. Sternglass, Janette D. Sherman, Jerry Brown, William McDonnell, and Joseph J. Mangano. 2000. “STRONTIUM-90 IN DECIDUOUS TEETH AS A FACTOR IN EARLY CHILDHOOD CANCER.” *International Journal of Health Services* 30 (3): 515–39.
- GPU Nuclear. n.d. *Simulated Uranium Pellet*.
- Gramsci, Antonio. 1971. *Selections from the Prison Notebooks of Antonio Gramsci*. Repr. London: Lawrence & Wishart.

- Günel, Gökçe, Saiba Varma, and Chika Watanabe. 2020. "A Manifesto for Patchwork Ethnography." *Cultural Anthropology. Member Voices* (blog). June 9, 2020. <https://culanth.org/fieldsights/a-manifesto-for-patchwork-ethnography>.
- Gupta, Akhil. 2018. "The Future of Ruins: Thoughts on the Temporality of Infrastructure." In *The Promise of Infrastructure*, 62–79. A School for Advanced Research Advanced Seminar. Durham: Duke University Press.
- Guyer, Jane I. 2007. "Prophecy and the near Future: Thoughts on Macroeconomic, Evangelical, and Punctuated Time." *American Ethnologist* 34 (3): 409–21. <https://doi.org/10.1525/ae.2007.34.3.409>.
- Hamblin, Jacob Darwin. 2007. "'A Dispassionate and Objective Effort': Negotiating the First Study on the Biological Effects of Atomic Radiation." *Journal of the History of Biology* 40 (1): 147–77. <https://doi.org/10.1007/s10739-005-6531-8>.
- Haraway, Donna Jeanne. 1985. *Simians, Cyborgs, and Women: The Reinvention of Nature*. New York: Routledge.
- . 2016. *Staying with the Trouble: Making Kin in the Chthulucene*. Experimental Futures: Technological Lives, Scientific Arts, Anthropological Voices. Durham: Duke University Press.
- Hatch, M C, S Wallenstein, J Beyea, J W Nieves, and M Susser. 1991. "Cancer Rates after the Three Mile Island Nuclear Accident and Proximity of Residence to the Plant." *American Journal of Public Health* 81 (6): 719–24. <https://doi.org/10.2105/AJPH.81.6.719>.
- Hecht, Gabrielle. 2009. *The Radiance of France: Nuclear Power and National Identity after World War II*. Inside Technology. Cambridge, Mass: MIT Press.
- Hutner, Heidi, dir. 2022. *Radioactive: The Women of Three Mile Island*. Three Mile Island Productions.
- Iglesias, Maria Laura, Angelica Schmidt, Abir Al Ghuzlan, Ludovic Lacroix, Florent de Vathaire, Sylvie Chevillard, and Martin Schlumberger. 2017. "Radiation Exposure and Thyroid Cancer: A Review." *Archives of Endocrinology and Metabolism* 61 (2): 180–87. <https://doi.org/10.1590/2359-3997000000257>.
- "Introduction to Reactor Technology - PWR: Chapter 1.0 Introduction to Pressurized Water Reactor Systems." n.d. Rev 0408. Human Resources Training and Development: Nuclear Regulatory Commission. Accessed January 11, 2023. <https://www.nrc.gov/docs/ML1215/ML12159A222.pdf>.
- Jack, Caroline, and Stephanie Steinhardt. 2014. "Atomic Anxiety and the Tooth Fairy: Citizen Science in the Midcentury Midwest." Blog. *The Appendix* (blog). November 26, 2014. <https://theappendix.net/issues/2014/10/atomic-anxiety-and-the-tooth-fairy-citizen-science-in-the-midcentury-midwest>.

- Jackson, Mark. 2013. *The Age of Stress: Science and the Search for Stability*. 1st ed. Oxford: Oxford University Press.
- Jacoby, Mitch. 2020. "US Has over 90,000 Metric Tons of Nuclear Waste, the Highest Amount of Any Country in the World." *Chemical & Engineering News* 98 (12). <https://cen.acs.org/environment/pollution/nuclear-waste-pile/scientists-look-for-best/98/i12>.
- Jaczko, Gregory B. 2019. *Confessions of a Rogue Nuclear Regulator*. New York: Simon & Schuster.
- Jain, Sarah Lochlann. 2007. "Living in Prognosis: Toward an Elegiac Politics." *Representations* 98 (1): 77–92. <https://doi.org/10.1525/rep.2007.98.1.77>.
- Jefferson, Alexis. n.d. "Hurricane Agnes." *Middletown Public Library* (blog). <https://middletownpubliclib.org/hurricane-agnes/>.
- Kafer, Alison. 2013. *Feminist, Queer, Crip*. Bloomington, Indiana: Indiana University Press.
- Kalckar, Herman M. 1958. "An International Milk Teeth Radiation Census." *Nature* 182 (4631): 283–84. <https://doi.org/10.1038/182283a0>.
- Kemeny, John G., and et al. 1979a. "Staff Report to The President's Commission on The Accident at Three Mile Island: The Report of the Public's Right to Information Task Force."
- . 1979b. "Report of the President's Commission on the Accident at Three Mile Island: The Need for Change: The Legacy of TMI."
- Kemp, Scott. 2020. "Radioactive Waste." Massachusetts Institute of Technology, October 15.
- Kessler, Charles H. 1968a. "Work Begins at Three-Mile Island." *Lancaster New Era*, February 24, 1968. LNP Media Group.
- . 1968b. "Land of Giants at 3-Mile Island." *Lancaster New Era*, December 12, 1968. LNP Media Group.
- Kikuchi, Shoichi, Nancy D. Perrier, Philip Ituarte, Allan E. Siperstein, Quan-Yang Duh, and Orlo H. Clark. 2004. "Latency Period of Thyroid Neoplasia After Radiation Exposure." *Annals of Surgery* 239 (4): 536–43. <https://doi.org/10.1097/01.sla.0000118752.34052.b7>.
- Kirmayer, Laurence. 1992. "The Body's Insistence on Meaning: Metaphor as Presentation and Representation in Illness Experience." *Medical Anthropology Quarterly* 6 (4): 323–46.
- Kleinman, Arthur. 1988. *The Illness Narratives: Suffering, Healing, and the Human Condition*. New York: Basic Books.
- . 2010. "Four Social Theories for Global Health." *The Lancet* 375 (9725): 1518–19. [https://doi.org/10.1016/S0140-6736\(10\)60646-0](https://doi.org/10.1016/S0140-6736(10)60646-0).

- Kuchinskaya, Olga. 2014. *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl*. Infrastructures Series. Cambridge, Massachusetts: The MIT Press.
- Lambek, Michael, ed. 2010. *Ordinary Ethics: Anthropology, Language, and Action*. 1st ed. New York: Fordham University Press.
- Lamis, Renée M. 2009. *The Realignment of Pennsylvania Politics since 1960: Two-Party Competition in a Battleground State*. University Park, Pa: Pennsylvania State University Press.
- Larkin, Brian. 2013. "The Politics and Poetics of Infrastructure." *Annual Review of Anthropology* 42 (1): 327–43. <https://doi.org/10.1146/annurev-anthro-092412-155522>.
- , ed. 2018. "Promising Forms: The Political Aesthetics of Infrastructure." In *The Promise of Infrastructure*, 175–202. A School for Advanced Research Advanced Seminar. Durham: Duke University Press.
- Lenzen, Manfred. 2008. "Life Cycle Energy and Greenhouse Gas Emissions of Nuclear Energy: A Review." *Energy Conversion and Management* 49 (8): 2178–99. <https://doi.org/10.1016/j.enconman.2008.01.033>.
- Lepselter, Susan. 2016. *The Resonance of Unseen Things: Poetics, Power, Captivity, and UFOs in the American Uncanny*. Ann Arbor, MI: University of Michigan Press. <https://doi.org/10.3998/mpub.7172850>.
- Lesutis, Gediminas. 2022. "Disquieting Ambivalence of Mega-Infrastructures: Kenya's Standard Gauge Railway as Spectacle and Ruination." *Environment and Planning D: Society and Space* 40 (5): 941–60. <https://doi.org/10.1177/02637758221125475>.
- Lewis, S.L., and M.A. Maslin. 2015. "Defining the Anthropocene." *Nature*, no. 519: 171–80.
- Lie, Merete, and Knut H. Sørensen. 1996. "Making Technology Our Own?: Domesticating Technology Into Everyday Life." *Art*, November.
- Maag, Christopher. 2019. "Investors See Huge Profits from Old Nuclear Plants, but It Could Cost Taxpayers." *NorthJersey*, June 19, 2019. <https://www.northjersey.com/story/news/watchdog/2019/06/19/nuclear-plant-decommissioning-holtec-other-firms-see-profit/1456809001/>.
- Macleod, Gordon. 1982. "A Role for Public Health in the Nuclear Age." *American Journal of Public Health* 72 (3): 237–39.
- Malone, T.B., M. Kirkpatrick, K. Mallory, D. Eike, J.H. Johnson, and R.W. Walker. 1980. "Human Factors Evaluation of Control Room Design and Operator Performance at Three Mile Island-2." NUREG/CR-1270. Nuclear Regulatory Commission.

- Mangan, Brian, P. 2012. "Significant Increasing Trend in Susquehanna River Water Temperature 1974-2010." Ecology III, Inc. and King's College Environmental Program. <https://www.nrc.gov/docs/ML1218/ML12187A053.pdf>.
- Marx, Karl. 1981. *Capital: A Critique of Political Economy*. Translated by Ben Fowkes. V. 1: Penguin Classics. London ; New York, N.Y: Penguin Books in association with New Left Review.
- Masco. 2015. "The Age of Fallout." *History of the Present* 5 (2): 137. <https://doi.org/10.5406/historypresent.5.2.0137>.
- Masco, Joseph. 2006. *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico*. Princeton, N.J: Princeton University Press.
- . 2014. *The Theater of Operations: National Security Affect from the Cold War to the War on Terror*. Durham: Duke University Press.
- . 2021. *The Future of Fallout, and Other Episodes in Radioactive World-Making*. Durham: Duke University Press.
- McGurty, Eileen Maura. 2007. *Transforming Environmentalism: Warren County, PCBs, and the Origins of Environmental Justice*. New Brunswick, N.J: Rutgers University Press.
- Mitchell, M. X. 2021. "The Cosmology of Evidence: Suffering, Science, and Biological Witness After Three Mile Island." *Journal of the History of Biology* 54 (1): 7–29. <https://doi.org/10.1007/s10739-021-09627-8>.
- Mobilia, Michael. 2017. "Today in Energy." *U.S. Energy Information Administration* (blog). April 27, 2017. <https://www.eia.gov/todayinenergy/detail.php?id=30972>.
- Moderator. 2012. "What Is a Reactor Trip and How Does It Protect the Plant?" *US NRC Blog* (blog). December 28, 2012. <https://public-blog.nrc-gateway.gov/2012/12/28/what-is-a-reactor-trip-and-how-does-it-protect-the-plant/>.
- Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice*. Science and Cultural Theory. Durham: Duke University Press.
- Muehlebach, Andrea, and Nitzan Shoshan. 2012. "Post-Fordist Affect: Introduction." *Anthropological Quarterly* 85 (2): 317–43. <https://doi.org/10.1353/anq.2012.0030>.
- Murphy, Michelle. 2006. *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers*. Durham [N.C.]: Duke University Press.
- . 2013. "Distributed Reproduction, Chemical Violence, and Latency." *Scholar & Feminist Online* 11 (3).

- . 2017a. “Alterlife and Decolonial Chemical Relations.” *Cultural Anthropology* 32 (4): 494–503. <https://doi.org/10.14506>.
- . 2017b. *The Economization of Life*. Durham ; London: Duke University Press.
- Nash, Linda Lorraine. 2006. *Inescapable Ecologies: A History of Environment, Disease, and Knowledge*. Berkeley: University of California Press.
- New York Times*. 1957. “MILK RADIO ACTIVITY UP; A.E.C. Aide Reports Increase of Strontium-90 Level,” April 25, 1957.
- Nixon, Rob. 2013. *Slow Violence and the Environmentalism of the Poor*. 1. Harvard Univ. Press paperback ed. Cambridge, Mass.: Harvard Univ. Press.
- “Nuclear Waste Disposal.” 2022. U.S. Government Accountability Office. 2022. [https://www.gao.gov/key\\_issues/disposal\\_of\\_highlevel\\_nuclear\\_waste/issue\\_summary](https://www.gao.gov/key_issues/disposal_of_highlevel_nuclear_waste/issue_summary).
- Petchesky, Rosalind Pollack. 1987. “Fetal Images: The Power of Visual Culture in the Politics of Reproduction.” *Feminist Studies* 13 (2): 263. <https://doi.org/10.2307/3177802>.
- Petryna, Adriana. 2013. *Life Exposed: Biological Citizens after Chernobyl*. Princeton, NJ: Princeton University Press.
- . 2018. “Wildfires at the Edges of Science: Horizioning Work amid Runaway Change.” *Cultural Anthropology* 33 (4): 570–95. <https://doi.org/10.14506/ca33.4.06>.
- Reiss, Louise Zibold. 1961. “Strontium-90 Absorption by Deciduous Teeth.” *American Association for the Advancement of Science* 134 (3491): 1669–1773.
- Richman, Alan. 1979. “Radiation Overdose: All in a Day’s Work.” *New York Times*, April 4, 1979, sec. A.
- Roberts, Celia. 2007. *Messengers of Sex: Hormones, Biomedicine, and Feminism*. Cambridge Studies in Society and the Life Sciences. Cambridge ; New York: Cambridge University Press.
- Roberts, Elizabeth F. S. 2017. “What Gets Inside: Violent Entanglements and Toxic Boundaries in Mexico City.” *Cultural Anthropology* 32 (4): 592–619. <https://doi.org/10.14506/ca32.4.07>.
- Ropeik, David. 2017. “Fear of Radiation Is More Dangerous than Radiation Itself.” *Aeon* (blog). July 5, 2017. <https://aeon.co/ideas/fear-of-radiation-is-more-dangerous-than-radiation-itself>.
- Schmid, Sonja D. 2015. *Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry*. Inside Technology. Cambridge, Massachusetts: The MIT Press.

- Schmitt, R.C., G.J. Quinn, and M.J. Tyacke. 1993. "Historical Summary of the Three Mile Island Unit 2 Core Debris Transportation Campaign." DOE/ID-10400. Department of Energy.
- Seaborg, Glenn T. 1970. "Our Nuclear Future — 1995." *Bulletin of the Atomic Scientists* 26 (6): 7–14. <https://doi.org/10.1080/00963402.1970.11457819>.
- Selye, Hans. 1936. "A Syndrome Produced by Diverse Nocuous Agents." *Nature* 138 (3479): 32–32. <https://doi.org/10.1038/138032a0>.
- Shapiro, Nicholas. 2015. "Attuning to the Chemosphere: Domestic Formaldehyde, Bodily Reasoning, and the Chemical Sublime." *Cultural Anthropology* 30 (3): 368–93. <https://doi.org/10.14506/ca30.3.02>.
- Silverstone, Roger, Eric Hirsch, and David Morley. 1992. "Information and Communication Technologies and the Moral Economy of the Household." In *Consuming Technologies: Media and Information in Domestic Spaces*. London: Routledge.
- Singer, Merrill. 2011. "Down Cancer Alley: The Lived Experience of Health and Environmental Suffering in Louisiana's Chemical Corridor: Experience of Health and Environmental Suffering." *Medical Anthropology Quarterly* 25 (2): 141–63. <https://doi.org/10.1111/j.1548-1387.2011.01154.x>.
- Singham, Nancy, and Stefi Weisburd. n.d. "Beata Tsosie-Peña." *Land Witness Project* (blog). <https://www.landwitnessproject.com/beata-tsosie-pena>.
- Smith, Aileen Mioko. 1989. "Three Mile Island: The People's Testimony." TMI Alert Archives. [https://www.tmia.com/sites/tmia.com/files/890327\\_TMI\\_Testament.pdf](https://www.tmia.com/sites/tmia.com/files/890327_TMI_Testament.pdf).
- Smith Herrnstein, Barbara. 1968. *Poetic Closure: A Study of How Poems End*. Chicago: University of Chicago press.
- Smith, Theodore. 2021. "U.S. NUCLEAR REGULATORY COMMISSION'S ANALYSIS OF EXELON'S DECOMMISSIONING FUNDING STATUS REPORT FOR THREE MILE ISLAND NUCLEAR STATION, UNIT 1, DOCKET NO 50-289," December 8, 2021. Nuclear Regulatory Commission. <https://www.nrc.gov/docs/ML2134/ML21342A154.pdf>.
- Stalnecker, Ashely. 2021. "Contract Worker Killed in Three Mile Island Accident Identified as Alabama Man." *LNP*, September 16, 2021. [https://lancasteronline.com/news/regional/contract-worker-killed-in-three-mile-island-accident-identified-as-alabama-man/article\\_947391ca-1723-11ec-b8a6-57b557a1b1ca.html](https://lancasteronline.com/news/regional/contract-worker-killed-in-three-mile-island-accident-identified-as-alabama-man/article_947391ca-1723-11ec-b8a6-57b557a1b1ca.html).
- Standerfer, E.R. 1986. "TMI-2 Cleanup Program: Post-Defueling Monitored Storage." GPU Nuclear Corporation. <https://www.nrc.gov/docs/ML2021/ML20214S448.pdf>.

- Stencel, Mark. 1999. "A Nuclear Nightmare in Pennsylvania: 20 Years Later." *Washington Post*, March 27, 1999. <https://www.washingtonpost.com/wp-srv/national/longterm/tmi/stories/ch10.htm>.
- Stephens, Sharon. 1997. "Nationalism, Nuclear Policy, and Children in Cold War America." *Childhood* 4 (1): 103–23.
- Sternglass, Earnest. 1980. "Infant Mortality Changes Following the Three Mile Island Accident." In . Tel-Aviv, Israel. [https://atomichistory.files.wordpress.com/2009/09/sternglass\\_infantmortalitytmi.pdf](https://atomichistory.files.wordpress.com/2009/09/sternglass_infantmortalitytmi.pdf).
- Sternglass, Ernest J. 1981. *Secret Fallout: Low-Level Radiation from Hiroshima to Three Mile Island*. 1st McGraw-Hill paperback ed. McGraw Hill Paperbacks. New York: McGraw-Hill.
- Stevenson, Lisa. 2014. *Life beside Itself: Imagining Care in the Canadian Arctic*. Oakland, California: University of California Press.
- Stewart, Kathleen. 1988. "Nostalgia- A Polemic." *Cultural Anthropology* 3 (3): 227–41.
- . 1996. *A Space on the Side of the Road: Cultural Poetics in an "Other" America*. Princeton: Princeton University Press.
- . 2012. "PRECARITY'S FORMS." *Cultural Anthropology* 27 (3): 518–25. <https://doi.org/10.1111/j.1548-1360.2012.01157.x>.
- Stoler, Ann Laura. 2008. "IMPERIAL DEBRIS: Reflections on Ruins and Ruination." *Cultural Anthropology* 23 (2): 191–219. <https://doi.org/10.1111/j.1548-1360.2008.00007.x>.
- Stranahan, Susan Q. 1993. *Susquehanna, River of Dreams*. Baltimore: Johns Hopkins University Press.
- Strathern, Marilyn. 1992. *Reproducing the Future: Essays on Anthropology, Kinship, and the New Reproductive Technologies*. New York: Routledge.
- Stromberg, Joseph. 2014. "Do You Live Within 50 Miles of a Nuclear Power Plant?" *Smithsonian Magazine* (blog). March 13, 2014. <https://www.smithsonianmag.com/science-nature/do-you-live-within-50-miles-nuclear-power-plant-180950072/>.
- Sutherland, John, dir. 1953. *A Is for Atom*. General Electric Company. <https://archive.org/details/isforAto1953>.
- Taussig, Karen-Sue, Klaus Hoeyer, and Stefan Helmreich. 2013. "The Anthropology of Potentiality in Biomedicine: An Introduction to Supplement 7." *Current Anthropology* 54 (S7): S3–14. <https://doi.org/10.1086/671401>.

- The Sunday News*. 1968. "Plant Construction Defacing Centuries-Old 3-Mile-Isle," March 10, 1968. LNP Media Group.
- "The TMI-2 Cleanup: Challenging and Successful." 2012. *American Nuclear Society* (blog). July 11, 2012. <https://ans.org/pi/resources/sptopics/tmi/cleanup.php>.
- Thompson, Charis. 2007. *Making Parents: The Ontological Choreography of Reproductive Technologies*. Inside Technology. Cambridge, Mass.: MIT Press.
- Thompson, Charles. 2022. "Damaged Three Mile Island Reactor Gets a New Corporate Parent." *Pennlive Patriot News*, June 2, 2022. <https://www.pennlive.com/news/2022/06/damaged-three-mile-island-reactor-gets-a-new-corporate-parent.html>.
- Thornburgh, Dick. 2003. *Where the Evidence Leads: An Autobiography*. Pittsburgh, Pa: University of Pittsburgh Press.
- "Three Mile Island - Unit 2." 2022. Nuclear Regulatory Commission. <https://www.nrc.gov/info-finder/decommissioning/power-reactor/three-mile-island-unit-2.html>.
- Tokuhata, George. 1984. "Three Mile Island Nuclear Accident and Its Effect on the Surrounding Population." Pennsylvania Department of Health. Nuclear Regulatory Commission. <https://www.nrc.gov/docs/ML2013/ML20133C790.pdf>.
- Tsing, Anna Lowenhaupt. 2015. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton Oxford: Princeton University Press.
- U.S. Joint Chiefs of Staff. 1946. "The Evaluation of the Atomic Bomb as Military Weapon: The Final Report of the Joint Chiefs of Staff Evaluation Board for Operation Crossroads." JCS/1691/7. National Archives.
- Vizenor, Gerald Robert, ed. 2008. *Survivance: Narratives of Native Presence*. Lincoln: University of Nebraska Press.
- Walker, Carter. 2021. "A Group of Notorious White Nationalists Met Secretly in Historic Lancaster County Barn in 2020. Why Here?" *LNP*, October 30, 2021. [https://lancasteronline.com/news/politics/a-group-of-notorious-white-nationalists-met-secretly-in-historic-lancaster-county-barn-in-2020/article\\_a2c7e89e-38e2-11ec-acc4-9f81d84dc505.html](https://lancasteronline.com/news/politics/a-group-of-notorious-white-nationalists-met-secretly-in-historic-lancaster-county-barn-in-2020/article_a2c7e89e-38e2-11ec-acc4-9f81d84dc505.html).
- Walker, J. Samuel. 2005. *Three Mile Island: A Nuclear Crisis in Historical Perspective*. Berkeley: University of California Press.
- Wang, X.-S., M. E. G. Armstrong, B. J. Cairns, T. J. Key, and R. C. Travis. 2011. "Shift Work and Chronic Disease: The Epidemiological Evidence." *Occupational Medicine* 61 (2): 78–89. <https://doi.org/10.1093/occmed/kqr001>.

- Warner, Michael. 2014. "Public/Private." In *Critical Terms for the Study of Gender*, edited by Catharine R. Stimpson and Gilbert H. Herdt, 358–92. Chicago ; London: The University of Chicago Press.
- Wellock, Tom. 2016. "REFRESH--Putting the Axe to the 'Scram' Myth." *US NRC Blog* (blog). February 18, 2016. <https://public-blog.nrc-gateway.gov/2016/02/18/refresh-putting-the-axe-to-the-scram-myth/>.
- Weston, Kath. 2016. *Animate Planet: Making Visceral Sense of Living in a High-Tech Ecologically Damaged World*. Duke University Press. <https://doi.org/10.1215/9780822373827>.
- Williams, E D, A Abrosimov, T Bogdanova, E P Demidchik, M Ito, V LiVolsi, E Lushnikov, et al. 2004. "Thyroid Carcinoma after Chernobyl Latent Period, Morphology and Aggressiveness." *British Journal of Cancer* 90 (11): 2219–24. <https://doi.org/10.1038/sj.bjc.6601860>.
- Wing, S, D Richardson, D Armstrong, and D Crawford-Brown. 1997. "A Reevaluation of Cancer Incidence near the Three Mile Island Nuclear Plant: The Collision of Evidence and Assumptions." *Environmental Health Perspectives* 105 (1): 52–57. <https://doi.org/10.1289/ehp.9710552>.
- Wing, Steve. 2008. "Objectivity and Ethics in Environmental Health Science." *Environmental Health Perspectives* 111 (14): 1809–18.
- Wool, Zoë H., and Julie Livingston. 2017. "Collateral Afterworlds." *Social Text* 35 (1): 1–15. <https://doi.org/10.1215/01642472-3727960>.
- Wool, Zoë Hamilton. 2015. *After War: The Weight of Life at Walter Reed*. Critical Global Health. Durham: Duke University Press.
- Yuhas, Gregory, and Owen Shackleton. 1979. "IE TMI Investigation Interview of Edward W. Houser Chemistry Foreman." Interview Transcript 263. TMI Investigation Interview. Trailer #203, NRC Investigation Site, TMI Nuclear Power Plant, Middletown, PA: NRC. US Nuclear Regulatory Commission. <https://www.nrc.gov/docs/ML1924/ML19249B027.pdf>.
- Zaretsky, Natasha. 2018. *Radiation Nation: Three Mile Island and the Political Transformation of the 1970s*. New York: Columbia University Press.
- Ziats, John, and Nancy Avolese. n.d. "Mansions on the Hill." *Lower Swatara Township Historic Preservation* (blog). <https://www.lsthistoricpreservation.org/mansions-on-the-hill-1>.