

Trope of Containment: Shale Oil, Risk Rhetoric, and the Lac-Mégantic Disaster

A Dissertation

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## Abstract

My fieldwork was located in Lac-Mégantic, Québec, where a train carrying Bakken shale oil derailed on July 6, 2013 causing a pool fire that killed 47 people. The evacuation of 2,000 residents was a catalyst for public discourse on hazmat-by-rail in North America. This study combines participant observation and oral history with a critical examination of rhetoric used in response to shale oil transportation, neoliberal capitalism, environmental justice, and discourses on sustainability. There have been 26 hazmat derailments since 2013, which occurred despite regulatory fixes, and demonstrate what I call a trope of containment. When rail accidents happen, public safety knowledge is strategically contained to myopic risk frames that benefit industry. My hope is that survivor stories can offer oppositional narratives to the transportation of hydrocarbons along a rail network that sustains itself through regulatory capture.

This project also examines relationships between fracking, climate change, and violence created by the production of fossil fuels. My goal is to demonstrate the failures that occur when containment strategies are institutionalized as a safety-based ideology. Secondly, critical pedagogical opportunities exist through an unmasking of rhetoric used to sustain a carbon economy, which works to delay alternative energy solutions to global warming. Included are research opportunities that can fill policy voids left by states with limited funds linking public safety to community education.

*Keywords:* oil-by-rail, hazmat, shale oil, rhetoric, climate change, and public safety

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## Chapter 1: Introduction

Every day fossil fuels are transported through the heart of America's towns and cities. Even though 1,500 oil trains cross the continent during peak years, their environmental footprint remains largely unseen. This movement and burning of hydrocarbons is constant, but public visibility on their impact is poor—until an accident occurs. The night of July 6, 2013 ruptured the silent passing of shale oil, and brought the deadliest explosive train derailment of the 21st century to North America. The disaster occurred in Lac-Mégantic, where 6,000 residents live in a rural township of Québec, Canada. At 1 a.m., on a serene summer night, a unit train composed entirely of 72 oil tanker cars derailed in the heart of town killing 47 people—some of whom died asleep in their beds. The explosion created a wave of burning oil, which trapped residents fleeing the town's main street. Ten were incinerated while running toward the lake, leaving nothing but charred husks of their calcined remains. A resident who stood on the lakeshore one kilometer away told me, "We had the impression that the whole sky was on fire" (M. Lassard, personal communication, July 5, 2017). The accident turned the downtown area into a "charred dead zone stretching across blocks" (Wells & Hutchins, 2013, para. 3). The impact that one oil train could have on a city with a low population density was staggering. Roughly 2,000 residents were evacuated that night, 169 people became homeless, 44 buildings were demolished, 27 children were orphaned, and four years later the historic downtown area remains a gravel filled dead zone ("Lac-Mégantic," 2015).

A large number of the victims were patrons of Yannick Gagne's Musi-Café, a popular restaurant and bar where local musicians had just finished a set. The building sat

next to an intersection where the railroad track made its first turn in town, and was the epicenter of the derailment. Seconds after the explosion, one of Gagne's servers called him while running from the restaurant, yelling, "Downtown is on fire. Your café is burning. There are so many people here!" (Wells & Hutchins, 2013, para. 6). Gagne's family lived just up the street, and he ran to his place of business to be stopped short by what he described as "a wall of fire—200 or 300 feet high. There was nothing, nothing, nothing. The kids were crying. I was crying too" (para. 6). Of the many shocking outcomes of this event, the foremost was a lack of awareness about the risks contained by shale oil trains. When Tom Harding, the train's engineer, called his dispatcher to report the explosion, he was completely unaware that the train he had recently parked was the cause of the accident. He assumed the fire was from propane tanks housed at the local railyard (Finnis, 2014). For a sense of scale, the accident train carried the equivalent volume of 28 Boeing 747 airliners with full fuel tanks. I like this analogy because the amount of oil released by the train's tank cars (5.5 million liters) has a flashpoint similar to jet fuel. A single oil tanker can release 100 tons of flammable liquid "with a density similar to kerosene or gas oil," which creates a fireball approximately 656 feet wide with a 20 second duration (Noll & Hildebrand, 2016, p. 10). The fire was so intense that it was impossible to extinguish and became a contained burn through the entire weekend. This disaster transformed the town into what one resident described as "a ghetto" (Partriquin, 2014, para. 4). In the wake of the accident, what was once an active community became a hushed shadow of its former self.

From a public safety standpoint, very few of the town's residents knew that shale oil was being carried by Montreal, Maine & Atlantic Railway (MMA), twice daily,

through the middle of their business district. They obviously saw the trains and tanker cars, but public education and awareness of the volatility of shale oil is a complicated matter. One of my discoveries is that government agencies are failing to properly inform at-risk communities about hazmat. Their education dollars are focused primarily on natural hazards like tornados, earthquakes, and forest fires. For example, many of the Musi-Café patrons made a critical mistake that night by sheltering in place. The initial vibrations from the derailment, which happened one block over, was misperceived as a natural phenomenon. Gagne stated that they "thought they would hide inside—maybe under a table—thinking it was an earthquake" (Wells & Hutchins, 2013, para. 7). Those who sheltered in place died in a massive pool fire. The bar's patrons who were outside, having a smoke break, were able to run from the fire and toxic cloud. Had residents been more aware of the hazards within their community, it is possible that more of them could have escaped.

If the loss of 47 lives was due to an Act of God, the citizens of Lac-Mégantic (LM) would have been better prepared to deal with the aftermath. Unfortunately, hazardous materials (hazmat) accidents are a guaranteed outcome of industrialization. The following chapters will be grim, but the most disturbing parts are not the accidents. My focus will be on the consistent pattern of government response to critical public safety issues involving evacuations. Specifically, the rail industry and its regulators actively work to contain knowledge about the volatility of shale oil to private and technical spheres. The concept of education for these agencies is not driven by transparent behavior, but through an internal process that leaves at-risk communities in the dark and fending for themselves.

A trope of containment describes business-as-usual practices, which function through regulatory capture, while manufacturing myopic public perceptions on environmental risk. It actively works to neutralize threats to industry, and thus sustains the status quo for capital. When a large-scale accident occurs, discourse often becomes contained to predetermined interpretations on public safety. Containment is based on an empirical belief in the prediction, management, and control of public hazards. This process was cultivated during the Cold War, which normalized how agencies manage threats to population centers. Therefore, rhetorical strategies to shield the public were institutionalized and became cyclical. If I could hand an investigator a containment checklist, it would include following questions:

- Is there a **narrative fiction** shaping how the public perceives risk?
- Is there a contentious **public debate** on those risks?
- Does the **framing** of the accident benefit a carbon economy?
- Is secrecy or **private knowledge** at stake?
- Will government **agency** be contained by market pressure?
- Would **regional** or **localized** knowledge change policy?
- Is there evidence of **slippage** where safety proposals revert to the status quo?

These major themes demonstrate a culture of containment, where ideology confines risk to a cost-benefit mode of analysis. Typically, accident outcomes that threaten the status quo are discursively managed to reinforce an ideology of containment.

Case in point is the Lac-Mégantic tragedy, which demonstrates all of the major themes. It was an apex event for hazmat-by-rail safety regulation, yet it did nothing to slow the movement of shale oil. According to the Association of American Railroads (AAR), crude oil volumes on Class I railroads rose from 9,500 carloads in 2008 to 493,146 in 2014. Visibility from the Lac-Mégantic accident also did nothing to slow

production. The next year saw the highest volume of oil-by-rail in North America with 540,383 carloads shipped during 2014 (AAR, 2018). The LM event started my five-year study of oil-by-rail accidents, and I began my investigation based on the idea that the tragedy was preventable. While this is technically true, I have come to the conclusion that lives lost fall under an industry standard of "acceptable risk" (Jonkman, van Gelder, & Vrijling, 2003). This concept embodies a market logic that "depend[s] upon how the costs and benefits are calculated" (Brownsword, 2001, p. 583) by a deregulated industry that has "low probabilities of accidents, where costs of precaution and accidents can be large, [but] a major challenge for regulators is to identify whether safety practices meet the acceptable risk threshold" (Burton & Egan, 2011, p. 568). The idea of acceptable risk as an ethical argument is outrageous. No person's life is worth a barrel of oil, even if an accountant could somehow justify human output based on a cost-benefit analysis. In theory, a person's total energy output over a standard lifetime can be measured and converted into barrels of oil equivalent energy (BOE). If a single life's total work output equals 136 BOE, by this logic there were 2,286 lifetimes of energy contained within 72 tanker cars of Bakken crude oil. This back-of-the-envelope calculation should make it obvious how ridiculous it is to measure the value of life. However, the demands of a carbon economy, described as "500 million years of buried sunshine" (Mitchel, 2013, para. 16), place regulators in a difficult position where they must balance between the poles of moral argument and market logic. It is in this gray area that the ideology of containment resides.

## **Oil-by-Rail Environments**

Oil train accidents represent a metaphorical collision, because hydrocarbons symbolically reside on the intersection between ethical choice and market necessity. The following section gives a brief overview of several critical themes I will examine throughout the dissertation. In most cases, the examples demonstrate some form of containment, be it material, discursive, spatial, etc. Chapter 2 is devoted to the roots of containment strategies, but before diving into the origins I want to preview areas where containment rhetoric can be found. Whenever I give a public talk about oil trains, I know that someone in the audience is going to ask about pipelines. Yes, pipelines are statistically safer than trains, and they contain oil to less visible realms, but fossil fuels have large-scale tradeoffs. Currently, pipelines carry 80% of the oil out of North Dakota (AAR, 2018, p. 3). In the wake of violence that came with the Keystone XL controversy, my answer on trains vs. pipelines is that I want neither. The best plan is for a future with zero spending on fossil fuel infrastructure. This makes people chuckle at my naiveté, but it does not mean stopping progress. Obstructing further development of the carbon economy is a life choice. Right now, climate change is killing and displacing millions of people. North America's oil advocates are a danger to at-risk communities, because the value of those lives is supplanted by the spot price for a barrel of oil. My hope is that increased visibility on oil-by-rail accidents can work to reduce North America's dependency on fossil fuels.

Global warming impacts are also in direct opposition to the oil and gas industry, which is what oil trains represent—an unlimited growth potential. The World Bank has plans to capitalize on climate change through "catastrophe bonds" (Jain, 2019), which are

based on their own research that 143 million people will be displaced by the year 2050 (Rigaud et al., 2018). There is a moral urgency in arguing for a carbon neutral world, and pushing the public to imagine a zero emissions future. Therefore, this dissertation is grounded in the values and frameworks of environmental communication. Oravec and Clarke (2004) define the discipline as

the study of the way we come to socially construct and know our natural world ... conceived of as perceptual lenses ... to guide our behavior within the environment. That is, how we talk about the land or nature creates and influences our interaction with it. For example, if we speak of the environment as a last frontier, something wild or to be feared, our policies, or actions will most likely be those that are defensive or exploitative.... Viewing the environment as something to be either aided or conquered justifies actions that can hurt or harm it. In the name of preservation or in the name of vindication, we affirm our mastery and control over the land. (p. 3)

To be clear, this was a critique—not a justification—for the ways in which human beings dominate the earth. The perspective of mastery is what pipelines affirm when rivers are displaced and natural resources become fungible commodities. The ideology of domination and control over nature is also clearly represented through the history of the railroads.

When hazardous materials transit vital waterways, this is a continued investment in the ideology of containment. Rail operators run under empiricism, which is a belief system grounded in prediction, management, and control. The idea of using science to control nature is based on "prediction and control, [which] reflects the world view of

logical empiricism" (Bochner, 1985, p. 39). This need manifests in the maintenance of the status quo for organizations, like the railroads and the oil and gas industry. Bochner (1985) stated that within this paradigm "preference is given to stability over change" (p. 39). When the U.S. transcontinental railroad met in Promontory Point, Utah, a golden spike was driven into the earth—symbolically plunging America into the 19th century.

The Chamber of Commerce of New York stated,

The new highway thus opened to man will not only develop the resources, extend the commerce, increase the power, exalt the dignity and perpetuate the unity of our Republic, but in its broader relations, as the segment of a world-embracing circle, directly connecting the nations of Europe with those of Asia, will materially facilitate the enlightened and advancing civilization of our age. ("East and West," 1869, para. 24)

That certainly was a prescient observation, but with a catch. What was part of the industrial revolution 150 years ago has now become a stable form of transportation and resource management. The famous golden spike lives on, and today's rail network is critical to getting North American crude to global markets. However, there is a problem with holding to old ways as climate change rapidly pushes civilization toward problems that require new and divergent thinking. For me, rail represents outdated modes of thinking, because locomotives still burn carbon and use pneumatic brakes, which is not fundamentally different from how they operated 150 years ago.

There are tradeoffs based on the routes that oil trains take, which often follow bodies of water. Once oil is released into an environment, it is always moving. The idea that a multi-car oil spill can be contained, especially when accidents happen near



waterways, is problematic. A protection of the commons, such as clean rivers and lakes, can become sacrificed in order for goods to reach markets by the most efficient path. Primary rail lines pass through protected wetlands and cross urban centers throughout much of North America. Each oil train brings with it the risk of fire, toxic smoke, evacuation, and water contamination. Since I began graduate work in 2011, there have been 31 major derailments. The federal government does not keep a detailed list of each accident, so I compiled data from various sources such as the NTSB, FRA, DOT, and city newspapers. Table 1 includes total car lengths, when possible, to show the fraction of cars which derailed or exploded. For example, the June 2016 Mosier, Oregon accident was a train with 94 oil cars of which 16 derailed into the Columbia River. Based on my research, there are an average of 5 significant derailments per year since Lac-Mégantic, with 3 out of 4 accidents requiring home evacuations. The following is a master list of cargo train derailments carrying hazardous materials (hazmat).

**Table 1. Hazmat derailments 2011-2018**

Date	Location	Cars	Cargo	Volume (gal)	Fire	Evac (pop)	River
June-18	Doon, IA	32	tar sand	230,000	yes	12	Rock
Aug-17	Hyndman, PA	32	propane		yes	800	
June-17	Boulder, CO	6	plastic			12	
March-17	Graettinger, IA	20/98		322,000	yes	10	Jack Creek
Nov-16	Ellendale, MN	22/146	propane			100	
Nov-16	Watertown, WI	15	crude	1,000		35	
June-16	Mosier, OR	16/94	crude	47,000	yes	100	Columbia
May-16	Heimdal, ND	6/107	crude	96,486		30	
March-16	Ripley, NY	16	ethanol	1,526		40	
Nov-15	Alma, WI	25	ethanol	20,413		100	
Sept-15	Lesterville, SD	7	ethanol	49,743			
July-15	Culbertson, MT	22/106	crude	27,201		30	
March-15	Gogama, ON	10/40	crude		yes		Mattagami

March-15	Galena, IL	6/105	crude	218,000	yes		Mississippi
Feb-15	Mount Carbon, WV	28/109	crude	378,034	yes	200	Kanawha
Feb-15	Gogama, ON	39/94	crude	360,000	yes		
May-14	LaSalle, CO	6/100	crude	7,932			South Platte
April-14	Lynchburg, VA	17/104	crude	29,868	yes	350	James
Feb-14	N. Vandergrift, PA	21/120	crude	9,800		12	
Jan-14	New Augusta, MS	18/85	fuel oil	25,450		50	
Jan-14	Philadelphia, PA	7/101	crude				Schuylkill
Jan-14	Plaster Rock, NB	17	crude	60,000	yes	45	
Dec-13	Cassleton, ND	21/106	crude	476,437	yes	1500	
Nov-13	Aliceville, AL	26/90	crude	630,000	yes	3	wetland
Oct-13	Gainford, Alberta	13/134	propane	100,000	yes	120	
July-13	Lac-Mégantic, QC	63/72	crude	1,600,000	yes	2000	Chaudière
March-13	Parkers Prairie, MN	14	crude	10,000			
August-12	Plevna, MT	17/106	ethanol	179,710	yes		
July-12	Columbus, OH	17/98	ethanol	54,748		100	
Oct-11	Tiskilwa, IL	26/131	ethanol	162,014	yes	800	
Feb-11	Arcadia, OH	32/60	ethanol	786,245	yes	20	

*Note.* List compiled from news sources and government data demonstrating frequency of hazmat derailments, fires, evacuations, and water impacts. This table is not exhaustive and there may be inconsistencies due to conflicting news reports. Total evacuations were 6,469 residents equaling 74% of derailments with water sources polluted 1 in 3 cases during this period.

I never bothered calculating the total cost in property damage from these spills.

From a safe drinking water standpoint, the Mount Carbon and Alma spills were particularly dangerous disruptions to public water utilities (Collins, 2015; Raby, 2015).

Diesel costs \$3 per gallon but the cleanup cost after a spill is \$400 per gallon of oil (DOT, 2017b, p. 56). For Lac-Mégantic, the initial cleanup cost surpassed \$400 million (Woods, 2015) and towns located downstream on the Chaudière River had their public

water services disrupted for six days (Millette, Gosselin, & Beliveau, 2014, p. 14). The total damage to plant and animal life have unknown costs. The oil and gas industry does not calculate biodiversity in their profit and loss statements. However, the railroads have budgets for containment equipment placed near bodies of water. The effectiveness of that equipment is debatable, particularly when severe weather is involved, as highlighted by the U.S. Department of Transportation's oil spill response plan (DOT, 2016b).

Rail has a history of repeating like-kind accidents. For instance, George Westinghouse invented air brakes for trains in 1886, but they were not adopted by the industry until an oil train collided with a passenger train killing 22 people (Musso, 2015). A similar narrative applies to certain regions, where disastrous rail accidents occur with a repeating theme. Due to its proximity to the Bakken shale formation, along with my local knowledge, a good deal of this dissertation will investigate Minnesota's efforts to increase rail safety—which can be traced back 100 years. The Cloquet Fire of 1918 was arguably the worst disaster to hit Minnesota. A raging wildfire was started by a passenger train, which sparked dry grass leading to the death of 453 people, the destruction of 30 towns, 4,000 homes, and 54,000 chickens (Roberts, 2007, p. 27). The railroad was held liable for the compensation of 52,371 people, which the state papers termed "refugees" (Carroll and Raiter, 1985). The initial caseload was a staggering 15,003 lawsuits, most of which were filed by local lawyers on a contingency basis that they would be paid up to 40% of awarded damages (p.7). Prior to the Cloquet Fire, liability was the responsibility of the federal government. The Supreme Court of Minnesota was logistically incapable of handling the caseload, and the state legislature passed a resolution sending the issue to the U.S. Congress, who then sent it to President

Harding, who then referred the case to the Railroad Administration (p. 11). In their summary of the initial three year legal process, Carroll and Raiter stated, "In the end, however, the Railroad Administration came forward with a 'take it or leave it' offer of 50 percent payment for the claims of all the Cloquet fire sufferers requiring the 278 people who had won their case to accept half of what the courts had already awarded them" (p. 13). However, the payment was held up by Congress for seventeen years because of the Great Depression (p. 21). After the Cloquet Fire, the Transportation Act of 1920 shifted liability back to private rail and set a precedent that has remained for 100 years (p. 8). The spoiler alert for this dissertation is that the railroads win nearly every case. Critical junctions for the freight network are located in Minnesota, and the state has a long history with rail. A good portion of my fieldwork occurred in the Twin Cities by participating at a series of civic meetings on rail safety. Those discussions have been fundamental to my framing of the contest between the private and public sphere. Chapters 5 and 6 will further explore contentious regulatory struggles between the federal and state governments over private rail interests.

To conclude this overview, let us come back to Lac-Mégantic (LM) and how containment applies to their story. Le Granit Region of Québec is entirely French speaking and comprises the Eastern Township, with the county seat being Lac-Mégantic. The remoteness and language barrier work as forms of containment. Pezzullo (2007) observed that "institutions tend to frame their narratives for tourists within discourses of safety and containment" (p. 4). Due to public spectacle and curiosity, industrial accident sites can become locations for toxic tours (Pezzullo, 2007) where disaster capitalism works to obstruct government regulation while profiting from tragedy (Klein, 2007).

These are elements of the trope of containment and have some connection to the LM story. Canadians make pilgrimages to LM, and the city is lobbying for a recreational convention center, but town guides told me they have not seen an organized tour in years. Busses are no longer bringing crowds to ogle at the ruined town center.

The most important signifier to the effectiveness of containment in LM is where the new rail line sits—exactly where it was before the accident. One of the first things communities want after a hazmat derailment is to move the tracks. If anyone had cause for a rail bypass it was Lac-Mégantic and that effort failed (Page, 2018a). The simple truth is that rail is always in someone's backyard, so it most often stays exactly where it has remained for a century. Lac-Mégantic is a prime study of how effectively containment works, because trains still roll through town and oil still moves through the region. Therefore, the story of hazmat-by-rail is more easily consigned to the technical sphere (Fraser, 1990) or areas of specialized knowledge. This is a case of industry winning the status quo, where resistance to fossil fuel hegemony was contained to the courts. The Lac-Mégantic historic train station was rebuilt and sits next to the original rail line, which was repaired before the main roads were even opened. Though the station is near the re-established rail line, it does not ferry passengers. The only way to get to LM is by vehicle, and there is no air or passenger rail service into town. What the train station does house are social workers who specialize in counseling for post-traumatic stress disorder (PTSD).

Some impacts are hard to measure after an industrial accident, but the volume of recovered fluids and contaminated earth is not. Millette et al. (2014) stated that the Lac-Mégantic cleanup site team "had to quickly determine the hydrocarbon migration routes

and the means to eliminate them" (p. 14). This is a seemingly innocuous statement until one discovers the various means in which Bakken shale oil can penetrate the fabric of life. In this case, there were 49,494,000 liters of oily water and oil (311,000 barrels) that were recovered and treated (p. 16). This meant that the town's sewer system had to be shuttered and rebuilt. The spill also contaminated 57,250 cubic meters of soil, which was initially stored in three large pits dug in the middle of the downtown area for future treatment (p. 16). The principle method for recovering soil contaminated with Bakken shale oil is to burn it in thermal desorption units (Sontag & Gebeloff, 2014). In a way, this does make sense. Oil is extracted to be burned in various forms such as engines, home heating, and the production of plastics. Therefore, when it spills during transport and contaminates the ground, the earth has to be burned. I am from California and the phrase "controlled burn" comes to mind, which is a common term in forestry management, but it is also a technique used in oil spill management (Gillespie et al., 2017, p. 10).

After the Lac-Mégantic release, the hardest to measure impact to the environment was the dispersion of oil across 120 kilometers of the Chaudière River. Inventories of fish were taken to evaluate the health of 30 different species, but the long-term effects are still unknown (Millette et al., 2014, p. 16). For comparison, 25 years after the *Exxon Valdez* oil spill it has been found that "only 13 of the 32 monitored wildlife populations, habitats and resource services that were injured in the spill [are] fully 'recovered' or 'very likely recovered'" (Holleman, 2014, para. 4). The total life-cycle disruptions as oil penetrates organisms up and down the food chain are immeasurable. In the Prince William Sound, bird populations that feed on marine species experienced chronic effects.

For example, "Elevated hydrocarbons in feces were measured in chicks living on oiled shorelines" among the black oystercatcher population, which are birds that can live over 15 years (Exxon, 2010, p. 12). It is important to remember that oil disasters shatter the balance of natural habitats. Gessner's (2011) investigation into the *Deepwater Horizon* spill examined the ripple effect on organisms like the periwinkle marsh snail, which are a cornerstone species critical to the equilibrium of that coastal wetland (p. 193). The Lac-Mégantic accident exists along a chain of disasters, where lessons in prevention should not be decoupled from the perpetual growth paradigm of a carbon economy.

Besides material containment, a goal of this study was to examine how the rhetoric of oil disasters works to contain resistant discourse. I won a Dunn Peace Research Scholarship to conduct fieldwork in Québec in June 2017, and Chapter 4 examines the relationship between oil and violence. The LM rail disaster is widely referenced by groups who work to change oil infrastructure in North America. It is nearly impossible to find a story on oil train derailments that does not mention Lac-Mégantic. Hazmat accidents should be used by environmental justice groups to unmask the containment strategies of Big Oil. My scholarship does parallel some of Pezzullo's work on Cancer Alley in Louisiana, and that area's relationship to the oil and gas industry. She stated, "Initially, my study of toxic tours led me to examine how they function rhetorically as creative or inventional acts of political dissent" (p. 8). However, I did not find organized resistance in LM. There are activists who operate as individuals, but the region was nothing like I imagined. What I found was a community that has been financially and psychologically broken through tragedy. Shohat and Stam (1996) stated, "The point is not merely to communicate sensations but rather to advance structural

understanding and promote change (as cited in Pezzullo, 2007, p. 43). Ethically, we all want to see some goodness come from tragedy. However, regulating the practices of privately owned industry is often an exercise in futility. Chapter 6 will examine the role of public discourse and groups working for civic transformation and awareness of hazmat-by-rail. Every chapter in this dissertation investigates public advocacy.

Unfortunately, I am not convinced that regulatory adjustments have the scope to prevent another Lac-Mégantic disaster. There has been incremental change since 2013, but to say that there has been fundamental change to improve public safety is an overstatement.

Democracy in North America functions through regulatory capture, whether it is by Big Oil or their predecessor the railroads. In the case of the national transportation network, industry profit has a history of triumphing over civic duty.

### **A Public Health Framework**

The guiding ethic of this scholarship is an interest in health and human safety. As I finished my bachelor's degree, I also became a licensed pilot and worked in aviation for a decade, ending my career as a regional airline captain. That experience was foundational for a health and public safety mindset, which is impossible for me to discount. I cannot look at transportation issues and ignore public safety. Therefore, I tried to leverage my professional experience with the federal airway network to think about parallel public safety issues in the national rail network. Second, even though this study is not directed at climate change, it is essential to link oil trains to global warming. The latest report from the Intergovernmental Panel on Climate Change (IPCC) makes it clear that a 1.5 °C threshold is necessary to keep the planet near its current ecological state. The United Nations recently lowered the global warming bar from 2.0°C to 1.5°C



due to scientific anxiety, or what the IPCC categorizes as "reasons for concern" (Oppenheimer, 2017). In particular, millions of coastal dwellers face extreme risks above the 1.5°C threshold. According to the IPCC, "Sea level rise will continue beyond 2100 even if global warming is limited to 1.5°C in the 21st century" (IPCC, 2018, p. 9). A misconception the public has is that climate change is reversible. It is important to realize that temperatures beyond a 1.5°C average lead to "irreversible loss of the Greenland ice sheet" (p. 9). The goal with the lower emissions cap is to slow the rate of sea level rise, in order to give civilization a chance to catch up with accelerating planetary change. The IPCC believes that "the slower rate of sea level rise at global warming of 1.5°C reduces these risks enabling greater opportunities for adaptation" (p. 9). However, nowhere in the document does the IPCC discuss death and dislocation from sea level rise. The threats they outline are saltwater intrusion, flooding, and infrastructure damage. What is disappointing is that summary documents written for policy makers are not overwhelmingly clear on the health impacts of climate change. The same can be said for oil-by-rail policy statements. Oil train derailments are a relatively new phenomenon, and have not destroyed dozens of towns or killed thousands of people, but those outcomes are a certainty given enough time.

As long as oil trains move, global warming moves with them. One of the economic realities of a 1.5°C cap is that oil trains cannot continue to freely move across North America carrying shipments for foreign ports. Rates of oil production parallel CO2 emissions and converge with global warming. According to the Carbon Disclosure Project (CDP)

Fossil fuels are the largest source of anthropogenic greenhouse gas emissions in the world. The fossil fuel industry and its products accounted for 91% of global industrial GHGs in 2015, and about 70% of all anthropogenic GHG emissions. If the trend in fossil fuel extraction continues over the next 28 years as it has over the previous 28, then global average temperatures would be on course to rise around 4°C. (Griffin, 2017, p. 7)

What is astonishing about this data is that a mere 25 companies produce half of the world's greenhouse gas emissions (GHG) (p. 9). At face value, it seems that regulating a handful of companies would be relatively simple. Pedro Faria, CDP's technical director, stated that "fossil fuel companies are also going to have to demonstrate leadership" to reduce emissions (p. 4). However, is this a fair request of a deregulated industry with a questionable history of self-policing?

Since shale oil is a feedstock for global warming, each year that allows increased production will equal increased suffering for at-risk communities. The start of 2019 saw North America become the largest oil producer on the planet, pumping more oil than any other time in its history. The U.S. Energy Information Agency stated that "U.S. crude oil production will continue to set annual records through the mid-2020s and remain greater than 14.0 million barrels per day (b/d) through 2040" (EIA, 2019, para. 5). It is now clear that the technology of fracking has prevailed against peak oil theory. Sustainable energy investments are growing, but still function as a social experiment when compared to fossil fuels. In their review of myopic decision making in the power sector, Heuberger, Staffell, Shah, and Mac Dowell (2018) stated,

Investment delays are likely to make the 2°C threshold unattainable. Moreover, economic and scientific models indicate that a path of inaction will be far more costly than one of action. . . . The current position is one of waiting for a unicorn technology as opposed to taking investment decisions today. (p. 1)

As an environmentalist, what is frustrating to witness is the failure to rupture a lifestyle that continues to be actively engineered for a carbon economy. Moving oil-by-rail is a microcosm of the greater challenge with climate change, that of slow-to-change policy vs. sustained development of fossil fuels. At a critical time when oil production needs to be slowing, it continues to accelerate. One of my conclusions is that the public is simply blind to the fact that oil kills. Industry PR and regulatory capture "contain" public awareness of the problem, and it is an easy sale, because our quality of life demands high-energy use and extreme consumption.

DARA, an international climate advocacy group based in Madrid, studied environmental impacts on children. They discovered that climate change is "responsible for 5 million deaths each year—400,000 due to hunger and communicable diseases aggravated by climate change and 4.5 million carbon economy deaths due mainly to air pollution" (DARA, 2012, para. 9). Front-page headlines about fires, asthma, air pollution, and oil trains could be opportunities to reinforce public awareness to the dangers of petroleum, and its mythical place as a perpetual growth product.

In contrast, the Pew Research Center conducted a global study on climate change by interviewing 45,435 people in 40 countries, and discovered that "around the world, most publics believe global climate change is a pressing concern. A median of 54% across the nations surveyed say it is a very serious problem" (Stokes, Wike, and Carle,

2015, p. 12). The bad news is that time consuming education hurdles still have to be crossed. Roser-Renouf et al. (2014) found that "when asked to estimate the number of people who are currently being injured or killed by global warming, and how many will be harmed in 50 years, large proportions say that they don't know" (p. 5). Even more disconcerting is that "fewer than six percent of members expect any health problem to increase—a strong indication that they simply are unaware of the health consequences of global warming" (p. 4). This partially reflects the *disengaged* group who (mostly for economic reasons) are unable to draw conclusions from a sea of information (p. 7).

What is shocking is that despite years of extreme climate events that kill (e.g., wildfires, drought induced famines, rising seas, resource wars, forced migration, drownings, etc.) there has been little movement in acceptance of global warming from a U.S. public. For example, since 2010 more than 50% of the U.S. has remained unconcerned about climate change with "no clearly identifiable trends" in a perception shift (Roser-Renouf et al., 2014, p. 8). One of the reasons that people care less today than they did after Hurricane Katrina is that "political cues were the primary driver of the downward shift in public opinion" (p. 8). The trope of the climate change hoax still sways many voters.

Senator Jim Inhofe, whose home state of Oklahoma is deeply invested in fracking—a contributor to global warming—has stated the following on numerous occasions: "To my knowledge, nobody has uttered the term 'global warming' since 2009. It's been completely refuted in most areas. . . . I really believe it's the greatest hoax ever perpetrated on the American people" (Germain, 2015, para. 118). Inhofe quickly derails consensus facts from climate science, along with its specific technical language, by using

political hype. Opposed are scholars who study climate change and acknowledge that "most scientists have reached a consensus that it is real and human caused" (Roser-Renouf et al., 2014, p. 9). Conversely, Inhofe rejected these beliefs by using long-established conservative tropes—which deploy hyperbole as a rhetorical weapon. The result is hyper alarmism on one side, and hyperactive denialism on the other. Chapter 2 includes a spotlight of environmental communication, and some methods it offers for interventions on climate science.

Another problem is that anti-oil environmentalism is a relatively new conceptual framework. It could be that climate change is happening faster than democracy can process through public discourse. In his work on environmental framing, Lakoff (2010) described a problem where "the effectiveness of short-term frames depends on the prior effectiveness of long-term frames" (p. 79). Big Oil has a century of established frames, which have been normalized into the status quo of the global north. For instance, Americans prefer to drive trucks and SUVs rather than ride electric trains. Lakoff believes "that conservatives have spent decades, day after day building up frames in people's brains, and building a better communication system to get their ideas out in public" (p. 73). Conversely, "In the case of global warming, all too many people do not have such a system of frames in the conceptual systems in their brains. Such frame systems have to be built up over a period of time" (p. 73). The planet currently averages over 400 ppm of CO<sub>2</sub> in the atmosphere, which is accelerating the melting of polar ice sheets, Greenland's glaciers, acidification of the oceans, droughts, floods, and tragedies linked to extreme weather events including mass migrations out of North Africa (Costello et al., 2009; Solomon et al., 2009). These effects have been known for a decade, and

what is North America doing ten years later? Pumping harder and faster than ever. In fact, the U.S. achieved maximum burn in 2018 with a hydrocarbon consumption record, despite global efforts to curb emissions (McFarland, 2019).

Big Oil can wait out climate change until refineries go bankrupt, but the community invested in climate science is under tremendous time pressure. The anxiety climate scientists live with has been classified as "pretraumatic stress" (Richardson, 2015). Nisbet (2009) stated that "the complex nature of climate change means no single news headline or visual image will catalyze widespread public attention" (p. 15). It is a generational problem, and it seems likely that the world has expended the last generation that could preempt catastrophic changes to our environment. Because the current scale of planet changing industrial waste has never been experienced before, we might lack the metaphors to effectively explain a global climate crisis. Unfortunately, there are plenty of fallback modes to dismiss the warning signs, which allow people a sense of false balance and/or ignorance.

I did warn about being grim, but the advocacy is to link public health to green energy alternatives. Nisbet's (2009) study of media framing found that global warming stories can be negatively perceived as "liberal alarmism" (p. 19). His concern is that a traditional style of environmental reporting "plays into the hands of climate skeptics and further reinforces the partisan divide in climate change perceptions. . . . In addition, the public is likely to translate these appeals to fear into a sense of fatalism" (p. 19). There is a track record of climate debate generating doubt, fear, and divisiveness. In order to move toward a world of the alternative, the environmental justice movement should focus on framing global warming in ways that embrace the proximity and immediacy needs of

the public. I believe that resistance to oil trains, and removing them from a global warming production chain, is a method to achieve more sustainable communities.

## **Chapter Guide**

I have simplified certain terms to save time. To clarify, hazardous materials, HAZMAT, or HazMat will simply be referred to as hazmat. This clustering includes various forms of hydrocarbons, and their refined derivatives, such as shale oil, bitumen, traditionally sourced crude oil, fracking fluids, propane, ethanol, fracked gas, natural gas, chlorine gas, etc. What I call the "trope of containment" is based on its recurrence throughout public energy rhetoric, which strategically attempts to sustain the status quo of oil-by-rail transportation in North America. These documents are sourced from 1) government agencies, 2) private associations, 3) corporate entities in the oil and gas industry, 4) and NGOs networked to the sale of hydrocarbons.

The following chapters will explore several themes: 1) rhetorical strategies attempting to contain hazmat transportation awareness; 2) the relationships between a fossil fuel economy, regulatory capture, government rhetoric, and safety regulation; and 3) accidents as opportunities to resist the burning of hydrocarbons using an environmental justice framework. Below is a brief summary of each chapter.

Chapter 2 is a short history on containment rhetoric as it was used during the Cold War to protect nuclear secrets. I examine how those strategies migrated to government efforts to contain public outrage on hazmat-by-rail. I also use close-textual analysis to visualize containment rhetoric in the form of word clouds, based on key documents from federal and state government reports on oil train safety.

Chapter 3 is a case study on the State of New York and its contentious relationship to fracking. This chapter focuses on the New York State Department of Health (NYSDH) report, which Governor Cuomo used to justify a permanent ban on fracking. The story of the Lac-Mégantic disaster started at a frack pad in North Dakota, where the oil originated. In order to understand the dangers of shipping flammable liquids, it is important to examine how they are sourced. There are considerable risks to communities and the children who live near hydraulic fracturing operations. This chapter establishes fracking as the first link in a chain of production, which is the sourcing, transport, refining, and final burning of hydrocarbons.

Chapter 4 is a case study on the Lac-Mégantic accident, which includes interview material obtained during my fieldwork in Québec. This chapter sits in the middle of the dissertation because it is the heart of my study, but not a central focus on rail safety. The tragedy was a catalyst for complex hazmat safety issues in the U.S. However, due to a language barrier, I had to take the approach of a tourist and this section is based on long-form journals I kept during my visit. Initially, I thought the town would be a site of resistance, but they have more pressing community health issues. Therefore, this section examines personal health impacts from the accident. This chapter also represents a link in the carbon production chain, which is the burning of fuels and the handling of waste.

Chapter 5 is a case study on the 2005 derailment and poisoning of Graniteville, South Carolina. This was the largest release of chlorine gas since 1915, and I use this accident to interrogate a failed effort by Congress to mandate rail safety equipment. The Graniteville case also demonstrates the degree of hazard that a single tank car of toxins can have on a community. The town's emergency communication system failed to



adequately protect its residents, and serves as a warning to communities who receive hazmat shipments. This case examines the links in the chain where federal oversight promotes secrecy as a method of containment.

Chapter 6 focuses on local rail safety issues in Minnesota. Due to the state's centrality on the national rail network, the Twin Cities are exposed to an above average volume of oil-by-rail traffic. A series of town hall meetings have been excellent opportunities to observe and study community response to hazmat. I have worked with an organization called Citizens Acting for Rail Safety, and include some of my experience as a participant observer. However, this chapter primarily focuses on government studies commissioned by the State of Minnesota in response to the Lac-Mégantic accident. My contention is that the state is focused on physical containment as a reactionary response in lieu of proactive rail safety measures.

Chapter 7 concludes the dissertation with a critique on the ideology of containment. It examines the rail industry's claim of a 99.99% safety record as being problematic. Because containment rhetoric is pervasive, I make the case that oil-by-rail needs, among other things, market solutions to make it an obsolete form of energy transportation.

### **Writing Oil Rhetoric**

Lastly, I want to be clear that my research method and writing style take a journalistic approach. One of the lessons I have learned is that academic work should fulfill a watchdog function. When the city papers stop writing stories about oil trains, who is left to hold the government accountable or follow-up on their safety claims? In the pursuit of my research, I have been ghosted, stonewalled, and given the runaround by

a slew of state agencies. Recently, I asked a public information officer if the state has a measurable response time in the event of a hazmat derailment. I wanted to know the time lag between the St. Paul Fire Department issuing an evacuation warning and the alert reaching local residents. Taxpayers fund the Integrated Public Alert & Warning System (IPAWS), which is part of a national network organized by FEMA. Minnesota's Statewide Emergency Communications Board IPAWS Committee holds public meetings on the effectiveness of this system. Yet, their office refused to answer security sensitive questions like the one I requested. When government agencies respond to credible research requests with static, I consider that a form of containment.

Beyond state agencies, one of the most effective safety organizations is the National Transportation Safety Board (NTSB). Since this dissertation relies on their reports, it is useful to look at their doctrine. When asked to describe the politics of the NTSB, Robert L. Sumwalt, Chairman of the NTSB, referenced a 1970 Senate Committee on Commerce report that justified their autonomy. He admired the wisdom of the Senate to protect the NTSB from administrative pressure placed on it by the FAA. Sumwalt quoted the Senate's conclusion, stating the following:

The most important single aspect of the National Transportation Safety Board must be its total independence from those governmental agencies it oversees in regard to their transportation regulatory functions. If the Board is under pressure from any administration to pull its punches or to tone down its reports or to gloss over Government errors in transportation safety, then its watchdog function has been fatally compromised. The public can then have no confidence that its

interest are being protected by a professional agency which has no responsibility other than safety. (Sumwalt, 2017, para. 27)

In a similar tone, I have been critical of the State of Minnesota regarding some of its safety policies. My education and hourly salary has been furnished by the Minnesota taxpayer, and I hope to have worked in their best interest for rail safety and community awareness. Additionally, the University of Minnesota has actively supported my work, and sponsored an in-depth radio interview with *Access Minnesota*. However, there are tricky barriers in telling the story of oil and violence, especially when the state appears unprepared. One of the critical timeframes I discovered is the 18 minute window. During the Graniteville chlorine accident, the hospital staff became overwhelmed with patients 18 minutes after the derailment. In Lac-Mégantic, the hospital staff had no opportunity to treat serious injuries, because those victims died from immediate exposure. These accidents demonstrate that no response is fast enough during a hazmat derailment.

When it comes to warning residents, government agencies are in a difficult position, which mirrors lessons from the Cold War and the threat of nuclear weapons. What do they say if the message is: "There is nothing we can do immediately after release." In Graniteville, the evacuation notice was given 13 minutes after the derailment. That is the fastest response humanly possible, because the fire station was one block from the accident site. How long would an evacuation notice take in an urban center? During a town hall meeting, I heard a fire chief openly worry about response times. Maybe the IPAWS communication officer was worried that I would leak their reply to the *Star Tribune*. Imagine the headline: "Minneapolis Fire Chief says, 'No

response fast enough.'" Frankly, there is little the fire department can do immediately after an explosive derailment. A coordinated response takes hours.

Hyping real problems can generate inconsistent responses from the public, and hurts the credibility of critical safety messages. Alarmism is not an effective strategy for environmental communication, because oil and climate change are giving us extreme stories to tell. Environmental journalists like Bill McKibben should not be calling the Anthropocene "an essentially impossible future" of emissions control, which is "the greatest challenge humans have ever faced" (McKibben, 2012, para. 47). Instead, fix the causal relationships using a consistent frame. Environmental news does not need to be hyped to get attention, but it needs clear links to public health. This can be illustrated by a business story from the *Independent*, where a price spike in olive oil was blamed on "erratic weather in Spain and Italy"—not on global warming (De Sousa & Vines, 2017, para. 1). NASA projected in 1998 that "Mediterranean agriculture accounts for virtually all olive oil produced worldwide" (para. 1) and "rapidly increasing greenhouse gases could adversely affect crops and water availability, critically influencing the patterns of future agricultural production" (Rosenzweig, Tubiello, and Cavalieri, 1998, para. 2). These types of stories are missed educational opportunities.

We are living in with an exponentially changing environment, which has been inconsistently discussed for generations. Maybe global warming from our burning of hydrocarbons is a cognitive gap that cannot be bridged in enough time to save enough lives. As we witness millions of people displaced from their ancestral homes, their suffering and their stories need to be clearly linked to climate change. The heart of environmental communication is to gain a better understanding of our complex

relationship with the planet. This means that we all need to do a better job of educating ourselves, which takes time. I spent a decade in the airlines, a decade studying communication, and have recently taught a generation entering university life with no memory of 9/11. Studying a reoccurring and consistent problem, which span generations, means it is likely to take generations to solve.

## Chapter 2: Theoretical Framework & Presentation of Case Studies

It is impossible to do a study on oil disasters without encountering the word containment. At face value, the term represents a simple idea based on a logical process. When a spill of significant size occurs, be it milk from a jug, a broken water heater, or 32,000 gallons of hazmat, the first step is to contain the fluid. Physical containment strategies make sense at the case level, and there is nothing ominous about them. However, the industrial discourse of containment belies a larger metaphorical set of meanings. Via a rhetorical analysis of 139 federal, state, and industry documents, it is clear that hazmat containment is a complex rhetorical phenomenon that, in turn, links to a much broader and contentious history. Nadel (1995) argued that containment is "perhaps one of the most powerfully deployed national narratives in recorded history" (p. 4). What is being examined here is not a simple idea, but a complex ideology that evolved out of the arms race. To clarify, the modern use of containment rhetoric was perfected during the Cold War. Scholars studied the "parallel problems of containment: the 'material containment' of nuclear hazards, and the 'discursive containment' of public knowledge about nuclear practices and their effects" (Kinsella, 2005, p. 62). One famous media example was the Civil Defense film *Duck and Cover*, where school children were taught that "we must obey the civil defense worker" (Rizzo, 1951). I use the film, which is preserved by the Library of Congress, to demonstrate inoculation techniques in my media literacy course. It is also an easy to understand model for containment rhetoric.

*Duck and Cover* employs a narrative fiction to shape how the public perceives large-scale risks. The film also set a Cold War precedent for how government agencies rhetorically handle low-probability/high-mortality scenarios. The threat of nuclear war

with Russia was contained to a jingle, an animated turtle, and the idea that an attack would be survivable—within a very narrow timeframe. My research on how government shapes risk is concerned with this relationship between the material and discursive, and the element of slippage as time passes. Containment ideology fosters asymmetric relationships, because in the act of containing, managing, inoculating or masking, the public sphere is ensnared by mismatched risk perceptions. For example, the public generally perceives the government to have a watchdog function over their safety. However, this belief does not fully pan out when it comes to transportation regulation. This dissertation examines several case studies where promised safety outcomes never materialized, even after Congressional mandates were given. Therefore, I believe community education must bridge the gap when government agency is contained by market pressure.

Cold War propaganda was particularly focused on educational films distributed to teachers, the most famous and overt example being *Duck and Cover*. It was scripted with the help of the National Education Association, and designed to train students on what to do when "the bomb" exploded over their town. While describing the severity of a nuclear blast, the narrator stated, "The bomb can knock you down hard or throw you against a tree ... or burn you worse than a terrible sunburn" (Rizzo, 1951). The film teaches that while the risk of nuclear attack is always present, it is survivable. The "flash" can happen while riding a bike to a Cub Scout meeting, or during a family picnic, or while driving a tractor on the farm. These were all dramatized scenarios, intentionally designed to create a sense of hyper-vigilance. In other words, nuclear war represents the myth of

containment. It is the idea that the large threats to our way of life can be contained through policy, government action, and industry managed public perceptions on safety.

When I show the film in class, I ask my students to count how many times bomb metaphors are used during the nine minutes of narration. The answer comes out to once every 20 seconds. In my mind, there is a tiny smoke filled room at Archer Productions, with the producer talking out of the side of his mouth. He asks, "How many times can we say bomb without being obvious?" The film was designed to inoculate the public against a culture of fear regarding nuclear weapons. Yes, the duck and cover method is still used today because it can save lives and prevent injury. However, the narrative fiction, or myth of containment, was part of a larger government program dealing with the Soviet threat. Surprisingly, the film never mentioned Russia, not even once. Maybe attribution was not necessary, or helped establish an avoidance of blame in government risk rhetoric, because everyone and their grandmother knew who had the bomb.

While the public was being conditioned to perceive the Soviet Union as a grave external threat, Disney produced "Our Friend the Atom," where nuclear energy was contained to an "atomic genie" in a bottle. The television episode was propaganda couched as educational programing, designed to acclimate children to the benefits of nuclear fission. Instead of perceiving atomic bombs as "a regretful waste of heat and energy," that power could be contained within a reactor, which "gives us the chance to make the atomic genie our friend" (Luske, 1957). What I am establishing here is that a trope of containment exists within a multitude of discourses, even seemingly innocent artifacts like cartoons. Young minds, which have been conditioned to view public risk in a consistently narrow fashion, may have the outcome of risk averse thinking later in life.



Kinsella (2005) stated, "Although the U.S. geopolitical strategy of 'containment' through nuclear threat was directed at the Soviet Union, it motivated a parallel domestic containment of individual identities, social roles, cultural expression, and political discourse" (p. 58). These tropes, or recurring narratives, create a confirmation bias over the course of time. The perception then becomes one of denying the probability of catastrophe. If it has not happened, it will not happen. Kinsella included containment as one of four master themes that directly influence public policy.

When Cold War nukes were a daily news obsession, how many Americans would have believed that their greatest fallout threat was not from Russia, but sitting in Pennsylvania? In their summary of the Three Mile Island (TMI) accident, the U.S. Nuclear Regulatory Commission (NRC) stated that roughly 2 million people were expected to have received a radiation dose above the background rate during the reactor's partial meltdown (NRC, 2018, para. 7). A recurring theme of containment rhetoric is that public safety perspectives fundamentally change after a large body is directly harmed. With this in mind, the TMI accident "permanently changed both the nuclear industry and the NRC. Public fear and distrust increased, NRC's regulations and oversight became broader and more robust ... [which] led to permanent and sweeping changes in how NRC regulates" (NRC, 2018, para. 9). America learned its lesson and Japan learned a similar one 32 years later. This generational gap in safety awareness is what I referred to as slippage. An empirical belief in being able to predict, manage, and control large-scale risk outcomes through the strategic use of rhetoric is what I call the trope of containment. When it comes to public safety narratives, these recurring fictions end up killing people.

The greatest threat to American cities is no longer thermonuclear war, but hazardous material (hazmat) releases including chemical and biological weapons. Trains carrying hazmat, such as shale oil, ethanol, and toxic gases fit this threat category. The Graniteville derailment involved 90 tons of chlorine gas, which was a larger volume release than a chlorine gas weapon used during World War I (see Chapter 5). Trains carrying Bakken crude oil contain such massive amounts of energy, that the cargo is often compared to the World War II raids on Hiroshima and Nagasaki. A witness to the Mount Carbon, West Virginia derailment stated, "It was like an atomic bomb went off" (Raby, 2015, para. 12). In fact, the term "bomb train" is used to categorize the uniqueness of mile-long unit trains hauling shale oil, which contain volatile organic compounds. It is also not uncommon to find the bomb metaphor in Lac-Mégantic disaster narratives. Scott Smith, whose company aided the *Deepwater Horizon* cleanup effort, conducted water quality tests in Lac-Mégantic after their oil disaster. He stated, "Conventional crude on the surface never ever explodes, let alone vaporizes people like Hiroshima" (Federman, 2014, par. 19). Smith was referring a 3,000°C fire and the unrecoverable remains of several residents, whose bodies were reduced to gleanings and ash (see Chapter 4).

For my study, I position containment rhetoric squarely within the public sphere, because it is a response tool used by government agencies to manage environmental crises. I also do not make a distinction between public health crises and the environment—these are linked phenomena. Pollution from the burning of fossil fuels is a public health crisis on many levels (see DARA, 2012). In a similar vein, hazmat from

derailments consigns environments to multipronged threats. When journalist Adam Federman (2014a) surveyed an oil train disaster, he discovered

a certain level of disbelief in Lac-Mégantic that, after so much oil was released into a relatively small geographical area, the ecological impacts have been contained. Residents are concerned about soil, air, and water quality in the area as well as contamination of agricultural land within the Chaudière River floodplain. (para. 7)

Oil train derailments pose a triple threat to the environment, public health, and community safety. Explosions pollute bodies of water, destroy civil infrastructure, poison the land, and create toxic inhalation hazards—all of which threaten communities at large. In contrast, the Transportation Safety Board of Canada (TSB) restricted the Lac-Mégantic accident investigation to human factors, technology failures, and regulatory oversight (TSB, 2014a).

It is common to find containment discourse confined to a material perspective, which primarily deals with physical barriers (e.g., tank car design). For instance, rail safety studies typically focus on "three types of containment" which are "guard rail, parapet, and physical barrier" (Lin & Saat, 2014, p. 5). If oil is involved, containment discussions put rhetorical weight on the spill and methods to prevent migration of fluids. Part of the problem is that government agencies continue to utilize an ideology established during the Cold War for dealing with public inquiry. Kinsella (2005) believes that "public discourse surrounding many urgent contemporary issues ... remains structured, in part, by the material and discursive 'legacies' of the Cold War" (p. 59). Theories on containment are rooted in strategies to protect nuclear secrets. Since

radioactive waste is the ultimate form of hazmat, there is a rich and precedent-setting history for public discourse on hazmat transportation. This chapter makes the case that norms established during the Cold War continue to guide government responses to large-scale public risks. Today, flammable liquids are the highest volume of hazmat moved throughout the United States (DOT, 2017a, p. 2-9). When accidents happen, public knowledge is strategically contained to specific risk frames to the benefit of a carbon economy.

One of my other goals for this chapter is to visualize the nature of containment rhetoric. In fact, containment theory can be mapped to demonstrate how groups construct and solve issues of public importance. An examination of key terms can be useful for demonstrating limits to existing research. My hope is that work in this field will help to break the frame of what Naomi Klein (2017) describes as "fossil fuel autopilot" (Don't Talk About Oil section, para. 5). Klein was referring to North America's all-of-the-above energy policies, which do not cap the extraction and burning of hydrocarbons. Containment rhetoric tends to confine public discourse to single-generation solutions. The big picture is that trains offer virtually unlimited capacity to move shale oil to foreign markets. Therefore, the unrestricted burning of fossil fuels, which generate consistent profits, compounds a multi-generational threat to global environments without interruption. Oil trains and global warming move together.

What is at stake on the local level is public knowledge, which requires transparency. When hazmat trains repeatedly traverse population centers, they introduce a compounding risk of violence for residents whom generally have little awareness of their operation. In Verman and Veter's (2005) study of derailments in Canada, they

discovered that standard risk models are "ignoring the number of times an individual is exposed to a certain risk" (p. 1301). This is an issue of frequency, the number of cars transiting a community, and the volume of hazmat. Current regulation allows Canadian National to use "a single threshold distance of 800 [meters] in their risk assessment as per the suggestion [by Transport Canada]. Our model, however, indicates that the fatality threshold distance for the Ultra-train is 2 km" (p. 1299). Essentially, the risk of injury is double what the rail company calculated. The Ultra-train is 68 cars of refined petroleum products, such as jet fuel and propane. Verman and Veter's argument is that the risk models do not adjust for non-linearity concentration curves. Therefore, the risk that the Ultra-train poses to downtown Montréal is much higher than officially recognized. To demonstrate, a train carrying one propane-tank car "exposes an individual living 1 km from the railroad to minor injury risk, whereas the same individual would be exposed to fatality risk due to a train with 21 propane tank-cars" (p. 1291). This case begins to demonstrate how strategies of containment can become self-fulfilling. Government agencies, in particular, work hard to limit public risk, but an outcome of this process is a tapering of public knowledge. Containment rhetoric can also function as a management tactic to insulate at-risk communities through a structured deployment of key terms.

Figure 1. Containment Word Cloud



Figure 1. Top 50 terms by reference count linked to containment node auto-coded from 20 documents on containment rhetoric. Image created using QSR International's NVivo 12 Software.

Researchers will often locate an ideology to a national conference or organization, which can represent a core mode of thinking. When Klein wrote *This Changes Everything*, the narrative began at the Heartland Institute's Sixth International Conference on Climate Change. I took a similar journalistic approach, and discovered the epicenter for containment theory occurred in 1997 at the first International Containment Technology Conference in St. Petersburg, Florida. The four-day event was sponsored by the U.S. Department of Energy (DOE), DuPont Company, and the U.S. Environmental Protection Agency. A noticeable military presence was also in the building, including the Society of American Military Engineers (SAME). The conference published a proceedings document consisting of 1,164 pages covering topics ranging from radioactive waste to mud slurries. I used this publication, along with 20 other academic documents on containment theory, to map key terms where "containment" was a core theme. Figure 1 represents 53 references linked to the concept of "containment" which were coded from my digital library using NVivo 12 software.

The word cloud is a visual representation of containment ideology, and useful for close-textual analysis. Notably, the conference's keynote address was given by Dr. Clyde W. Frank, Deputy Assistant Secretary at the DOE. His remarks opened with the contradictory ideas that containment technologies "offer the best and fastest opportunities to reduce cost and risk at the same time" (p. 3) and that "privatization is a key investment strategy. We need to maximize the effectiveness of privatization" (Campbell, 1997, p. 4). Not only did the conference emphasize private, not public knowledge, it also embraced regulatory capture—which is a consistent theme found in containment rhetoric. In fact, "Industry-Government Engagement (IGE) is the cornerstone on which SAME was founded" (<https://www.same.org/>). Chapter 6 will cover this topic in more detail through an examination of Minnesota hazmat regulation.

My contention is that strategic moves to focus containment rhetoric to material and discursive barriers have an outcome of perpetuating public risk. The generational problem for communities is that material fixes are time-limited solutions. To illustrate, reading down the boxed row in Figure 1 gives the following sentence: "Containment development improves the performance of barrier technologies." The word cloud demonstrates that key concepts are predominately focused on physical elements, such as barriers and technology. However, mapping key terms makes it possible to quantify modes of thinking excluded from safety discourse. For example, the concept of public safety education is not linked to themes on containment—ever. A basic explanation is that containment is an academic concept, and technology solutions are business oriented. However, I also discovered that the term containment does not exist in any media reporting on train derailments—at least not in my archive. There is a noticeable use of

the verb "contain," which is not rhetorically significant. Basically, it is an innocuous verb unlike the multifaceted use of containment as an active rhetorical strategy. Chapter 6 has an in-depth discussion on how government agencies engage with public safety concepts based on containment rhetoric. The purpose of Chapter 2 is to emphasize containment as a trope, or reoccurring theme, which is inescapable in the study of hazmat accidents. Before exploring tropes in more detail, it is necessary to establish a brief history of containment rhetoric.

### **Origins of Containment Rhetoric**

This section touches on three eras that are critical to the shaping of containment rhetoric: 1) industrial labor struggles of the 1900s, 2) the Cold War, and 3) post-1980s deregulation. The rhetorical roots for railroad related containment reside in labor struggles. According to Genter (2014), "The so-called culture of containment originated in the late 1910s when the US government struggled to confront the dislocations generated by industrialization" (p. 618) resulting in assorted "challenges to the legitimacy of the American state" (p. 619). The threat of unions was in direct opposition to capital, which was incentivized to maintain the status quo. The history between railroads, labor, and capital is contentious, complex and beyond the scope of this work. However, that antagonistic relationship set a precedent, which is continuously reaffirmed, for the ways in which civic disruptions are addressed. Specifically, the Railway Labor Act (RLA) of 1926 had far-reaching implications and governs transportation labor disputes to this day. When it comes to legitimizing federal power, the RLA has such broad and precedent-setting scope that it applies to contracts for airline crews conducting international flights.



Containment, in this frame, is clearly linked to capital and the need to shield industry from costly public outrage. Altheide (2013) uses the term "shielding risk" to describe "a symbolic moral order that is sustained by focusing on what might be termed the 'conventional threats.' Thus, other risks are shielded from awareness and reflection" (p. 101) which works to obstruct social change (p. 100). In the language of the RLA, there is a duty "to avoid any interruption to commerce or to the operation of any carrier" (45 U.S.C. § 151a). Demonstrating this policy, Governor Mark Dayton of Minnesota established a Council on Freight Rail two summers after the Lac-Mégantic disaster. The state couples "railways [that] make important contributions to our state's economy" to the "vitality and safety of our communities" (Office of Governor, 2016). This position created a double bind for state regulators. Alene Tchourumoff, State Rail Director, chairs a board with eight cabinet members on one side of the table, and seven private rail representatives on the other. During a Civic Buzz event hosted by the League of Women Voters, Tchourumoff stated, "To really have an understanding of what's going on within their industry [railroads], we really need them wanting to be almost partners ... instead of it being [long pause] adversarial" (personal communication, February 7, 2017). For a safety council, which is only required to meet twice per year, this desire may be wishful thinking. One of the consistent frustrations expressed that evening was a desire for an open exchange of information from the railroads. Their response is typical of corporations under threat, in that they engage only to the extent required by law. Until there is a catalyst that disrupts the status quo (i.e., loss of life and public outrage) the railroads have no incentive to de-couple from a long-established cultural norm. Therefore, change is contained to best practices, which are designed to protect profit

margins. For instance, explosive derailments are covered by insurance premiums and become a cost of doing business. Chapter 6 will examine this subject in more detail.

With the invention of nuclear weapons, industry and government narratives on containment made a pivot. The focus on struggles between labor and capital were partially sidelined by political ideologies governing foreign policy. According to Taylor (2007),

nuclear weapons created a traumatic exigency requiring the development of cultural narratives to control the associated public experience of fear and responsibility. The central motif of that narrative, Nadel argues, was "containment," a term which captures the conflation of declared foreign policy, informal domestic policy, and official rhetoric "that functioned to foreclose dissent, preempt dialogue, and preclude contradiction." (p. 676)

What Taylor hints at is an ideological relationship, grounded in policy rhetoric, between foreign and domestic strategies. Nadel (1995) stated, "Containment was the name of a privileged American narrative during the cold war [*sic*]. Although technically referring to U.S. foreign policy from 1948 until at least the mid-1960s" (p. 2). Regardless of the era, the rhetorical mechanism for containment does not drastically change. This is still a policy of restricting information from the outside Other. Whether it is a foreign Other, or a national public audience, it does not alter the intent of containment—which is to protect the power of private profit interests. My argument makes a bit of a leap here, from nukes to oil, because I have not discovered a smoking gun. Unlike the work of Oreskes and Conway (2010), I have not found a network to prove my assertion that containment rhetoric crossed over from nuclear discourse. However, domestic oil rhetoric cannot be

separated from foreign policy discourse, because energy trade defines national relationships.

Case in point is influence wielded by the U.S. within the United Nations Security Council, and its history of levying sanctions on oil and gas exports from countries not friendly to the United States. Bina (2004) defines this policy as the "American Doctrine of Containment after the Second World War" which was "an embodiment of (1) the containment of the Soviet Union, (2) the containment of democratic/nationalist movements in the 'Third World,' and (3) containment, co-option, and the molding of 'civil society' in the United States" (p. 14). Inherent to the ideology of containment is the U.S. federal government's reaction to threats. Again, the RLA of 1926, which has been continuously updated and affirmed for over nine decades, gives the state broad powers to maintain commerce—occasionally at the expense of public safety.

Deregulated railroad corporate culture also embodies a culture of containment. The Brotherhood of Locomotive Engineers and Trainmen (2007) expressed "a growing concern that the rail industry, deregulated in 1980, has failed to properly police itself" (p. 5). This can be demonstrated by the story of Michael Elliot, a 16-year veteran engineer at BNSF who sought federal whistle-blower protection after the company failed to respond to his safety requests. He asked the company to repair signage along the Tacoma to Vancouver, WA route, where there was a legitimate collision risks between passenger and freight rail. The company did nothing, so after several weeks of waiting Elliot reported the case to the Federal Railroad Administration (FRA), where he stated the following:

In the 16 plus years I have worked on the railroad, I have watched train speeds, lengths, and tonnages increase in the interest of production without there really being a balanced discussion as to the consequences this particular business model has on safety. (Elliot, 2011, p. 3)

The FRA conducted a six-week inspection and issued 357 safety violations, discovered 112 signal defects, and levied a \$1,000 fine (Silverstein & Joseph, 2015). In retribution, a BNSF supervisor instigated a parking lot fight to give management grounds to terminate Elliot, who also happened to chair the local union. The entire incident is described in evidentiary letters contained within *Elliot v. BNSF Railway Company* litigation. The case ended with a federal jury awarding Elliot \$1.25 million in damages (Carter, 2015). That entire process took eight years, which accrued over \$400,000 in legal fees for Elliot. This story is much bigger than a single rail worker, because it was not a one-off event. Elliot's experience demonstrates a consistent cultural norm of containment at the railroads. There were 2,000 retaliation cases against employees from 2007 to 2015, with BNSF leading the industry by generating 409 official complaints (Silverstein & Joseph, 2015). This begs the question of how the railroads police themselves. Chapter 3 will discuss the practice of containing public safety complaints to closed-door litigation, which is also a common theme in the oil and gas industry.

### **Clouds and Tropes**

Six months after 9/11, the Office of Naval Research (ONR) published a study on dispersion patterns for chemical and biological weapons, with the goal of using the models to construct civil defense plans. They focused on how weather interacts with a toxic dispersion, which was defined as a "contaminant cloud" (Boris, 2002, p. 24). It

made me wonder: How does the government try to contain a toxic cloud? The answer is that the ONR used the biggest parallel processors available at the Department of Defense to create models of major U.S. population centers. Since real-time computations are not fast enough, the trick was "computing the consequences of a range of threats and meteorological situations. Then the detailed local conditions can be entered into a more modest computer to make the local corrections very rapidly" (Branscomb et al., 2010, p. 27). This version of reactionary containment could have been useful in the Graniteville disaster. Chapter 5 has a more in-depth discussion on this issue.

The metaphor of a cloud is a good fit for visualizing the rhetoric of containment. Due to the popularity of blogs, nearly everyone knows what a word cloud looks like. It is a cluster of high frequency search terms organized into a cloud shape, with the lower frequency words in sequentially smaller font sizes. These are metadata representations of keywords, which graphically depict terms based on popularity. As a result, the larger the size of a word in the cloud, the more hits it generated. The blogosphere can help us to picture how containment rhetoric works because it is often driven by tropes. Nadel (1995) stated,

Tropes performed the ideological task of constructing narratives that allowed a significant portion of the population to link its sense of self—the story of its life—to national history. . . . The repetition of tropes, however, facilitates narratives that by virtue of their repetition seem "natural," like clichés, and, like "common sense." (p. 8)

One of the things I enjoy about close-textual analysis is that word counts can be useful for spotlighting terms that are rhetorically focused and normalized. For example, the

term "containment" appears 1,517 times in 75 documents in my archive. In Kinsella's (2001) study of the Hanford Reservation, he examined "containment as a guiding metaphor" (p. 164) for the material and discursive contestation of nuclear waste. The site has been extremely controversial for decades, where public argument and "the meanings of that information and the authority to make those meanings are rhetorically contained ... and contested" (p. 164). However, every act of material containment through government secrecy creates a "discursive leakage" which has the outcome of changing "the interpretive frameworks that people bring to the processes of understanding and discussing those matters" (p. 171). The critique from Burke (1978) is that the material turn is "a strategy of containment, a substitution designed to arrest the movement of ideological analysis before it can begin to draw in the social, historical, and political parameters which are the ultimate horizon of every cultural artifact" (p. 411). I argue that government rhetoric on hazmat-by-rail functions to contain public discourse, especially community risk perceptions, which follow Burke's definition of the material turn.

**Figure 2. Minnesota Safety Word Cloud**



*Figure 2.* Top 25 terms by reference count linked to safety theme, auto-coded from 9 Minnesota state documents, 77 references, 124 hits comprising 4% of total word count. Image created using QSR International's NVivo 12 Software.

The State of Minnesota has been actively working to contain the public's perception of rail safety to grade crossings, because that is a location of maximum visibility for oil tanker cars. A grade crossing is where a public road crosses a private rail line. The State Rail Director stated,

The intersection of both highway and rail is probably one of the most dangerous ways the general public interacts with rail. So, grade crossing safety is hugely important and the governor has a number of proposals to support improving grade crossings ... we have 4,500 at-grade crossings in the state of Minnesota and not all of them are protected. (A. Tchourumoff, personal communication, February 7, 2017)

The concept of grade crossings is one of the key terms in nine primary state documents on rail safety (Figure 2). This is clearly evident by reading down the boxed row in the word cloud. The state has invested in "improving rail safety [at] grade crossings." The flipside of that coin is the State of Minnesota does not conceptualize public safety in a way that is fundamentally outside of crossings.

The history of hazmat derailments refutes the idea that the public's exposure risk is highest at grade crossings. Following the Lac-Mégantic disaster, the Minnesota Dept. of Transportation (MnDOT) spent \$93,000 on a study of grade crossings (MnDOT, 2014, p. 4). The report was done in conjunction with the Rail Safety Education's Operation Lifesaver (p. 16) but fatalities in Minnesota are rare. Between 1979 and 2008, the state had six vehicle/train deaths (MnDOT, 2015, p. 2-18). Currently, the state averages one collision per year (Harlow, 2017). More importantly, none of the derailments from Table 1 involve a train impacting a vehicle, and I am aware of no explosive derailments caused

by cars or trespassers. In a recent and exhaustive study on derailment probabilities at highway-rail grade crossings, there was no mention of hazmat or crude oil (Chadwick, 2017). Again, public education does not make the list when it comes to the state's discourse on rail safety. In their defense, the Dept. of Public Safety made sweeping policy changes to educate first responders on hazmat-by-rail after Lac-Mégantic. However, in typical fashion, education as a concept for regulators became an internal process. Risk education for the public continues to be contained to the idiom of Stop, Look, and Listen before crossing. Public education on rail safety reverts to long-established norms of "never race a train," and "slow down, look both ways and listen" (Harlow, 2017). These crossings, which the state defines as high risk, could become a site of contestation for hazmat. Instead, they remain contained by the appearance of common sense safety tropes.

### **Spotlight on Environmental Communication**

Within communication studies, there is an emerging body of work that pushes for public intervention. Because my work is case based, and departs from a theory driven research project, this chapter does not include a traditional literature review. Be that as it may, I do want to defend this work as being grounded in environmental communication, and spotlight several authors who inform my approach to risk rhetoric. There is no single person, or mode of thinking, which best represents environmental communication as a discipline—hereafter referred to as enviro comm. However, there is a core belief in a "certainty that global warming is real, human caused, dangerous, and solvable; and that most scientists have reached a consensus that it is real and human caused" (Roser-Renouf



et al., 2014, p. 9). This statement is not in contention within the discipline, but it has been negotiated in the public sphere far too long. According to a recent survey by the Yale Program on Climate Change Communication, the public has a facepalm level (my term) of understanding about scientific consensus. Among the respondents, 28% had no clue that 97% of climate scientists are convinced that global warming is human caused. Yale highlighted the work of NASA atmospheric scientist Kate Marvel who stated, "We are more sure that greenhouse gas is causing climate change than we are that smoking causes cancer" (Gustafson and Goldberg, 2018, para. 1). One of the struggles for enviro comm is addressing the ways in which stakeholders perceive scientific truths.

As a former president of the Sierra Club, and long-established scholar on environmental communication, the work of Robert J. Cox is useful for mapping the boundaries and values of the field. Published in the inaugural edition of the *Environmental Communication Journal*, Cox's "Nature's Crisis Disciplines" was the lead article. It was a call-to-arms for environmental communication scholars whose work engages climate change. Cox advocated that the field should be considered as a mode of crisis communication. Nevertheless, he emphasized a critical departure from the typical business orientation found in crisis comm. Cox (2007) stated,

I am proposing, our task would become two-fold. It would include identification and analysis of the failures, distortions, and/or corruption in human communication about environmental concerns. But, it would also include the willingness to recommend alternatives, to enable "policy decision makers, communities, businesses, educators, and citizen groups" to respond to signals of

environmental stress in ways that are appropriate to human and biological well-being. (p. 18)

His closing argument includes a segment from the original proposal by Senecah and Nezley (1996) in the formation of the Environmental Communication Commission of the National Communication Association. My dissertation attempts follow the advice Cox gave for the discipline. There is value in critical analysis of hazmat-by-rail as a systemic problem, but I also believe that the heart of enviro comm is to educate and inform on public policy.

The theoretical foundation for traditional crisis comm is a bit different, and it tends to gravitate toward public relations—which does not share a critical perspective. For instance, the situational crisis communication theory (SCCT) is a core concept in crisis comm. It was designed by Coombs and Holladay (1996) to give crisis responders tools to bring a level of certainty and prediction to events with potentially uncertain outcomes. According to Coombs (2004), "The idea was to articulate a theory-based system for matching crisis response strategies to the crisis situation to best preserve the organizational reputation" (p. 266). A fascinating case study was a listeria outbreak at Maple Leaf Foods (Canada's version of Hormel) which caused the deaths of 21 people, including schoolchildren who were poisoned from boxed lunches. SCCT was actively used to manage public outrage, which helped the corporation avoid bankruptcy (see Howell & Miller, 2010).

The other side of SCCT is that can be used to shield organizations that are negatively impacting public health and safety. Kinsella (2001) who is an enviro comm scholar, believes that shielding rhetoric is an approach which seeks "to minimize the

production of public messages ... and to control their informational content" (p. 164).

These two theories make for a wonderful counter-point exercise to examine the spectrum of crisis communication. However, for the railroads, it is arguable whether or not they have a public perception problem regarding safety, or one which is actively managed using crisis comm tools. Case in point, a single aviation accident will profoundly damage an airline's public image, but there are thousands of train derailments every year in the U.S. One of the reasons derailments have limited publicity is that rail has the advantage of containing accidents to private property.

Conversely, transparent public accountability is a core theme throughout much of Cox's writing. He cautioned against crisis comm as a management tool for "an orientation and an economic interestedness that mirrored certain industry positions" (p. 13) because "we are straddling an ethical divide that implies choice" (Cox, 2007, p. 14). This statement highlights some fundamental differences for enviro comm, which I want to break down. First, Cox defines a crisis discipline as one that "must offer recommendations for management or intervention to protect imperiled species, biological communities, or ecosystems, under conditions of urgency and often without theoretical or empirical guarantees" (p. 6). Whereas crisis comm can be used as a management tool to reduce uncertainty, enviro comm does not have that luxury. In other words, environmentalism typically embraces the precautionary principle. Chapter 3 will cover that topic in detail.

The second core difference is that Cox advocates for an ethical responsibility to society. He stated, "I am less sure that simply to 'promote' scholarship, research, and so on, or 'awareness in the area' is enough to signal purpose in its sense of a disciplinary

mission" (p. 7). The role of enviro comm to engage with time critical work for public consciousness raising is also fundamental to the discipline. However, what Cox is saying is that enviro scholars (or those who write about climate change, the two are not synonymous) have a civic duty which goes beyond attention getting. Advocating for a multi-generational ethic of stewardship supersedes publication or promotion, and "scholars, more generally, have a duty to speak publicly when the results of their scholarship point to danger" (p. 16). Chapter 7 will discuss this conflict of interest in more detail. A sense of duty, or moral argument, often conflicts with market logics that incentivize the use of hydrocarbons.

Therefore, interdisciplinary approaches with long-term outcomes are fundamental. In particular, Cox drew heavily from Soule's scholarship in conservation biology. Some might argue that Cox transposed Soule's guidelines for a STEM field into the humanities. Regardless, there is a valid argument for enviro comm bridging interdisciplinary work to help solve our climate crisis. Cox (2007) stated that "both conservation biologists and communication scholars feel that the stakes are high as our own and other societies engage, or fail to engage, significant environment problems" (p. 9). This concept of high-stakes work, which should translate into progressive policy action, is a thread that connects the research of most enviro comm scholars. Lastly, Cox (2007) is concerned with effective action. To address significance, he referenced Jared Diamond and civilization collapse: "Social communication, more than natural biological changes alone, determines a civilization's course when confronting environmental decline" (p. 14). In a simple way, enviro comm scholars are a type of translator. This is one of the critical functions of communication, which is to bridge

disciplines in order to promote effective policy action. More specifically, it is an orientation that is cautious of regulatory capture. Cox concluded by emphasizing again that the discipline has a duty to speak out and provide warnings to society when we become aware of serious environmental impacts. This is a call-to-arms "derived from the work we do and the documentation we provide of problems or failures in communication systems related to representations of 'environment'" (p. 16). The outcome is an evolving dialogue about our relationship to the environment and to "competently communicate" (p. 17) time critical work. If the IPCC target date of 2040 limiting global warming to 1.5°C is to be reached, oil cannot freely flow out of the Bakken. My dissertation argues that oil trains have to be stopped if global warming is to be slowed. Oil is the feed stock of climate change, and roughly half of U.S. oil comes from North Dakota and half of that is shipped by rail (Grueskin, 2017).

Environmental communication is rooted in critical scholarship, but it also needs to engage with media to link global issues to immediacy and proximity. Matthew Nisbet (2009, 2013) is a critical media scholar who uses public health frames as a form of advocacy. When it comes to communicating climate change in the media, there is an ever evolving concern with methods for influencing public opinion. Perceptions on climate risk in North America have a solid decade of being stalled by apathetic impasses. One of Nisbet's concerns is that the media favors certain viewpoints, such as negatively biased climate crisis messages, which are highly buzzworthy and support the scientific uncertainty frame. These methods consistently shift attention away from policy action by focusing debate on uncertainty. Specifically, Nisbet critiqued Al Gore's documentary, *An Inconvenient Truth*, as hyperbolic advertising for "the most terrifying film you will ever

see" (p. 19) which reinforced an apocalyptic narrative as part of the Pandora's box frame. Nisbet (2009) stated,

These challenges, which are easier when the target of ridicule is a former political figure such as Gore, quickly reactivate a focus on scientific uncertainty and the heuristic of partisanship. In addition, the public is likely to translate these appeals to fear into a sense of fatalism, especially if this information is not accompanied by specific recommendations about how they can respond to the threats. (p. 19)

When I first taught environmental framing in my media literature course, class discussion always brought up advocacy. Most everyone understood how global warming leads to extreme weather events. When discussing fracking, my students were quick to understand the basics of regulatory capture by groups like the American Petroleum Institute. For example, Nisbet (2013) described the binary between climate science and economics as "the enduring division between those warning of industrialization and those defending its promise" (p. 11). What was hard to answer were the big questions, such as: What can any of us really do about climate change?

This is where Nisbet shines when it comes to advocacy, because he links to familiarity, proximity, and immediacy. There is a huge gap in public education about the health impacts posed by global warming. According to the *Six Americas* survey, less than 1% of U.S. citizens can draw a connection between drought, famine, and global warming. However, the public has a decent understanding of asthma, allergies, and heat stroke. Nisbet (2009) argued that a public health frame "shifts the geographic location of impacts, replacing visuals of remote Arctic regions, animals, and peoples with more socially proximate neighbors and places across local communities and cities" (p. 22). Air

quality might not be a big deal in Minnesota, but when I lived in California every city in the state was affected by pollution. Sometimes, it was scary for me as a kid growing up in Los Angeles, because there were days we were afraid to play outside. The air pollution was so bad that it would burn our eyes and send kids with asthma to the nurse's office.

In summary, the public health frame does not solve for the big questions in global warming, but it can be effective in raising awareness about the impacts of climate change—or the hazmat in our communities. People get it when they are sitting in traffic and see trucks belching diesel exhaust, or have to wait 15 minutes for an oil train to clear a crossing. Pollution is a broadly understood problem in N. America. The goal is to link relationships that give us the opportunity to discuss health with information on climate change. The media needs to up their game when it comes to reporting on health issues. For instance, stories linking the Zika virus to global warming were practically non-existent (unless one reads Bill McKibben). Nisbet (2009) advocated that "one way to reach audiences is to recruit their influential peers to pass on selectively framed information about climate change that resonates" (p. 22). Climate change needs more stories, and efforts to bridge media literature with environmental advocacy are a path forward. Other scholars like Maibach et al. (2010) have picked up the banner to begin advocating for the CDC to run campaigns on the environment, which mimic highly effective public health campaigns on communicable diseases. Nisbet is a wonderful source for interdisciplinary scholarship, because his work connects enviro comm to critical media studies in a way that addresses the immediacy needs of climate change policy.

Thirdly, because my methods are grounded in investigative journalism, I want to spotlight the work of Naomi Klein. I greatly admire her work and public persona, having met Klein at Scripps College during a lecture on *Shock Doctrine*. This was in 2008, right after Bear Sterns had collapsed, which fundamentally changed the way I view the dangers of capitalism. Something lost on the audience that night was how courageous Klein is with her investigations. She is an agitator, which is a necessary outcome of effective investigative journalism, but it has been personally risky for Klein and her family. For this review, I am mostly drawing from her "Capitalism vs. the Climate" article published in *The Nation*. It is a preview of her book *This Changes Everything*, and it has been a popular read with my students.

If Nisbet's health advocacy is an intervention for global warming, Klein's (2011) call to fundamentally dismantle neoliberal capitalism is the uncompromising solution. She is a Canadian socialist from Montréal, with extensive experience reporting on climate change impacts from Alberta's tar sands. Her position is that "mining the oil in the Alberta tar sands alone, says NASA's James Hansen, would be 'essentially game over' for the climate" (para. 19). Klein uses a hyper critical approach to the study of industry's contributions to global warming, along with a distinct apocalyptic narrative. What I appreciate about Klein's writing style is that it is succinct and hits hard. As an illustration, she said, "Climate change is a message, one that is telling us that many of our culture's most cherished ideas are no longer viable." (para. 27). Her scholarship is extremely useful for big picture perspectives on the relationships between climate change and the fossil fuel industry.



I am not convinced that one can effectively study climate change without examining the dilemma posed by those who try to detach the negative impacts of global warming from the ideology of capitalism. In her book, Klein opens with a recounting of a conference she attended, hosted by the Heartland Institute, in order to understand the ideology breeding opposition to progressive climate policy. Klein (2011) stated,

Indeed, if you ask the Heartlanders, climate change makes some kind of left-wing revolution virtually inevitable, which is precisely why they are so determined to deny its reality. . . . It is not opposition to the scientific facts of climate change that drives denialists but rather opposition to the real-world implications of those facts. (p. 61)

One of the repercussions is that the long-standing tenet of capitalism, the need for perpetual growth, would be fundamentally dismantled to the financial ruin of many industries. Klein prefaced the spending problem stating, "The old answer would have been easy: we'll grow our way out of it. Indeed, one of the major benefits of a growth based economy for elites is that it allows them to constantly defer demands for social justice" (para. 51). This argument unmasks the binary between the needs of capital and the needs of the environmental justice movement. It puts into tension the vested interest corporations have in maintaining the status quo (i.e., the hegemonic power of neoliberal capital) vs. a scientific mandate for a stable climate (i.e., liberal progressivism enforced through strict regulation).

Klein also points out that "the thirty-odd-year experiment in deregulated, Wild West economics is failing the vast majority of people around the world" (para. 37). This work opens the door to thinking about a post-industrial, and sustainable, world which is

not managed by technocrats born out of the military-industrial-complex. One of the most interesting chapters in the book is "Dimming the Sun," which examines several far-fetched solutions to climate change—ones designed to maintain Big Oil's hold on the status quo. A particularly ludicrous tech-based proposal was to blanket the earth with plastic sheets in space in order to block out the sun. Another was to actively cause volcanic eruptions in order to cool the atmosphere, along with other forms of solar radiation management where "the cure could be worse than the disease" (Klein, 2014, p. 275). Environmental solutions must eventually address the problems of living on a planet with finite resources, and economic systems based on perpetual growth. Klein (2011) stated that "these are profoundly challenging revelations for all of us raised on Enlightenment ideals of progress, unaccustomed to having our ambitions confined by natural boundaries" (para. 27).

Lastly, Klein has a very clear, frame-breaking style of advocacy, "After years of recycling, carbon offsetting and light bulb changing, it is obvious that individual action will never be an adequate response to the climate crisis. Climate change is a collective problem, and it demands collective action" (para. 31). This is a fairly typical statement within the environmental justice movement, but Klein believes the solution is to divest away from dirty money—such as fossil fuel investments and private capital controlled by Wall Street. The way forward is by supporting carefully regulated and subsidized markets in clean energy. However, there is a catch. What took me time to understand about the Lac-Mégantic disaster was how their town did not become a focal site for oil resistance. The region was, and continues to be, traumatized by the accident, which will be covered in detail in Chapter 4. Another disturbing outcome is that the region became

more dependent on oil and gas than before the accident. Most of the town's mixed-use buildings were demolished, and what was constructed in their place is an outdoor mall. It is hard for people to see how a fossil fuel economy wrecks the planet, but it is easier to notice once a town is destroyed. However, I am concerned that trauma, which always follows the extraction of precious resources, traps essential narratives into closed and private discourses.

### **Containment Thesis**

My core argument is this: A trope of containment describes business-as-usual practices, which function through regulatory capture, while manufacturing myopic public perceptions on environmental risk. It actively works to neutralize threats to industry, which sustains the status quo for capital, while containing public discourse to regulated interpretations of safety. This process was born out of Cold War policy, which normalized rhetorical strategies to shield the public from the dangers of nuclear weapons. Simultaneously, educational campaigns endeavored to normalize the development of nuclear power. That multifaceted strategy set a precedent for the ways in which business and government cooperatively manage the public sphere—particularly in order to contain dissent. Within government, what is also being contained are slow-to-change regulatory practices guiding public safety. In a study by the U.S. Government Accountability Office, the FRA admitted that their National Inspection Plan "is not designed to account for newly emerging risks or react swiftly to recent accidents" (GAO, 2013, p. 18).

These very same strategies, designed to protect the status quo, operate in today's oil and gas economy—which depends on the railroads to move hazardous materials. Without government agencies shielding the public from knowledge about the risks of

violence inherent to the extraction and transportation of hydrocarbons, it is unlikely that containment rhetoric would be an effective strategy to safeguard private profit interests. For example, in their review of railway safety regulation, Burton and Egan (2011) argue that the Federal Railroad Safety Act

fails to provide any method to make injured parties whole and, in fact, closes every available door and remedy for injured parties. As a result, the judicial system is left with a law that is inherently unfair to innocent bystanders and property owners who may be injured by the negligent actions of railroad companies. (p. 549)

Without public outrage, rail maintains its hegemony, reinforces cultural norms, and perpetually extends the threat that resource extraction poses to public safety and the environment.

Let us return again to the 1997 International Containment Technology Conference (ICTC), a site which operated as an epicenter for containment ideology. In his keynote address, describing DuPont's zero waste achievements, Dr. Hugh J. Campbell, Jr. stated,

When attempting to apply containment at specific sites, all of us have received public resistance. Essentially, containment was thought of as a "do nothing" approach that was a cheap and easy way to claim you were environmentally responsible. Slowly but surely this perception is changing ... to make containment a more reliable, acceptable, and cost-effective remedial technology.

(Campbell, 1997, p. 8)

He was responding to media flak about DuPont's history of toxic waste dumping, and defending containment as "sound science and engineering" (p. 8) for in-situ situations.

However, as a rhetorical strategy, containment is always working—until it fails—and new containment strategies are put in place to defend against a rupture. Campbell was shifting the focus back to technology, or material containment, even though he hinted at DuPont's failures with discursive containment. By the way, DuPont never fixed their containment problems with toxic waste, and they are deeply involved in the oil and gas industry (Fallon, 2018). Many of the complex chlorine and acid mixtures needed to frack a well are produced by DuPont (DuPont, 2018).

These types of containment policies are occupied with on-site treatments (e.g., the term in-situ generated 234 comments at the conference) which works to discount larger impacts. Case in point, the *Exxon Valdez* and *Deepwater Horizon* accidents demonstrated the need for in-situ burns, which would have been less damaging than the cleanup methods used at those accident sites (Shigenaka, 2014, p. 4). The public relations solution was to hide the severity of those spills using dispersion technology in order to sink the oil to the seabed (Gessner, 2011). However, shale oil is incredibly mobile, not just in its material properties, but the way it is transported and discursively framed. It is my contention that rhetoric designed for localized hazmat has spilled over, and the ideology of containment now influences policy far beyond its original intent. For example, the keynote speakers at the St. Petersburg conference represented the DOE, EPA, and DuPont Company. Taylor (2010) observed that "sociologists and historians have commonly depicted the DOE (and its predecessor agencies) as an authoritarian bureaucracy engaged in tragic (and arguably criminal) practices of secrecy, deception, and the containment of public understanding" (p. 5). Oreskes and Conway (2010) also

have a large body of work demonstrating the revolving-door system between private corporate interests, policy wonks, and regulators.

There was a serious conflict of interest within the steering committee of the ICTC. Specifically, the Office of Science and Technology, which resides in the Executive Office of the President of the United States, was now "in the technology deployment business" with the goal of "timely regulatory approval" through the "continue[ed] investment in regulatory cooperation" along with "privatization [as] a key investment strategy" (Campbell, 1997, p. 4). These were the ideological touch points of Dr. Clyde W. Frank's keynote speech at the ICTC, and 20 years later they still embody the mission of the Office of Science and Technology who employed him.

From a rhetorical perspective, it is unwise to separate the material from the discursive. Smith (2010) described "containment rhetoric" as a way to describe and define rhetorical imaginings that contain the threat of a group considered Other. Containment rhetoric can be insidious and difficult to detect ... [including] its distinguishing tropes and patterns" (p. 129). Scholars will often put "containment rhetoric" in quotes, because there is an irony in its very naming. The significance is not that rhetoric can contain groups or discourses, but how and why it functions. Therefore, the study of containment rhetoric is not so much a theory with clearly defined boundaries, but a way to map strategies which attempt to manage public discourse. In this process of representation, one discovers recurring themes or "imaginings that foster a more homogenous than diverse public sphere.... That is, they manage to rhetorically contain the threat of an opposing way of life" (p. 139). Containment rhetoric can also be described as a type of soft power or fiction—which capitalizes on ignorance.

Taleb (2007) described this normative paradigm as the case of the Thanksgiving turkey. From the bird's perspective, life is grand and each day follows the prior week's experience—until the final moment of the butcher's block. Taleb stated, "Something has worked in the past, until—well, it unexpectedly no longer does, and what we have learned from the past turns out to be at best irrelevant or false, at worst viciously misleading" (p. 41). For example, transportation accident chains generally unfold in a similar pattern. Risky behaviors perpetuate, until probability catches up to an environment that expedites the conditions necessary for a catastrophic event. Once a major accident happens, the public is outraged, government agencies depend on material effects (i.e., technology stop-gaps) to manage the public and their risk perceptions, the discursive threat to agency power and business interests become contained, and the conditions which precipitated the accident (i.e., the status quo) remain until the next accident occurs. Essentially, containment rhetoric often sustains itself discursively until it fails materially.

A model of this critique was a 1977 U.S. Nuclear Regulatory Agency (NRC) modal study on the ability of spent nuclear fuel (SNF) to survive transportation accidents involving a fire. This was the first in a series of studies investigating methods for moving radioactive waste. At the time, no one was sure if it was safer to send waste to a storage facility like Yucca Mountain by rail or by truck. In the development of a probability tree, one of the accident scenarios was a truck on a highway with SNF colliding with a fuel tanker or a train. The burn limit for a fire was 30 minutes at 1,475°F. It was concluded that the risk factor for rail was that 0.012% of all accidents would be severe enough to release radiation into the environment at levels exceeding regulation (Connolly & Pope,

2016, pp. 59-60). However, the Lac-Mégantic accident had a maximum temperature of 5,400°F. What this means is that a cask holding spent nuclear fuel will fail within a one hour inside an oil pool fire—an event unaccounted for by existing models. An oil train can sustain a fire above the worst-case-scenario models for several days. Taylor (2010) stated that "security institutions now incorporate the limits of knowledge, certainty, and control into their practices. Their subsequent plans depict the probability of undesirable events ... and in this process, 'risk' becomes an effect of rhetoric" (p. 3). However, containment responses, which are grounded in nuclear risk models, are slow to account for evolving risks—particularly the thermal potential of shale oil. None of the updated NRC studies hypothesized a truck with SNF hitting an oil train. That scenario would literally create a radioactive glow cloud, along with a severe toxic inhalation hazard (TIH). Chapter 5 will discuss TIH in more detail.

Descriptive rhetoric tends to be prescriptive—it enacts what it illustrates. For containment, this means that a government tasked with protecting the public can fall into a rhetorical trap of shielding corporations that produce hazmat. Genter (2014) argued that the Cold War "was simply one part of the larger unfolding of modernity.... All of which justified, in the name of either guarding or obtaining the secrets upon which the security of the American state supposedly rested" (p. 625). The security of the United States has been tied to resource extraction since day one. Nadel (1995) mentioned that nuclear power created a "fantasy-like economic boom in less than one generation" (p. xi). The same can be said of the Bakken, Eagle Ford, and Marcellus Shale oil fields. During the State of the Union address in 2014, a plan to develop "Sustainable Shale Gas Growth



Zones" was sold to the public as a way to secure America's energy future—without the reliance of foreign oil (The White House, 2014).

For the purpose of interrogating the state's position on rail safety, studies on government responses to public perceptions of risk about nuclear weapons also correspond to current hazmat risk response. Understanding these mechanisms is a useful analytical approach to the study of rhetoric used to manage narratives of other forms of hazmat—such as flammable liquids. Genter (2014) discovered that "the anxieties that gave rise both to the culture of containment and to the subsequent challenges to that culture were part and parcel of the vicissitudes of modernity at midcentury ... [which] marginalized the forces of dissent interfering with domestic security" (p. 618).

Containment from a government perspective is necessary to "to suture ... fractures within American society" (p. 619). This begs the question of whether rhetorical strategies from the Cold War are sustainable, or should be used to inform policy in today's Big Oil, Big Money, Big Data world.

As a rhetorical scholar, one of the gates that I have tried to hurdle is that our current conceptions of a radically changing climate are incompatible with preexisting ideologies. One of my past research projects was looking at prudence, the environment, and wise counsel from the early modern period. I was curious if it had any value or application to sustainability policy in today's political climate. Palmer (1984) stated that Renaissance environmental thought was primarily a reflection of environmental determinism or "the idea that climate does exert a decisive effect on the affairs of men" (p. 163). However, the overriding ethic was that "mankind fulfills its purpose on earth by bringing order to nature and mastering it" (p. 164). This ethic is still alive and well

through the embrace of fossil fuels. The oil and gas industry sells the idea that technology can manage, predict, and control a global environmental footprint. I am in the camp that believes society has a dysfunctional relationship between sustainable industrial practices and the ways in which capital incentivizes the future. The threat is so acute that a new strategy has to emerge, because oil does not get captured and it cannot be contained.

Oil is always working and cycles through the atmosphere for centuries after it is burned (see Solomon et al., 2009; Oppenheimer & Antilla-Hughes, 2016). The next chapter will explore this idea in detail, and how policy based on precaution is a more sensible approach, especially for mitigating damages caused by a single century's fuel burn. The Anthropocene needs to become an era of disruption for concepts like containment. Civilization is failing to balance short-term economic needs like putting gas in our cars, with long-term ethical needs such as species extinction. Carbon must stay in the ground or sea level rise will force horrendous outcomes, such as island nations like Tuvalu being forced to abandon ancestral land (Allen, 2004). Finally, the threat that free-rolling oil trains pose to our future cannot be contained ad infinitum. As long as oil trains crisscross America, a zero emissions future remains a distant and unobtainable goal. As long as oil is brought to unobstructed markets, it insures the death and dislocation of millions of people who are powerless to control their future.

### Chapter 3: Fracking in New York

We live in the era of the vigilant consumer, where products are carefully labeled and ingredient tables are clearly printed—on everything. The organic food movement has invested a tremendous effort in educating the public about the origin of the foods that fuel our bodies. When I go to the market, I can clearly see if the tomatoes were grown in California or Chile. The same cannot be said for the origin of the fuels that power our lives. Every semester, I look for the chance to poll my students on our sources of energy. I will point up at the lights and ask, "Where does that electricity come from?" I have yet to have a student proclaim, "Clean coal!" It is actually rare for them to mention coal at all, even though it can be spotted on river barges parked near campus. Sometimes, I can dig out the answer of natural gas. The Twin Cities campus burns both fuels during the academic year. The Main Energy Plant was renovated in 2017 and is hard to miss, because the construction had massive cranes that changed the skyline (Nygard, 2017). The building is also situated at the end of a main bridge that feeds pedestrian and bicycle traffic into the campus. Just upstream are the Southeast Steam Plant's four giant smoke stacks, which is also a prominent landmark on the Mississippi River. Both of these properties are owned by the university, and are highly visible in the winter from large exhaust plumes. One can even taste the bitterness in the air and feel the vapor sprinkle the face and eyes while on the Dinkytown bridge.

There is a tragic irony about the attention personal diets get while our collective energy diets generally go unnoticed. However, there are opportunities to better educate the public when energy use intersects with public health (Nisbet & Gick, 2008). For example, the first day I biked past the Main Energy plant, and smelled a chemical change

in the air, it motivated me to research what was in that building. Fracking in New York is a case where the potential harm motivated the public to have their health concerns addressed. This chapter focuses on the New York State Department of Health (NYSDH) report, which, Gov. Cuomo used to justify a permanent ban on fracking. It should be considered a primary document in fracking and shale oil scholarship. The report contains a collection of letters written by prominent health officials across the country, who advocated for a ban based on the precautionary principle. The New York controversy represents a significant clash between the public and private sphere in energy discourse.

This is also an important case study because it functions as an entry point for public education on hydraulic fracturing—which is also the starting point in a chain of production that made the U.S. the largest oil exporter in the world (Ladislaw, Sieminski, Verrastro, & Stanley, 2017, p. 1). Lastly, in order to better understand the consequences of shale oil consumption, or what has been called Shale 2.0 (Blas, 2018), it is important to understand the mechanics of how energy is acquired. One of the struggles for the public sphere is its ability to make informed choices, which is an underlying issue within the fracking controversy. For instance, several studies show a lack of education the public has about drinking water. The University of North Texas, in Denton, which is located at epicenter of fracking development, found that "54% of survey participants had a bachelor's degree or higher and yet were unfamiliar with the watershed concept." Among the 1,000 residents surveyed, 41% did not know the source of their drinking water, and there was widespread confusion about the recharge cycle of groundwater, or how fracking could pollute such water sources (Fry et al., 2012, p. 7444). A gap in environmental education has sustained a ten-year controversy over the safety of fracking,

along with the rest of the shale oil production chain. The public does not fully understand the process and this is a problem for regulators, alternative energy advocates, and disruptors of the status quo.

### **How a Moratorium Became a Ban**

One of the questions that I have been investigating is whether the U.S. is crossing a threshold where decisions have to be made on what is more valuable—cheap gas or clean drinking water. Fracking, in particular, has created a conflict between the nation's demand for cheap gas/oil and local resistance to drilling in order to protect public water sources. Notably, when Vermont publicly announced their ban on fracking, Governor Peter Shumlin stated,

This bill will ensure we do not inject chemicals into groundwater in a desperate pursuit for energy. It is a big moment. I hope other states will follow us. The science on fracking is uncertain at best. Let the other states be the guinea pigs. Let the Green Mountain State preserve its clean water, its lakes, its rivers and its quality of life. (Shumlin, 2012)

When he gave this statement in 2012, refined oil products had become the single largest export category in the United States, worth \$117 billion (Cart, 2014, para. 16). The boom came from improvements in horizontal drilling and hydraulic fracturing of shale rock and tight oil formations, hereafter referred to as fracking. Discourse on America's energy infrastructure often centers on big numbers positioned to equate economic growth. Barry T. Smitherman (2014), Chairman of the Railroad Commission of Texas, which regulates oil and gas drilling, stated that "over 400,000 Texans work in the Oil and Gas [*sic*] industry and the average wage per employee is a staggering \$128,000" (para. 7). The

public sphere is caught in the middle of a clash between the production of cheap gas and the protection of safe drinking water. There was another milestone in the 2014 energy controversy, and it occurred in Denton, Texas "the birthplace of hydraulic fracturing" (Cart, 2014, para. 12) and "the first city in the Lone Star State to outlaw the oil and gas extraction technique" (Richter, 2014, para. 1). The debate on fracking will determine how the nation wants to balance resource depletion against environmental stewardship.

Days before the winter recess in Albany on Dec. 17, 2014, the State of New York announced a permanent ban on high volume hydraulic fracturing (HVHF). During the prior four years, while a moratorium on drilling was in effect, the pursuit for natural gas "was heavily promoted as a source of economic revival for depressed communities along New York's border with Pennsylvania" (Kaplan, 2014, para. 2). Their neighbor to the west embraced an open drilling policy to exploit the Marcellus Shale, the largest and most productive natural gas field in the United States (Rahm et al., 2013). This is an exceptional case study on the intersections between oil, environmental stewardship, and the precautionary principle.

In other words, fracking is consistently framed as a jobs creating enterprise. It can bring income to rural residents who are under financial hardship, thus allowing them to retain ownership of generational land. Some New Yorkers felt that the state was prohibiting their ability to maintain a living through the ban on fracking. While the moratorium was in effect, local counties exercised the right of "home rule" by using zoning laws to prohibit drilling (see Negro, 2012; Smith & Ferguson, 2013). However, several large oil and gas companies had purchased leases on land that was available for drilling prior to the bans (Mufson, 2018). These contentious relationships were famously

dramatized in the film *Promised Land*, which depicted industry reps going door-to-door to have landowners sign drilling rights for large cash payments. In opposition were other residents concerned about a litany of unknown impacts that fracking could bring to their community. The economic pressure often fractured the social fabric of these communities. Scott Kurkoski, a lawyer representing a New York dairy farmer who signed a drilling lease in 2007 stated, "Are we going to let 932 towns decide the energy policy of New York state [*sic*]?" (Mufson, 2018, para. 22). Apparently, he was referring to the other 639 towns that had yet to pass regulation on fracking (New York State Library, 2018).

Due to increasing economic pressure, succession talk started to spread in the southern tier of New York prior to the ban. Speaking to a group of diners in Windsor, NY, journalist Tina Susman heard from farmers who believed that "it's better to save local economies than leave them to die based on what might happen" because "they had not seen evidence of fracking's dangers to support the ban" (Susman, 2015, para. 26). Furthermore, according to *The New York Times* the fracking controversy "has been one of the most divisive public policy debates in New York in years" (Kaplan, 2014, para. 7). Vermont was the first state to ban fracking in 2012, then New York in 2015, and Maryland in 2017 (Kelly, 2017). Fracking has been rhetorically constructed to polarize the economy against environmental sustainability, which makes for a useful study on how the precautionary principle manifests in government regulation.

### **Chain of Production**

The process of how energy gets into our gas tanks, runs our computers, and lights our path is fundamental to an environmental education. I include a discussion on the

mechanisms of fracking in this chapter because it is critical to the New York ban decision. Understanding the extraction process requires an examination of the potential environmental harms that occur with toxic fluids, and poorly regulated waste management practices. An EPA study identified over 1,000 chemicals in flowback (EPA, 2012, p. 164) from fracking wastewater, which the industry calls "produced brine" or produced fluids (Rahm et al., 2013, p. 106). Fracking uses a pressurized fluid cocktail to extract hydrocarbons, and the path of least resistance is typically back up the well to surface holding tanks. However, public utilities are incapable of treating extremely salty brines (>100,000 mg/L TDS). Any serious discussion of energy policy requires an examination of the produced waste. Analysis on shale oil is also critical to the accident chain that fixed Lac-Mégantic to tragedy. The product that did the damage was sourced in North Dakota from a fracked oil well.

The American Petroleum Institute (API) created an education campaign on the oil supply chain that is designed "to communicate, in the simplest terms, how the industry works from the identification of resources to the end user" (API, 2017, para. 1). The Lac-Mégantic tragedy happened in the middle of a 12-step process, or what I call a chain of production. This chapter primarily focuses on the fourth stage, which is production. The prior three steps are identification, exploration, and construction. However, production is critical because the full-scale extraction process, according to the State of New York, threatens public safety. There is also a problem of scale when it comes to shale oil extraction. At the national level, fracking is the start of a revenue stream that sends hundreds of thousands of tank cars to 143 refineries in the U.S., which then sends hundreds of thousands of gasoline trucks to an equivalent number of retail pumping



stations (Lemieux, 2017). Mitchell (2013) noted that "10 percent of the land area of the lower forty-eight U.S. states had been leased for oil and gas, making this the largest single land-use in the country" (para. 11). At this scale, it becomes apparent how interconnected fossil fuel extraction is to capitalism. A dismantling of one would cause the undoing of the other, which is a core problem for sustainability advocates and a "keep it in the ground" policy (Boyd, Boykoff, & Newell, 2011, p. 605).

The term chain of production is historically linked to critiques of capital. In fact, the phrase "modes of production" originated with Karl Marx. Hall (1978) explained production very succinctly when he stated, "In whatever form, capital could not exist for a day without production; and production was not possible without the exploitation of productive labour in the class-structured relations of capitalist production" (p. 366). However, my overriding concern is how capital exploits the environment, rather than capital's interest in exploiting human labor for profit. Analysis on a chain of production mirrors Worster's (1990) perspective that "technology has restructured human ecological relations, that is, with analyzing the various ways people have tried to make nature over into a system that produces resources for their consumption" (p. 1090). Fracking demonstrates a primary relationship between our way of life and the environment, which can be negotiated as a discursive contest between profit and public health. In other words, energy conflicts are typically a clash between spheres, which was certainly the case in New York.

This collision between the public and private spheres has a tendency to demonstrate dysfunction at the national level in the democratic process, yet can be extremely effective at the local level. Hall (1978) stated, "Economic crisis can eat away

the supports of democratic class societies, and expose their inner contradictions" (p. 338). Even though he was discussing systemic racial issues, which are magnified by neoliberal capitalism, a similar structural mechanism exists within our energy infrastructure. The debate on fracking is a story about nationalized capital, represented by the oil and gas industry, and its clash with local communities—particularly farmers. Our energy problems are so large that no single group has the power to break the hold fossil fuels have on public conventions. During my initial research, I attended an informal talk with *New York Times* journalist Andrew Revkin, who believes that environmental problems have become too large to manage in a traditional sense. What he hinted at was regulatory capture and corporate power over the public sphere.

Hall (1978) and Harvey (2012) are useful for unpacking fracking discourse through a critical perspective on the mechanisms of capitalism. Hall's work on racial tension in England is useful for framing, and Harvey's examination of the urban landscape is useful for problematizing the nation's energy infrastructure. For example, fracking has been positioned as a bridge technology to grow the U.S. economy. In 2012, President Obama stated, "We have a supply of natural gas that can last America nearly a hundred years, and my administration will take every possible action to safely develop this energy" (McKibben, 2014, para.4). However, communities like Dish, TX, which sit on the Barnett Shale, are being abandoned due to environmental destruction caused by venting gas and water contamination from produced brines (Adlesic, Wallace, & Fox, 2012). Harvey (2012) stated, "A process of displacement and dispossession, in short, also lies at the core of the urban process under capitalism" (p. 18). Dish is part of the

Dallas-Ft. Worth metroplex, and was one of several urban communities engaged in public anti-capitalist demonstrations against the oil industry.

In certain cases, fracking has been a way for capital to syphon wealth from landowners, particularly by targeting farmers on the margin. Privatizing the use of water enables fracking companies to mask several long-term and potentially destructive impacts such as groundwater contamination, illegal dumping, and surface spills of epic proportions. All of these hazards have been exposed by a nine-month *New York Times* investigation on North Dakota fracking operations (Sontag & Gebeloff, 2014). It was discovered that between Jan. 1, 2006 and Oct. 13, 2014 the oil industry was responsible for 2,390 uncontained spills in the state ("Reported," 2014). Contamination was the catalyst that set neighbor against neighbor roughly ten years ago when fracking began to invade private property. It has caused a rift in communities where some families depend on mineral royalties to keep possession of their property, whereas their neighbor might have no interest in an oil company being on their land. However, both groups share groundwater, which has the potential to become polluted through injection and/or dumping. Injection disposal uses deep wells (>5,000 ft.) to dump used flowback and high-TDS (total dissolved solids) brine as a permanent wastewater treatment method. It is an industry solution for moving toxins away from groundwater. However, due to the depth and pressure needed to deliver fracking fluids, wells have a history of cracking open (Rumpler, 2013, p. 11). Disposal sites that should be secure for 10,000 years can still release toxic wastewater into clean water sources. *ProPublica* has a long-standing investigation series on injection wells, and one particular case in Ohio stands out. A well drilled in 1989 to a depth of 6,000 feet was used for phenol disposal, a caustic chemical

linked to organ failure. After 16 years, the fluid waste had migrated up to mix with drinking water at a depth of 80 feet (Lustgarten, 2012). Spills and toxic leaching of protected water sources from industrial waste are long-term consequences from policies aimed at short-term profits. The next section of this chapter will cover more evidence on produced brines migrating out of fracked wells.

The problem for environmental discourse, when it is limited to an economic benefits focus, is that it delegitimizes policy designed for ecological protections. During the State of the Union address in 2014, a plan to develop "Sustainable Shale Gas Growth Zones" was introduced ("The State of the Union," 2014). Then national support of fracking was reinforced when President Obama stated, "If extracted safely, it's the bridge fuel that can power our economy with less of the carbon pollution that causes climate change" (McKibben, 2014, para.5). The impact is that alternative discourses, such as global stewardship of the environment, are marginalized. Hall (1978) believed that heavily capitalized fields play "a critical role as a disinflationary factor in periods of capitalist recession—one of the pivotal mechanisms of crisis management in an economy characterized by 'slumpflation'" (p. 344). Oil has been stuck in the \$60/bbl range for over a decade, which is half its peak value (EIA, 2019). A mechanism of economic vulnerability is often at work in cases that cause both a fracturing of the land and a fracturing of community relationships—all of which are an advantage to the oil and gas industry. Fracking operations are designed to make a quick profit and then abandon the area. For instance, the production curves of horizontally drilled wells typically have a 60% depletion rate within the first two years ("The economics of shale," 2014).

A fracked well's production lifecycle is a major concern in North Dakota, where the oil boom places tremendous pressure on social support services, and communities are wary of building permanent infrastructure to handle an influx of migrant workers. The state also has a history of being jilted at the altar with unrealized construction projects that were promised by the oil and gas industry (Adamson, 2015). To the north, at Fort McMurray, lies the heart of the North American oil boom. Locals call it "Fort McCrack" for housing "what the municipality calls the 'shadow population' dwelling in motels, camp-grounds, homeless shelters, and even shipping containers" (Horwitz, 2014, loc. 97). Fracking also represents a civic problem where voices at the local level fade within a larger discourse on energy infrastructure—where needs going beyond a single generation. Harvey (2012) is deeply concerned with how society constructs meaning through attachment to social symbols. He believes that

the right to the city is an empty signifier. Everything depends on who gets to fill it with meaning ... we inevitably have to confront the question of whose rights are being identified, while recognizing, as Marx puts it in *Capital*, that "between equal rights force decides." (p. xv)

Similarly, I believe that fracking is a signifier of a crisis where anti-fracking movements symbolize a direct threat to an economic system based on unsustainable energy production. Harvey's work toward an urban revolution is useful for positioning the oil and gas industry as a problematic outcome of neoliberal capitalism.

In this sense, fracking represents an infinite-loop model of consumption demands generated by urban life and finance capital. Harvey (2012) stated, "Capitalism is perpetually producing the surplus product that urbanization requires. The reverse relation

also holds. Capitalism needs urbanization to absorb the surplus products it perpetually produces" (p. 5). Case in point, some argue that the New York fracking ban was merely a symbolic victory, because urban living (especially during winter) depends on natural gas. A lack of production in New York corresponds with increased production elsewhere. Scott Martens, a Middletown resident who campaigned against new construction of a natural gas pipeline, stated that "we're about to plug New York City into 40 years of fracking. So yeah, we do frack here in New York State" (Ziesche, 2018, para. 18). He was referring to fracking in the Marcellus Shale, which produces gas outside of New York to be brought into the state through pipelines. Harvey was clear that "booms in one place ... correspond to crashes somewhere else" (p. 44), which begs the question of who is on the other side of the fracking trade?

Communities like Denton, TX have lived with fracking since 2001, where 121,000 people reside among 270 gas wells (Malewitz, 2014, para. 7) exceeding the Barnett Shale average of 8 wells per square mile (Hughes, 2014, p. 188). The city council passed a fracking ban in 2014 due to resident health complaints. However, in 2015 Texas passed House Bill 40 which prohibits cities from banning drilling, and Denton is open for business again in an environment where halting development of natural gas reserves has become illegal (Baker, 2015). Denton sits in the middle of a gas zone that could peak at 41,426 fracked wells (Hughes, 2014, p. 188). For reference, there are 15,434 gas stations in Texas, which is 10% of the United States market (<http://www.tffa.com>). The state's decision to maintain open drilling in Texas was expressed by Smitherman (2014), who worried that

if the citizens of Denton vote to ban hydraulic fracturing, they essentially will be voting to ban drilling. If other cities were to follow your lead, then we could potentially, one day, see a ban on drilling within all cities in Texas. (para. 15)

He went on to reinforce the link between urban communities and the capital produced by the oil and gas industry. Smitherman said, "It's amazing that our three largest Texas cities, where millions of people use lots of air conditioning in the summer, had the lowest utility bills in America ... and it's all because of hydraulic fracturing" (para. 10). As a prominent voice for the oil and gas industry in Texas, he was expressing the deep concern the energy complex has about losing its grip on national infrastructure. Today, he teaches one energy class every spring at UT Austin's School of Law, which is informed by his time as a Wall Street investment banker and chair of both the railroad and public utilities commissions (Smitherman, 2019).

## **Precautionary Principle and Public**

### **Health**

Modern policy on fracking represents a clash where material rhetoric used to justify economic exploitation of the environment has to reconcile with modern predicaments, which the precautionary principle tries to manage. One of the concepts supporting this ethical perspective is that "environmental and health problems continue to grow more rapidly than society's ability to identify and correct them" (Kriebel et al., 2001, p. 871). The idea is that we live in a world of exponential environmental pressures, which are dealt with through linear public policy corrections. Phrased more simply, "The problem very often is that long before the science does come in, the harm has already been done" (Pollan, 2001, para. 5). For example, despite industry assurances of safe

practices, Chesapeake Energy was fined over \$1 million for contaminating the well water of 16 families in Pennsylvania (Kusnetz, 2011). However, it was uncertain if that was an isolated incident or part of a systemic problem of well casing failures intrinsic to industry best practices. At the time, pollution data from 24,925 fracked wells was inconclusive due to the complexity of the ongoing study (EPA, 2012).

What makes New York special is the precautionary principle was used to circumvent the problem of policy based on uncertain science. For instance, the NYSDH (2014) acknowledged that "the science surrounding HVHF shale-gas development and public health risks is only just beginning to emerge" (p. 41). It should also be noted that environmental policy has been in a long struggle against capital interests invested in the manufacture of doubt and uncertainty, which enables industry to maintain business-as-usual practices (Oreskes & Conway, 2011). Fracking in New York could have the potential to accelerate climate change through the release of methane gas. In certain areas, particularly Texas, the off-gassing from fracking is shockingly higher than industry experts admit (Srebotnjak, & Rotkin-Ellman, 2014). The New York State Department of Health (NYSDH) report was particularly concerned with methane gas leaks. John L. Adgate, Chair of the Department of Environmental and Occupational Health in New York, stated that

the impact of methane emissions during well development, for example, is important given the realities of a changing climate. The science assessing the cumulative effects of shale gas development on climate change is, however, still emerging, and the implications of this work for NY-specific regulation unclear. (NYSDH, 2014, p. 73)



Taking this idea further, Brownsword (2011) links prudence, precaution, and stewardship over "a commons" which "provides the staging for all communities of (human) agents—a set of conditions that are generic in the sense that they are essential no matter what particular purposes a community and its (human) agent members might choose to pursue" (p. 574). In New York's public health review on fracking, they linked the commons to air and water quality, community safety in the prevention of automobile and trucking accidents, and the avoidance of induced earthquakes from drilling operations. It is also no coincidence that the NYSDH used precaution as a guiding principle due to its relationship to the medical profession's duty of care ethic. The call was also made for other states to follow their example and "advocate for a more concerted transition from fossil fuels to sustainable energy" (NYSDH, 2014, p. 143). Based on the evidence used by the NYSDH, this is a case of moral argument winning against market logic.

However, fracking is a critical economic activity and generally cannot be contained to the lens of public ethics. Conservative reactions to precaution argue for more scope, to account for the range of impacts that a statewide ban could produce. John D. Graham, administrator at the Office of Management and Budget, gave a lecture at the Heritage Foundation promoting a centrist approach to environmental policy. He believed that organizations must "consider the dangers of excessive precaution. One of those is the threat to technological innovation" (Graham, 2003, p. 3). Due to the Three Mile Island incident (TMI), he went on to state that

there has been a de facto moratorium on the construction of new nuclear power plants in the USA. We have become more deeply dependent on fossil fuels for energy, and now precaution is being invoked as a reason to enact stricter rules on

use of fossil fuels. Part of the answer may rest with clean coal technologies and renewable energy. (p. 3)

Withdrawal from nuclear power on the east coast did create a greater reliance on hydrocarbons. One generation after the TMI accident, 35 years in this case, the U.S. was again wrestling with the implications of a new energy policy.

The precautionary principle can work as a multi-generational approach to environmental stewardship, in particular, to resist and/or manage capital driving fossil fuel economies. For example, carbon output from urban centers like New York impact remote villages on the other side of the planet. The relationship between distance and health is one of several factors guiding the precautionary principle, but another element is time. The Haudenosaunee belong to the Five Nations living in the Northeast, which includes New York. Rick Hill Sr., chair of the Haudenosaunee Standing Committee on Native American Graves Protection and Repatriation Act, stated, "If you ask me what is the most important thing that I have learned about being a Haudenosaunee, it's the idea that we are connected to a community, but a community that transcends time" (Spurling, 2004). He was referring to the role of chief in considering the future needs of interconnected groups. The wisdom of indigenous peoples is to steward the land to the seventh generation (Clarkson, Morrissette, and Régallet, 1992). Consider that the IPCC has a target date of 2040 to limit global warming to 1.5°C with projections of significant sea level rise by 2100 once that level is breached (IPCC, 2018). A seventh generation perspective, with 2018 as the starting point, would guide environmental policy to the year 2250. Faithkeeper of the Onondaga Nation, Oren Lyons, stated,

When you sit in council for the welfare of the people, you must not think of yourself or of your family, not even of your generation. He said, make your decisions on behalf of the seven generations coming, so that they may enjoy what you have today. (Spurling, 2004)

For Howard Zucker, the NYSDH acting commissioner, environmental ethics is a personal choice, "I have asked myself, 'Would I let my family live in a community with fracking?' The answer is no. I therefore cannot recommend anyone else's family to live in such a community either" (Susman, 2015, para. 15). His statement became the most publicized sound bite during the NYSDH's presentation of its 184-page report to state lawmakers. Even though his rationale is sound, it does contain environmental discourse to a single-generation perspective, which can be destructive to the long-term goals of climate change reform.

One of my take-away questions is whether New York's statewide ban on fracking, rationalized by the precautionary principle, was good policy (a.k.a., a prudent act). Hariman (2003) stated, "The history of prudence is not so much a study in development as it is a means for recognizing and managing a particular cultural predicament" (p. 290). Industrialization is forcing the planet toward a global warming has a tipping point. One of the predicaments of the Anthropocene is whether governments can design multi-generational policies to account for the carbon footprint of economic expansion. Pollan (2001) believes that "the precautionary principle poses a radical challenge to business-as-usual in a modern, capitalist, technological civilization" (para. 5). Opposed to this perspective are the oil and gas industry and the immense economic activity that depends on a constant flow of hydrocarbons.

Therefore, Big Oil works to re-entrench a fossil fuel economy through fracking, thus embracing hazardous behavior rather than engaging in prudent environmental policy. Cox (2013) stated, "The proponent of an activity, rather than the public, should bear the burden of proof" (p. 325). This ethical argument has the effect of inverting the precautionary principle in the face of market logic. Big Oil has clearly established a financial incentive to fake science and hide evidence of its activities on the planet. In fact, Exxon Mobil "channeled more than \$8 million to forty different organizations that challenged the scientific evidence of global warming" (Oreskes & Conway, 2010, p. 246). Also, in real terms, the State of New York has a large consumption demand where it can afford to import natural gas. Governor Cuomo stated, "I've never had anyone say to me, 'I believe fracking is great.' Not a single person in those communities. What I get is, 'I have no alternative but fracking'" (Kaplan, 2014, para. 3). Since the state generates revenue from financial services outside of fracking, it does not rely on fossil fuel income as a measure of last resort.

Lastly, Big Oil embraces an old ethos that humans hold domain over nature. This idea can be traced back to Cicero (2014/1913) who stated, "Everything that the earth produces is created for man's use" (1.21). Getting at the root of this idea could be useful for understanding how industrialization has screwed up the planet in an amazingly short period of time. I mention Cicero because it can be useful to return to the roots of ethical philosophy. For instance, a review of Renaissance environmental thought argued that pre-industrial law was linked to environmental conditions. Palmer (1984) reflected on the work of Thomas More when he stated, "The two principal theorists of environmental impact in early modern Europe both subscribed to some degree to the idea of

environmental determinism, believing that culture and social institutions can be understood as responses to environmental conditions" (p. 164). The definition of environment in this case was linked to climate. However, More believed "that reform and the just society could be achieved when humanist doctrines were incorporated into the legal system" (p. 169). I believe that New York's ban on fracking is such a case.

In contrast, the fracking model where shale oil production depends on perpetual growth is the epitome of "running a vast experiment on the biosphere" (Cox, 2013, p. 323). There is a general absence of moderation in the oil sphere. It is about pumping as hard and as fast as humanly possible, which is diametrically opposed to reasonable long-term management of carbon emissions. To maintain the 2013 boom rate of natural gas and shale oil production, the U.S. would need to drill 6,000 new wells a year at a cost of \$35 billion (Loder, 2013, para. 7). When seen at this scale, the economics of fracking start to unravel. The oil and gas industry is also notoriously remiss when it comes to supplying evidence to the effects of fracking. One of the industry's litigation strategies has been to shift the burden of proof to landowners, who are generally incapable of providing evidence that their well water met purity standards prior to fracking operations (Sontag & Gebeloff, 2014). However, state law often does not require baseline measurements of air and water quality before fracking operations begin (Burton et al., 2014; Jackson et al., 2014).

In the era of the Anthropocene, conceptions of the commons must span across every ocean and nation-state to embrace a multi-generational stewardship of nature. Of the various policy applications of the precautionary principle that I have reviewed, the most relevant is Geiser (1999) who believed the following:

The United States Congress should amend its environmental laws to establish a general duty to act precautionously toward the environment. A general duty to act with caution would clarify the responsibilities of all parties to assure environmental protection, even where there are no statutory regulations with which to comply and where there is no scientific certainty on which to rely. (xxi)

Palmer had a beautiful concluding remark that "nature is not an awesome, tyrannical force, determining man's fate and character, or causing widespread misery. Rather it is a common treasury intended for the enjoyment of all" (p. 174). This contention also reflects the seventh generation principle, which is a mode of thinking where prudence fosters a global normative ethic of stewardship to moderate the demands of industrialization.

### **Risks Beyond New York**

Economic pressure to drill works to delegitimize long-term stewardship of the environment. The competition for how we use and abuse our natural resources has a limited timeline. For example, government and industry studies publish energy outlooks with single-generation timelines in the face of multi-generational impacts. British Petroleum (BP) and the U.S. Energy Information Agency (EIA) release yearly outlooks on the energy industry with projections ending in the year 2040 (BP, 2014; EIA, 2014a). This is not a healthy perspective for a society in desperate need to construct a sustainable future. The drilling model of 2,500 new wells a year in the Bakken Shale exemplifies an economic system that depends on constant and unsustainable consumption ("The economics of shale," 2014, para. 9). Stanford University released a study in 2011 showing that the U.S. could convert its electricity production entirely to wind, water, and

sun power (WWS) by 2030 using existing technology. They also claimed that the U.S. could be completely free of fossil fuels by 2050 with a zero emission infrastructure (Jacobson & Delucchi, 2011). So why are we stuck in the fossil fuel paradigm?

The Stanford study shows that sustainable WWS power can get the United States to the same electricity generation capability that fracking will generate within the next 20 years. Part of my intent in producing this work is to raise the publicity of essential environmental arguments about shale oil production. The ban controversy in New York certainly raised public awareness about fracking. Fraser (1990) stated that publicity "can mean 1) state-related; 2) accessible to everyone; 3) of concern to everyone; and 4) pertaining to a common good or shared interest. Each of these categories corresponds to a contrasting sense of 'privacy'" (p. 70). Corporate privacy couched in the technical sphere is one of Fraser's concerns. For illustration, the Ohio phenol incident was a 23-year legal battle with the EPA and Ohio regulators. It ended with Aristech Chemical Corp. walking away from any liability. The company no longer exists, having been bought and spun-off into two corporations. During that process, key documents demonstrating toxic leaching of drinking water disappeared from 40,000 pages of state records (Lustgarten, 2012).

National resources issues cannot be held within private discursive fields, or relegated to localized arguments, that ignore the oppressive structure of the fossil fuel industry—which actively works to reproduce the status quo. Smitherman (2014) stated that "hydraulic fracturing is the transformative technology that has radically changed the Texas, American, and Global [sic] energy markets in a very favorable way" (para. 3). Using rhetoric to position the fossil fuel industry as transformational technology is a false signifier. This frame has to be broken in order for a national discourse to move toward

sustainable energy policy. Fraser (2007) also warned that entrenched neoliberal capital interest are a means of "systematically reversing the democratic project [by] using markets to tame politics instead of politics to tame markets" (p. 17). It might be possible for the anti-fracking movement to form a new urban green revolution. Even in the light of the New York state ban, this is a highly contested issue within the public sphere. The November 2014 elections saw three Ohio cities reject proposed fracking bans, while Athens, Ohio approved a new gas project. In California, proposed fracking bans failed in Santa Barbara County but passed in Mendocino and San Benito counties (Richter, 2014, para. 13). Robert Rivas, San Benito county supervisor stated, "I'm concerned about quality-of-life issues. We need to be in control of our growth, not the oil and gas industry" (Cart, 2014, para. 14). This is sound ethical reasoning.

One of the few voices in academic rhetoric on the environment is Sovacool (2008) who stated, "The public sphere faces steady erosion by the elevation of personal and technical groundings of argument" (p. 346). He advocated for public education on environmental issues as a means to break free of cognitive dissonance, as seen in the debate between cheap gas and clean water. A major hurdle to overcome, and where the central controversy exists, is water contamination. Groundwater depletion and safety is an extremely complicated issue and varies county to county and state to state. Geological formations can be as diverse as communities. However, natural gas is expected to produce one third of America's electricity by 2040, with the major source being shale gas from fracking (EIA, 2014a, pp. MT 21-23). The push to get natural gas fired generators into the national electric grid saw a 5% jump in 2012 alone (Wang et al., 2013, p. 11). Concurrently, the greatest increase of demand on water over the next 15 years will come



from the energy sector with 85% of the share (Carter, 2013, p. 1). According to British Petroleum (2014), "The power sector is the one place where all fuels compete" (p. 19). The nation's constant and expanding energy demand operates within a discursive arena from which we as a society can examine how we construct our future.

Another egregious problem is the privatization of water, which enables fracking companies to mask several long-term and potentially destructive impacts. Following this trend are cleanup costs after a spill, which are so expensive that incentives exist to mask the damage being done to the environment. Fraser (2007) stated that "efforts to 'privatize' economic issues and to cast them as off-limits with respect to state activity impede, rather than promote, the sort of full and free discussion that is built into the idea of a public sphere" (p. 74). The following story of a farming family in North Dakota encapsulates her critique.

The isolated property of the Jensens in Tioga, North Dakota was the site of "the largest on-land oil spill in recent American history ... which went unreported to the public for 11 days" where 33 acres of wheat were permanently destroyed by 20,600 barrels of oil leaked from a pipeline which had not been inspected by its owner, Tesoro Logistics of San Antonio, for eight years (Sontag & Gebeloff, 2014, A record spill section). More than a year after the July 2013 spill, there has been no penalty to the company. L. David Glatt, Section Chief of the N. Dakota Environmental Health Department and former manager of the groundwater protection program, publicly acknowledge that "clearly, [Tesoro] have impacted the groundwater system" (A record spill section). He criticized the oil company by stating, "How do you lose over 20,000 barrels of oil and not realize it? That does kind of boggle the mind a little bit" (A record

spill section). The spill was reported to the EPA, who did not proceed with any enforcement action. According to Sontag and Gebeloff, "With spills steadily rising in North Dakota, evidence gathered by *The Times* suggests that the cooperative approach is not working that well for the state" (para. 16). Their investigation discovered "more than 18.4 million gallons of oils and chemicals spilled, leaked or misted into the air, soil and waters of North Dakota from 2006 through early October 2014" (para. 18). It did not help matters that the state issued 1,927 drilling permits inside a 10-day window during 2011 (Sontag & Gebeloff, *Embracing the oil section*).

For the Jensen family, it will take two years to clean up their farmland, with estimated damages between \$4 and \$25 million. The costs have a wide variable because the soil has to be burned on site in thermal desorption units, and the more oil they uncover the higher the cost (Sontag & Gebeloff, *A record spill section*). To reiterate Fraser (1990) this is a clear example of the private sphere acting "to enclave certain matters" (p. 73) in order "to shield them from general public debate and contestation" (p. 73). Therefore, "critical theory of actually existing democracy ... should render visible the ways in which social inequality taints deliberation within publics in late capitalist societies" (p. 77). One of the recurring tropes in the fracking controversy is when multi-generational farming families lose their way of life due to pollution and become outlaws in a fight to publicize their story. The HBO documentary *Gasland Part II* clearly exhibited families in Wyoming, Pennsylvania, and Texas who were under gag orders because of settlements with oil and gas companies, whose fracking operations led to contamination of their property.

The North Dakota case is a blatant example of the risks fracking poses through surface contamination, but what of the more insidious form of groundwater contamination. Environmental communication is critical to the unpacking of data and technical jargon to counter oil and gas industry rhetoric, which claims that fracking is not a threat to property or safe drinking water. Studies on the Barnett and Marcellus Shale legitimate public concern that oil and gas extraction does indeed pollute groundwater sources (Fontenot et al., 2013; Vengosh et al., 2013). In a study of private drinking water wells near extraction sites in the Barnett Shale, which surrounds the Dallas-Ft. Worth metroplex, 29 of 90 water wells exceeded the EPA's limit for arsenic (Fontenot et al., 2013, p. 10035). Compounding the issue of water contamination is the accelerated withdrawal that fracking places on water sources. Use of groundwater in the DFW area by fracking will double by 2025, which is projected to significantly lower the water level in the Trinity and Woodbine aquifers (p. 10036). A separate study on the Carizo aquifer in Texas, which is the primary source for fracking fluid used in the Eagle Ford Shale, found that "population growth will increase demand for this resource and possibly compound stress on the aquifer whose water levels have significantly declined in past decades" (Nicot & Scanlon, 2012, p. 3584). During the time of my study, Texas was in a severe drought that was amplified by the oil and gas industry's unsustainable demand.

To put this demand on a personal scale, fracking one well in California in 2013 consumed 87% of the yearly water supply for a family of four (Onishi, 2014, para. 1). Water is a scarce public resource for the planet, so much so that in July 2010 the United Nations General Assembly adopted a resolution "recognizing the human right to water" (Baer, 2014, p. 145). The real danger is not the depletion, but the potential pollution

compounded over a stressed resource. During the process of fracturing rock (picture breaking apart a slate chalkboard buried a mile underground using a toxic sandblaster) water and the fossil fuel it carries can migrate rapidly to areas beyond the control of the companies who drill for the gas. *Gasland Part II* raised public awareness of these risks by displaying a couple American families lighting the water from their kitchen faucets and garden hoses on fire. Sometimes fracking operations were on their property, and sometimes they were miles away. However, in each case, the gas migrated into the homeowner's drinking water. Through increasing national discourse, the public is becoming more aware that fracking does not simply pose an individual or local threat, but it is indeed part of a risky national energy policy that positions cheap gas ahead of safe drinking water. Encapsulating New Yorker's pride in their water, Brooklyn Brewery was an early voice by creating an anti-fracking "Save our beer!" campaign, highlighting the risk that gas migration could pose to the unfiltered water their customer's depend upon (Brooklyn Brewery, 2012).

Put simply, the demand for cheap gas at the national level places a "cumulative risk of violations" on the environment and public stewardship (Jackson, 2014, p. 10903). These harms come in the form of water contamination, deficient regulatory oversight, dumping, well casing failures, tax evasion, etc., all occurring at an exponentially increasing rate due to economic pressure to frack harder (Sontag & Gebeloff, 2014). What is at stake is the ability of democratic governance to support the stewardship of natural resources while under stress from an energy driven economy that demands perpetual growth. Hydraulic fracturing is a resource extraction technique fueling a national economic story with the potential to create a national environmental crisis. It

also is a means for the oil and gas industry to position state against state and neighbor against neighbor, while maintaining an uninterrupted revenue stream from dirty oil.

### **Fracking Futures**

Environmental analysis on fracking begs the question: Is short-term value creation worth long-term risks? Value creation within the neoliberal model is almost exclusively financial. Speculative capital, in all its various forms, are highly incentivized and the driving force behind fracking. Harvey (2012) stated, "The world Bank plainly favors speculative capital over people. The idea that a city can do well (in terms of capital accumulation) while its people (apart from a privileged class) and the environment do badly, is never examined" (p. 29). The second, and fundamentally most important, problem that Harvey examined is the paradigm of perpetual capital growth:

Compound growth (say, at a minimum of 3 percent forever) is a sheer impossibility. Capital has now arrived at an inflection point (which is different from an impasse) in its long history, where this immanent impossibility is beginning to be realized. (p. 128)

A transition to alternative energy is being actively delayed by neoliberal capitalism, which is a crime against the environment. Today's energy space, under the shroud of global warming, is reminiscent of the J. Wellington Wimpy predicament of naively exploiting the present with little concern for the future. Fracking has a limited lifecycle of wells that rapidly decline, thus requiring an exponential increase in drilling. Energy industry projections ending at 2040 raise the question of whether fracking is a one-generation solution to America's energy needs—which depend on constant consumption. The Stanford study shows that N. America can get to the same place that fracking will get

us within the next 20 years, but it can be done in a sustainable and virtually pollution free manner using WWS. There is also the problem of waste, particularly when fracking fluid is dumped down abandoned wells to rest beneath groundwater for eternity. Or until the casings crack and the fluid migrates up the well into a fresh water source.

Klein (2014) described conventional oil and gas drilling as "the fossil fuel equivalent to the surgeon's scalpel—the carbon is extracted with relatively small incisions. But extreme, or unconventional extraction takes a sledgehammer to the whole vicinity" (p. 329). Fracking is an extreme method of resource extraction, along with Canadian tar sands, deep water drilling, and the opening of protected environments to the 21st century's desperate energy markets. Wind, water, and solar could have gotten us to where natural gas will be in 2030, but it requires a fundamental dismantling of the fossil fuel industry, which is a direct threat to the ideology of neoliberal capitalism. It was no mistake that global stock markets crashed while the price of oil was above \$140/bbl and locked the first half of this new century into Shale 2.0.

Environmental issues are foremost discursive problems, because civilization has a long way to go in resolving our relationship to nature. In its simplest form, environmental communication scholarship functions "to help stakeholders to 'understand' or 'participate in' processes that affect them, or 'translate' technical reports. . . . [in] furtherance of an ethic of personal and societal competence as a means for accomplishing a more environmentally sustainable society" (Cox, 2007, pp. 14-15). Like most environmental scholars, Cox emphasizes a duty to speak out and provide warnings to society when serious environmental impacts are discovered through research. There is also an opportunity to resist status quo entrenchment by Big Oil. Mitchell (2013) stated,

"Democratic struggles depend not on future designs but upon identifying in current socio-technical systems their points of vulnerability" (para. 35). The banning of fracking in New York was one of those points. It was also an opportunity for lawmakers to understand the mechanics of energy extraction. Williams et al., (2017) raised the point that "public engagement (invited or uninvited) is as much about policymakers learning about public issue definitions, competing visions of the future, and priorities, as it is about publics learning the facts" (p. 101). Public discourse is a critical link in a chain of production that produces shale oil and gas in one state, ships it across the nation, and delivers the hydrocarbons to our automobiles and kitchen stoves.

In this vein, we have to ask ourselves what exactly is being produced through fracking. In addition, what exactly flows up the well along with the oil and gas, and what flows out the sides if there is the slightest defect in its construction? More importantly, do we know our energy diets to the same level as we understand our nutritional ones? Do we (as members of a public body) know the source of our water that we drink today? I spent six months intensively researching how water operates in the fracking space. The State of New York spent over six years in a massive undertaking to evaluate the risks of fracking. In both cases, the precautionary principle became an overriding ethic. Brewer, Wise, and Ley (2014) emphasize that "the burden of proof should fall on those seeking to show that something is not harmful rather than on those seeking to show that it is harmful" (p. 26). In the hundreds of reports I have read, there is a consistent call to action by scientists that longitudinal studies need to be done on fracking. In particular, the risk to groundwater contamination is poorly understood. In order to have effective multi-generational energy policies, and a better understand of the tradeoffs fracking

imposes on communities and the nation, we need a more thorough education in environmental communication.



## Chapter 4: Tragedy in Lac-Mégantic

For those who seek and doubt, You come to talk to him  
about tomorrow. For the blind on the road, You come to  
show him the way.

*–Memorial Mass of July 6, 2017, Sainte-Agnès of Lac-  
Mégantic*

Bienvenue au Québec! I arrived in Lac-Mégantic (LM) during the week of the fourth year remembrance ceremony. The July 6th day featured an afternoon church service and evening music concert to commemorate those who were killed in the 2013 rail accident. Town greeters and tour guides started work just two weeks prior, so the memorial service was a bitter opener for summer business. The tourism season starts late in this part of North America, where rain and cold weather can last through June. LM is not all bad news though, and the seeds of joy are sprouting. It was happily a busy week for public officials due to the arrival of the Canada Man/Woman Triathlon. As a destination site, Lac-Mégantic is in a transition period as it works to re-establish itself as a premier outdoor recreation destination. The lake and surrounding hills offer ideal geography for a slew of activities. The residents I interviewed were excited to see their community return to a place of summer recreation. The Québec tourism office has vivid posters of hiking and kayaking, and defined Lac-Mégantic as "the region's administrative, economic, and tourism hub" (Tourism Eastern Townships, 2016, p. 105). Until recently, LM has been known for disaster tourism or what a city guides described as a pilgrimage site (G.P. Lassard, personal communication, July 6, 2017). It was not unusual to see organized groups arrive to mourn for the victims. I personally witnessed a moment of silence while observing a tour group on my second day in town. The entire conversation was in French, and I missed a good deal of context, but the bowed heads and silence were

unmistakable. The Granit Region of Québec is entirely French speaking, and I am self-trained in French, so I was limited in the research I could conduct. Therefore, this chapter serves as a travelogue of my experience, which is still useful for situating the LM story into a larger critical discourse on oil-by-rail.

It is fitting to start with the church service for a few reasons. The foremost is that it was during the Communion service when I realized that the community is still healing from the accident. The epilogues in this chapter are from the prayer handout given during Mass. They each convey the theme of loss and recovery. Even though LM is the moral heart of an oil train resistance movement, it is not a political center for action. My thesis is that explosive oil train derailments are visible opportunities to resist a carbon economy, and push for alternative energy solutions to curb global warming. Until I walked the town, I had trouble understanding why Lac-Mégantic did not emerge as a site for oil resistance. Even four years later, outside of the church, the town has no central community meeting space for citizens organize. Those buildings were destroyed and have not been restored. The severity of their tragedy is hard to appreciate until one visits the town and experiences the weight of that accident.

Grief has a way of passing through witnesses and was a common emotion communicated during this trip. A short speech, which functioned as a benediction, was given halfway through the Commemorative Mass. I have enough training in romance languages, along with the help of Google language tools, to work with written texts. My translation is missing some provincial context, which results in a few odd terms. The benediction was the following:

*This morning, remembering the tragic events we had 4 years ago ... we ask you, God our Father, to receive and answer our prayers ... for the 47 people who lived the Big Meeting with you that night. In the name of Jesus and Mary, we ask you, God our Father, to show them your tenderness to wrap them with peace and mercy. **Lord, hear us***

*The beautiful dreams that these people bore for themselves, their family and all those who were cherished. God our Father, in the name of Jesus and Mary, we ask you to spread in their souls a balm of healing and consolation. **Lord, hear us***

*For our community still hurt by the many upheavals caused by this tragedy, we ask you God our Father in the name of Jesus and Mary, to activate our creativity for our restoration while arming ourselves with patience, respect and solidarity. **Lord, hear us***

*For our Church, let her listen to the people who are suffering, and let us know helps us make sense of our life and our death, we beseech you God our Father, in the name of Jesus and Mary. (personal communication, July 6, 2017, emphasis original)*

The first time I encountered a Lac-Mégantic story, it was a newspaper article on death and loss. Years later, news coverage focused on reconstruction efforts, financing, and regulatory outcomes. Allen (1984) believed that scholars working on oral histories have the opportunity to "articulate the experiences of people whose lives are not documented in standard historical sources as a means of allowing ... individuals to speak for stories in their own words, to give voice and shape to their historical experiences" (p. 5). The heartache that comes with a tragic past is an important part of the LM story. If grief works to contain the lessons learned from the accident, then another small town somewhere along the tracks in North America might suffer a similar fate.

As I conducted interviews, it was not possible for me to force a conversation about oil. In fact, no one I spoke with focused on hydrocarbons being problematic to life in the 21st century. The conversations were always more personal. During 2017 Commemorative Mass, there was a media swarm for these stories, but the TV crews were respectful inside the church and conducted discreet interviews. One of the benefits of

having yearly interviews after the memorial service is the conveyance of the town's emotions. One that stood out was with stained-glass artist Maurice Gareau, who said, "People don't need a reminder of the tragedy. They want to feel that the community is healing" (Page, 2018b, para. 48). Based on news footage I saw that week, several interviewees put on a good face for a public audience. Nevertheless, the face that I saw displayed inside the church was quite different, and I was overwhelmed with the rawness of their grief—it is hard to describe. I have seen death and experienced the loss of loved ones; my father died before this trip. After years of living in a big city with lots of distractions, the intensity of those emotions wanes. A dimming of emotional intensity is not what I witnessed in Lac-Mégantic. I can still picture the faces of several people who returned to their pews after Communion. As they passed me, I saw the faces of parents who had just lost their child.

**Figure 3. The 1918 Derailment Near Sainte-Agnès Church, Lac-Mégantic**



*Figure 3.* This derailment of a lumber train occurred in the same location as the oil train derailment of July 6, 2013. The picture is on display at the town's historic train station. Christian Angelich photo.

The Église Sainte-Agnès de Lac-Mégantic sits just uphill of the 2013 accident epicenter, which happened at the intersection where the rail line splits downtown. The church grounds were the only surviving structure within 100 meters of the oil train explosion. Built in 1913, the cathedral first received mourners from a rail accident just a few years after its opening. Figure 3 is a picture of a 1918 derailment that occurred near the same location as the 2013 accident (Samson, 2015, p. 8). Instead of crude oil and a devastating fire, the 1918 train was hauling freshly cut timber, which is still a mainstay industry for the region. The church is clearly visible in the background. The tourist guide describes Sainte-Agnès as "a true emblem and the heart of Lac-Mégantic, representing the strength and resilience of the people from this town" (Tourism Eastern Townships, 2016, p. 25). From a media perspective, the commemorative service is how news of the accident reaches new audiences.

The next section is my travelogue, and I included it to reinforce the environment of the Granit Region of Québec. My method is best described as ethnography, one of studying place and feelings, but not in a manner of closeness performed by an anthropologist. My focus was on "understanding what people believe and think, and how they live their daily lives" (Brennen, 2013, p. 159). Emerson (2009) described daily life as "ordinary troubles" (p. 536) of "living with or around disturbance and upset" (p. 537). Before I started interviewing residents, I was warned not to discuss the accident with business owners, because they have been flooded with insensitive questions from tourists and the media. However, I had no difficulty discussing what locals call "la

tragédie" when it was done within the context of my research. Some of the questions I took to Lac-Mégantic, which will be examined in this chapter, are the following:

- 1) Social: How does the accident continue to disrupt the lives of residents?
- 2) Environmental: What is the current state of recovery for the local ecosystem?
- 3) Economic: The Eastern Township is highly dependent on tourism, what is the status of commerce?
- 4) Health: What are the long-term health consequences from the accident?

I also discovered that I was the only person from a U.S. university to step foot on what *CBC* termed "the worst environmental disaster in Canadian history" (*CBC News*, 2013). That is, until the Fort McMurray fire occurred three years later. An unseasonably dry summer in Canada's largest oil patch fueled a fire that burned for 15 months (McDermott, 2017). As I said in the introduction, climate change is giving us extreme stories to tell.

This chapter also works to discover how the trope of containment functioned in the Lac-Mégantic accident. I will explore the rhetoric of place and memory, and the community's role in discourses on oil train safety and resistance. Before delving into the rhetorical dimensions of the accident, I think it is important to have a sense of the geography to better understand the scope of the event.

### **Québec Travelogue**

For the one who suffers and weeps, You come to him to  
console him. For the poor without abode, You come in his  
heart to fill it.

—*Memorial Mass of July 6, 2017, Sainte-Agnès of Lac-  
Mégantic*

Traveling to Lac-Mégantic requires the burning of fossil fuels, albeit a relatively small quantity, but there is no other practical way to get there in the 21st century.

Theoretically, it is possible to travel by boat, which is how Benedict Arnold got to town during his 1775 expedition of Québec, but it was a costly and dangerous trip—only 550 out of 1,100 men in his party lasted the entire journey (Figure 4). The Chaudière River begins at Lake Mégantic and runs 185 kilometers north to the Saint Lawrence River, which is why Arnold chose that route. According to my tour guide, Lucie Lafrenière, the key to the city of Lac-Mégantic was forged from weapons carried by those colonial soldiers (L. Lafrenière, personal communication, July 5, 2017). The area of the Eastern Township is part of the Appalachian Mountains, with dense forest and wetlands. I spent nearly 24 hours in travel time from Minneapolis to this region of Québec. Arnold's journey was several hundred miles shorter, but lasted months. Without fossil fuels, that trip was so difficult that some of the men resorted to eating their hunting dogs, and when the meat ran out they boiled bones for soup (Kesteman, 1985).

The point is that one does not simply arrive in town by accident, because LM was not engineered to be a stop along a famous highway like Route 66. Most cities in the province were established around a church, but LM was historically centered on the train station (L. Lafrenière, personal communication, July 5, 2017). There is some irony to this fact, because the city's new reconstruction office, and public health outreach personnel, are housed in the historic train station. Regardless, the region's economy is now served by a jumble of provincial highways designed to move timber.

Figure 4. Plaque Outside City Hall, Lac-Mégantic, Québec



Figure 4. A plaque showing the timeline and route of Benedict Arnold's colonial invasion force which passed through Lac-Mégantic. Christian Angelich photo.

My Canadian overland journey started 270 kilometers to the west in Montréal at a rental car lot. Like Minneapolis, this part of Canada is choked with freeways and shopping centers. I flew in on a Sunday during the 150th anniversary weekend of Canada's founding, and the city roads were busy. Once I navigated across several bridges on the Saint Lawrence River, and got 30 kilometers outside of the city, the geographic differences become unmistakable. The Granit Region sits on the southeastern edge of Québec along the Maine border. It has an Alpine meadow feel, with lush green hills blanketed in dense forest, and the farms are more holistically set into the landscape than seen in the States. I drove by grazing fields where horses could cross the main road with no visible gate to the highway. There are fewer barriers here, with fewer fences and seclusion between neighbors.



The road to Lac-Mégantic is interspersed with small hamlets, which show pristine care from their residents. The dairies are generally limited to a single building, and have smaller footprints than their U.S. counterparts. They exhibit a fresh coat of paint and an air of sedate efficiency. There are no CAFOs here, but there is a trace of cow in the air, which adds a rich undertone to the smell of cut grass and earth. One is not punched in the face with the sour stench of manure found at a California or Texas dairy. The forest and wet soil dominate the senses.

The most striking difference is the woodland. I have never seen such a dense variety of trees coexisting on the same stretch of land. Having grown up in Los Angeles, I was taught that urban space was limited to palm trees, juniper bushes for home privacy, and a spattering of wild oak. Here, there is so much variety that I cannot identify them all: ash, pine, spruce, maple, fir, birch and elm—for starters. The land is a model for biodiversity. Washington State can be as green as Québec, but that region feels more reserved in its wildness. In the Pacific Northwest, trees give each other room to sway. Here, they are planted as if stuck into the ground like hairs on a head. In this part of Canada, the trees stand as if a model builder was told to construct a forest using toothpicks. Fistfuls have been jammed into the clay with the zeal of youthful impatience. It is a mess and it is breathtaking.

This far north, the summer nights come late, but I did not want to push a long drive on narrow unfamiliar country roads. I stopped at a halfway point between Montréal and Lac-Mégantic at an inn run by a retired city chef. I was the only guest for the evening, which added to the sense of remoteness. Chef David served a stew of wild boar cooked in beer and fresh tarragon, with vegetables from his garden. I snooped around the

grounds after dinner and saw no one, except for a lone pickup truck speeding on the dirt road out back. I went to bed ridiculously early to the twang of bullfrogs. The morning brought a more concerted chorus. The frogs sounded like a dozen digital synthesizers being popped one note at a time overlaying a symphony of bird calls. When there are no industrial noises, like freeway or jet traffic, it is amazing how loud nature becomes.

At breakfast, David mentioned that I arrived on the first full day of sun in two months. Maybe that is why there was no one at the inn? Instead, I asked about politics and the difference between the Québec Quois and American conservatism. He made a point that I should understand the principle of basic human welfare in the north. He was remorseful that there is poverty in Canada, but felt obliged to mention that people do not die from disease at the frequency seen in the States. I asked if Canadians get upset by those of us in the States who claim first right to the term American. He did not seem to mind, but also did not join me for a coffee. We said goodbye and I was back on the country roads for another two-hour drive.

It is a gloomy and overcast morning with light rain. For a city guy who hates traffic, the drive into Lac-Mégantic was refreshing. I saw less than 12 cars on this leg of the trip. The roads here are different, designed for large trucks with double lanes for passing on uphill grades and single lanes downhill. They are also in a fantastic state of repair. It was quiet for a Monday morning, with most of the traffic going the opposite direction. The typical vehicle is a logging truck stacked with freshly cut planks. The other curious difference is diesel mechanic garages interspersed every 50 km or so and always open for business. Just outside LM, the highway begins to parallel the rail line that passes through Nantes. The town is big enough for a fire department, but still tiny

with a single school and just two stop signs. The rail line then snakes across highway 166 twice before entering LM. Just outside of Nantes is the site where the runaway freight train of 2013 was parked. I have to say, it is eerie seeing a parked train here, which is a reminder of the accident night. The train that derailed measured 4,700 ft. and weighed over 10,000 tons (Clavet, 2014, p. 1). This is the exact spot (Figure 5) where the final accident sequence began four years ago, creating 27 orphans through the gruesome deaths of their parents.

**Figure 5. Rail Siding at Nantes, Québec**



*Figure 5.* There are two rail lines in this photo. The boxcars are parked on a siding in the same location as the accident train of July 6, 2013. Christian Angelich photo.

The photo above shows the downhill grade, and it is hard to do this drive without imagining a ghost train running along the highway at the same speed as my car. The city of LM sits at the bottom of the hill, sheltered within a densely wooded valley. My first impression was how surprisingly modern it looked, like most resort towns in North America. The first large building is a Honda Powersports dealership, along with a

Walmart, a large food co-op, and hardware store. This is also the most traffic I have seen since Montréal. Every stop light has a line of cars and it is only 10 a.m. As I drive farther into town, the buildings get smaller and the stores more elaborate. Laval Street is how I imagined the town center, which mirrors Walt Disney's vision for Main Street America. The buildings are typically older wood and brick structures, and some are multiuse with apartments on the second floor. There are also a fair number up upscale businesses. For example, a fancy salon is hard to miss with a boutique pet store across the street. It is still early and there is no one walking around.

After lunch, to get a sense of the area's history I walked the town with Lucie Lafrenière who volunteers as a greeter. Lac-Mégantic joined the Global Greeter Network in 2017 and I was their second guest for the summer. When I asked about the town's transformation, she stated,

It's the heart of the city that was taken. We had no shoe store, no post office. Our bank, our pharmacy, everything was gone. For now, people are trying to make it their own, but it doesn't have the soul that the old street [had]. (L. Lafrenière, personal communication, July 5, 2017).

There is an emotional tug of war between memories of what the town was, and what it has become since the accident—locals refer to the event as *la catastrophe* or *la tragédie*. The area is marketed for its natural beauty, but it has become remembered through tragedy. This dichotomy creates a difficult tug of war among priorities, perceptions, and feelings. Lafrenière explained,

That's why I chose to become a greeter because there is a rich history here. I want people to have a sense of the other things that happened here ... the history and

the people that make scenery and architecture come to life. (L. Lafrenière,  
personal communication, July 5, 2017)

After spending several hours walking and driving the city with Lucie that day, I was left with a dichotomous understanding of the town's identity. Obviously, Lac-Mégantic cannot mean one thing or create the same emotional connections for all audiences. The town's uniqueness is fixed to a painful past as they strive to heal, rebuild, and forge a path forward. I have touched on several elements that work to contain the town's identity to narratives on tragedy (e.g., paid tours and news coverage). There are also several facets that work to contain the violence oil brought upon this community (e.g., geographic remoteness and regional dialect). The one aspect of containment that stood out above all others is psychological trauma, which the next section examines.

### **Trauma & Toxic Tours**

For the heart in the darkness, You come to give him light  
and life.  
For the sick person, You come to testify by your cross.  
—*Memorial Mass of July 6, 2017, Sainte-Agnès of Lac-  
Mégantic*

I would be remiss to take this narrative any further without mentioning *Toxic Tourism*, Phaedra Pezzullo's book on the rhetoric of pollution. It is a significant work of scholarship, and often used in environmental communication for its focus on issue visibility. Pezzullo (2007) categorizes toxic tours as "discourses of uncertainty and contamination, of social justice and the need for cultural change ... [as well as] noncommercial expeditions into areas that are polluted by toxins, spaces that Robert D. Bullard calls 'human sacrifice zones'" (p. 4). This definition certainly applies to Lac-Mégantic; however, there is one glaring omission. Pezzullo only briefly discussed the

"political consequences of pain" and the retelling of narratives "on behalf of those in pain" (p. 73). The impact of trauma, particularly PTSD, on a community was not directly examined as part of the narrative of toxic tours.

For environmental disasters, it is difficult to categorize LM into a simple box. Based on lives lost, it is the single largest North American oil accident in decades. Based on property destruction, it began in the \$400 million range, which is relatively minor (Woods, 2014). Based on contamination of wetlands and waterways, it is significant but pales in comparison to the *Exxon Valdez* or *Deepwater Horizon* accidents. LM had roughly 1/3rd of the volume of the Alaska spill. The Gulf Coast disaster released 800 million liters of oil vs. the 6 million in LM (Mitchell, 2013). Every year, North American oil pipelines quietly leak far more oil than released from LM accident.

The Lac-Mégantic tragedy is a modern day story akin to ancient Pompeii, where citizens unaware of the threat to their village became trapped in a cataclysm of overwhelming heat and fire. Coincidentally, the day of the 2013 accident was one of the warmest on record and coincided with a full renovation of the Musi-Café, which was situated at the derailment epicenter (Giovannetti, 2013a). The energy and excitement for that weekend was seared away by an oil fire, which burned for 36 hours. Much of what is understood about the critical moments, as the oil freight train derailed, comes from forensic evidence. The immediate aftermath was a toxic "ghost town" effectively ending business that year (Mann, 2013). The medical examiner's report described the fire's impact on flesh as "carbonization of the body" with extreme "charring and fragmentation" which limited autopsy examination (Clavet, 2014, p. 3). Frankly, there

can be a morbid fascination with the accident. The amount of burning oil released in a confined space was astounding to witness. Federman (2014b) described,

A 48-inch storm pipe that runs from the train yard to the nearby Chaudière River became a conduit for the petroleum, spewing flames and oil more than half a mile into the water. 'It looked like a Saturn V rocket,' says Robert Mercier, director of environmental services in Lac-Mégantic. Manhole covers on the Boulevard des Veterans exploded as columns of fire shot into the air. (para. 3)

One resident told me about "an oil wave three feet high that ran to the lake" where a friend ran from the Musi-Café toward Veteran's Park and leapt into his boat to escape, barely outpacing a tidal wave of burning oil (L. Lassard, personal communication, July 5, 2017). That man was lucky because, according to the medical examiner, many citizens died from the following:

Lethal thermal injury even before a cutaneous attack by the flames ... [or] had burns to the respiratory tract [associated] with development of rapid laryngeal spasm or obstructive edema leading to asphyxia. . . . The intense heat can also cause a disturbance [to] major heart rhythm and cause sudden cardiac arrest. Inhalation lesions may also occur and are usually due to exposure to hot gasses and irritating and asphyxiating products of combustion. The gases associated with fumes are very dangerous and can cause spasm of the larynx ... [which may] prevent people caught in a fire from going in the right direction and to breathe properly, and represents a major cause of death. (Clavet, 2014, p. 3)

Inside the blast zone, the choices were instant combustion, heart attack, acute carbon monoxide poisoning, loss of consciousness due to oxygen starvation, or choking and stumbling leading to immobility and death.

The combination of sudden and extreme violence, which occurred in an area of protected quietude, had an outcome of acute long-term psychological trauma. This phenomenon eclipses the scope of many toxic tours. According to journalist Adam Federman (2014b), "Few residents interviewed for this article knew that millions of gallons of highly flammable light crude oil were passing through their lakeside village nearly every day" (para. 7). LM has a long history with rail, the previous major accident occurred in 1918 in nearly the same spot as the 2013 derailment, but had since been forgotten (L. Lafrenière, personal communication, July 5, 2017). Davis (2013) stated,

Imagine this scenario in your community: fifteen of your citizens confirmed dead and at least 45 still missing, six blocks obliterated; the library, the historical society and some 40 commercial and residential buildings in your historic district all gone. Sections of streets have been reduced to sand, as the asphalt vaporized and manhole covers blew sky-high. To me, it is unimaginable. (para. 2)

What I am working to establish is that the shock of the catastrophe caused profound psychological trauma, manifesting in long-term anxiety, depression, and severe post-traumatic stress effecting 76% of the population two years after the incident (Généreux & Maltais, 2017). This number does not apply to every town residents, but 800 people who are in a long-term study conducted by the University of Sherbrooke. Among those residents, 271 lost family members.



The damage and health impacts could have been worse. It rained on the first morning of the fire, and the lake current and wind helped to channel toxins away from homes. Louise Lassard, a gerontology nurse on duty at the city's only hospital, during the weekend of the accident, told me they were scared that the wind might shift and bring the fire to the hospital. Fortunately, none of the emergency services were interrupted (L. Lassard, personal communication, July 5, 2017). For a sense of scale, the 6 million liters that escaped the oil tankers is the equivalent to the gas tank volume of 133,000 four-door passenger sedans. The epicenter of the accident was roughly six blocks. Half of the victims died in the Musi-Café, which bordered the tracks near the center of the pileup. Rejean Campagna, a 73-year-old Lac-Mégantic native, stated that "people never had a chance to get out of their homes, so swift was the flow of fire" (Federman, 2014b, para. 7). For comparison, BP's *Deepwater Horizon* accident killed 11 workers and released 5 million barrels (800 mil liters) of oil over a period of three months (Mitchell, 2013, para. 27).

The most difficult to measure loss was that of biodiversity. LM experienced a significant fish die-off, which was reported by Canadian news agencies within a year of the spill (Curtis, 2014). Understanding the cascading effects of life cycle interruptions are highly complex and understudied. Simply measuring the deaths of animal and insect life is difficult to impossible. There are several environmental studies on the area, but they have not been translated from French and I have been unable to access them. Greenpeace believed the Canadian government had been purposefully withholding information as part of a containment strategy (Marquis, 2013). Personally, I have not found any evidence that supports their claim.

At the time of my study, the survivor stories had not been fully collected and would make a persuasive oral history project. For instance, "One of the people close to the accident was a pregnant woman, who was in the bathroom, and noticed the window shades began to melt and got out in time" (L. Lassard, personal communication, July 5, 2017). However, my limited French made that project unfeasible. I was happy to learn that a team of social workers began collecting personal narratives in 2018, as part of a therapy program addressing the ongoing issues of severe PTSD (M. Généreux, personal communication, April 20, 2018).

**Figure 6. Maison du Temps, Lac-Mégantic, Québec**



*Figure 6.* Location of the accident epicenter, which is now a memorial walk and information kiosk. Christian Angelich photo.

I stayed in LM for five days, and a big chunk of that time was spent at the Maison du Temps (House of Time) which is staffed by three college students working through their summer break (Figure 6). It is an information booth placed on a commemorative walk, which borders the rail line and an empty lot. Before the accident, Frontenac was

the main street with all of the small business within walking distance of each other. The accident has since scattered downtown, with the shops being pushed out from what was the town center in three directions. If one were to measure based on parking lot size, the Maison du Temps is the new town center. Students who work there function like park rangers for the city. The kiosk was built out of community pressure to create a public outreach site because, as I mentioned earlier, business owners were having their work interrupted by curious tourists.

In some ways, the Maison du Temps follows Pezzullo's (2007) concept of toxic tours being used by communities to "transform their situation" (p. 4). Every block near the Maison du Temps has educational displays, and the kiosk holds several books with photos of the cleanup process and articles about the accident. For Pezzullo, "Toxic tours led me to examine how they function rhetorically as creative or inventional acts of political dissent" (p. 8). However, after conducting 15 hours of interviews, what I thought would be a story about petroculture did not happen. Instead of finding voices of dissent, I heard humble stories of identity and fellowship.

What I have on tape are people's investment in the town's history and its place in modernity. Notably, there are parallels to the Flint, Michigan story because the largest employer is a single mega corporation. Tafisa is a lumber processing facility, which sits on the site of the former airport that existed since 1935 (Kesteman, 1985, p. 237). Since the opening of the plant, there has been no air service into Lac-Mégantic for over a decade. Instead, it receives a flow of 1,000 trucks per week (Tafisa) and trains that divert through Frontenac onto Tafisa's private rail line. The town is acutely dependent upon fossil fuels and transportation for its future survival. It is important to note that the main

rail line was the first piece of infrastructure replaced after the accident, and became operational before any of the new roads or buildings. There is also an intense pressure to move forward. The largest construction project for the city is to build a regional conference center to recoup years of lost tourist revenue. My impression is that once that project is accomplished, the identity of what the town was, and what it is becoming, will take shape.

### **Business as Usual**

The day the Lord redeemed you by day. The day he made you his child forever. The day when your heart made his stay. Bless the day.

—*Memorial Mass of July 6, 2017, Sainte-Agnès of Lac-Mégantic*

One of the goals of doing fieldwork in Lac-Mégantic was to locate a regional experience within a national discourse on rail safety. The lived experience in Le Granit Region does not closely align with the desires of U.S. civic groups studying oil train accidents. At every public rail safety meeting I have attended in Minnesota, someone in the audience wants to have the railroad tracks moved. They usually know about the Lac-Mégantic accident, but they do not know that even in the town with the greatest reason to ban oil trains, the tracks could not be moved. In fact, the rail line was the first thing repaired after the disaster. Lyons (2011), in her study of the *Deepwater Horizon* accident, stated that "corporate interests are out of touch with the ordinary lives of the people who consume their products and services" (p. 96). She went on to question how "we might wrest back some control over these institutions that we have created but whose power now seems beyond our control" (p. 97). As a response to the catastrophe, there

were legal measures preventing hazmat from transiting Lac-Mégantic. Those agreements have since been revoked.

Even before the contaminated soil was removed from LM, it was again legal to park unattended trains outside of town—which was a prime cause of the accident (Campbell, 2015). In 2018, a resident discovered 50 wagons parked at the Nantes siding (Figure 5) without handbrakes or a derailer installed. The convoy included 29 tank cars of propane, which sat unattended and without a locomotive on the hill above town (Campbell, 2018, para. 67). Just five years after Canada's worst runaway freight train disaster, the same environmental conditions were in place for a runaway scenario in the exact same location. The argument goes: If it can happen in Lac-Mégantic, it can happen anywhere. My conclusion is that the public underestimates the influence of regulatory capture, and generally lack the ability to create systemic change. A stopgap measure is to look to nonprofit organizations as a means to influence policy.

A visible NGO working to resist new oil infrastructure is the Sightline Institute, which has a research center in Seattle, WA. Eric de Place, Director of The Thin Green Line energy policy initiative, and co-creator of the term "bomb train," stated the following:

The Lac-Mégantic disaster was not a one-time event. In the months that followed, oil trains blew up in Alabama, New Brunswick, North Dakota, and Virginia. Thankfully, no one else was killed. Yet the risks remain very real for communities across North America, and particularly in the Northwest, where the oil industry has its sights set on a massive increase in oil trains. (de Place, 2014, para. 12)

Like many groups working on a transition away from fossil fuels, they are policy focused with an emphasis on accident prevention. However, one of the contradictions is that the community of LM generally does not share the identity given to it by oil resistance movements in the United States. The impression given is that Lac-Mégantic residents are highly mobilized and active, but this does not seem to be the case. The last public protest in LM was in 2015 with 150 participants, which represented 0.02% of the town's population (Feith, 2015). The memorial services also have diminishing attendance from 1,400 reported in 2014 (Blatchford, 2014) to the 200 people I counted in 2017.

**Figure 7. Frontenac Street, Lac-Mégantic, Québec**



*Figure 7.* Location of the accident epicenter awaiting conversion to a memorial park. Christian Angelich photo.

Business in LM also faced decline, with 24 shops closed in the downtown area (i.e., centre-ville) that was leveled by fire and oil contamination. Of those, 20 have relocated to alternative buildings and town officials are working on finding spaces for the remaining four businesses. The town is too busy working to restore their former quality

of life to mobilize organized resistance against the railroads or Big Oil. Everything has shifting since the accident. At the top of Frontenac was the Musi-Café. I asked a city guide to mark it with a red stick for reference (Figure 7). To the right of the church is the reconstructed mortuary and crematorium. Frontenac has physically moved, along with the centre-ville. Currently, there is no town center. It has been displaced into three separate locations due to contamination. As of 2017, the former downtown area remains an empty lot, which extends several hundred meters behind the wood stick in Figure 7. For the last two years, Frontenac has been a weed covered gravel lot with a lingering petrochemical odor. On the edge of the lot is the historic train station, which houses the reconstruction bureau. During the summer of 2017, the city brought in architecture students from the Université de Lyon, France to begin the conversion of the space into a memorial park.

One of the buildings closest to the derailment's epicenter was the library. LM's sister city in Farmington, Maine is 93 miles to the south, and was an early contributor to donated funds to rebuild Lac-Mégantic. The Farmington public library created a book replacement fund of \$3,500 to help the children of LM return to some sense of normalcy (Hanstein, 2013). The residents are very proud of their new library. However, it was built on the site of a textile factory, off the main road and between the city's two business districts. Frankly, it is in a weird spot that is not easily accessible or kid friendly.

**Figure 8. Papineau Street, Lac-Mégantic, Québec**



*Figure 8. Current location of the town's restaurants and boutiques. Christian Angelich photo.*

Today, Papineau Street functions as a temporary replacement for the centre-ville. Figure 8 was taken on July 5, 2017 during a Wednesday lunch. It was the first sunny day of the summer, but the street was quiet. There is a quality ice cream shop at the end of Papineau, and this was a hot day, yet I hardly saw any kids during my stay. One of the city's restoration projects is a skate park designed to bring more life to the downtown area, but it is still awaiting funding.

The picture of Papineau looks like it could have been shot anywhere in North America. The buildings were designed to be temporary replacements for structures lost in the fire, but the street has become a permanent restaurant row. As an outsider, I mentioned to my Greeter, Lucie Lafrenière, that the look of Papineau bothered me. She nodded and said, "Very contemporary architecture. What you see is copy and paste everywhere. The soul was removed out of it, but this was for business purposes" (L.



Lafrenière, personal communication, July 5, 2017). The city offered a financial incentive package to the business owners on Frontenac to relocate to Papineau. The first shop to open on December 2015 was a liquor store. I had several residents tell me that getting wine was a vital necessity to help deal with the stress of the aftermath. When I asked about the look of the town, that question was a bit contentious. There was no consensus on whether the reconstruction efforts were good or bad for the city. During her investigation of the Hurricane Katrina disaster, Naomi Klein's (2007) observed the following:

Most people who survive a devastating disaster want the opposite of a clean slate: they want to salvage whatever they can and begin repairing what was not destroyed; they want to reaffirm their relatedness to the places that formed them.  
(p. 5)

Her observation seemed to hold true for roughly half of those I spoke with, and the other half were looking forward to a "new generation" for innovation in civic planning.

Jacques Cloutier, a teacher of entrepreneurship in LM's vocational school, asked, "How many times will you have the opportunity to rebuild a city?" (Lindeman, 2015). There are plenty of people who want to see Lac-Mégantic mirror its more urban sister cities.

### **Risk Narratives**

Go, to the country of tomorrow, To live with God in the clear.  
Go, in spite of our troubles and sorrows.  
–*Memorial Mass of July 6, 2017, Sainte-Agnès of Lac-Mégantic*

Chapter 2 established the concept of a chain of production for the narrative of climate change, and Lac-Mégantic is clearly linked to that chain. Choi (2008) defined the

mechanism of narrative as "functional devices through which past events are efficiently politicized to accommodate power relations in the present" (p. 371). How does this translate for the Lac-Mégantic story? I believe they were not the first, nor will they be the last, in a long string of consequences for sites touched by oil disasters. A carbon economy is in the business of sacrificing towns and cities. It may be easier to picture sea level rise swamping places like Miami or the Maldives, but people who feel the most secure cannot escape the tradeoffs that come with oil. Indeed, Lac-Mégantic may embody the future for small town America, because the train derailment is not what fundamentally changed their way of life—it was oil.

Of the many shocking outcomes of the derailment, the foremost was a lack of awareness about the risks that surround shale oil transportation. During my walk with Lucie Lafrenière around the historic train station, I mentioned hearing the initial phone call between Tom Harding, the sole train engineer, and his dispatcher. Harding was completely unaware that his train, which was parked on a hill outside of town, had become a runaway leading to the devastation of Lac-Mégantic (Finnis, 2014). If the man responsible for the oil shipment did not know what happened, what chance did the locals have of understanding the contents of the tanker cars? Michel Lassard, a retired accountant who lived in view of the accident, told me the following:

When the wagons derailed they had evacuators that would let the oil spill and I could hear it whistling like a pressure cooker and then it exploded. I remember just the whistle, extremely, many whistles because there were many wagons ... approximately 60 exploded, not only oil but 8 different types of hazmat.... It should never have been in these wagons. They were sued and the city of Lac-

Mégantic won, but we don't really know the products [that were in the wagons].

All we know is there were many products and some of them should never have been transported. (M. Lassard, personal communication, July 5, 2017)

Earlier that day, I learned that Lafrenière's husband was the fire chief who commanded the emergency response. I asked her what the town knew about hazmat before and after the accident. She stated,

My husband, as the fire chief, knew how to read the signs on the train and he was aware of that. After he got the position, he made sure that his crew knew about hazmat. [For the public,] it is hard to change mentality because while it has happened here, [they believe] it won't happen again—this is like magical thinking.

(L. Lafrenière, personal communication, July 5, 2017)

The one thing every resident I spoke with, and gets repeated yearly in news interviews, is that the accident should have never happened. It was preventable and catastrophic derailments should continue to be prevented through sound policy.

The oil that changed this remote region of Canada was sourced in North Dakota—it is not the oil they use—but it is the oil we use in the United States. The fuel in Québec is primarily sourced from Alberta's tar sands (Natural Resources Canada, 2017).

Conversely, Bakken shale oil is the primary fuel stock for nearly all gasoline purchased in Minnesota (Hughlett, 2016). The hazardous material that killed 47 people in Lac-Mégantic was carried by one of the hundreds of trains, which take America's number one export product to market every week. There is an unmindfulness about the ways in which we consume oil. It flows all around us, typically unseen until tragedy strikes.

In the wake of "la tragédie," the danger of oil has slipped back under the surface of daily consciousness. No one I interviewed in Lac-Mégantic directly talked about oil. The rail company and the train engineer took all the blame, while *CNN* ran a headline featuring Edward Burkhardt, chairman of Montréal, Maine and Atlantic Railway (MMA) as "the most despised person in Canada" (CNN, 2013). The story ran with a clickbait headline, but received just 6,750 views. The risks associated with shale oil being that was carried by MMA continue to receive poor media coverage. Citizens of LM obviously saw the black wagons, and the hazmat was known to the local fire department, but public education and awareness of the volatility of shale oil was poor. Many of the Musi-Café patrons made a critical mistake by sheltering in place, because the town had no evacuation plans. At the time, no one conceived that a large pool fire created by a derailment would hit a peak temperature of 3,000°C and vaporize a town. There was also no public education about response times for such an accident. Michel Lassard's wife, Louis, was a nurse on duty during the initial explosion. She told me, "There was no one who came to the hospital that night because they were either dead or unscathed. . . . We've never seen the ER room that empty. For those who were close, they had one minute to evacuate before their house started burning" (L. Lassard, personal communication, July 5, 2017). The story of the 2013 rail disaster is important to environmental communication, because it can help us to understand the tradeoffs that come with a carbon lifestyle.

There are consequences that come with two dollars per gallon for gasoline. What killed 47 people on that summer night in Lac-Mégantic was oil pumped out of the ground 1,500 miles away in North Dakota. It was boiled up to the surface through fracking,

loaded onto tank cars designed in 1960s, and put on a rail network that was laid over 150 years ago. Then it began a journey to the largest refinery in Canada, which sits on the east coast in Saint John, New Brunswick. The oil train wound its way along the Mississippi river, through Minneapolis, then Milwaukee, Chicago, Detroit, Windsor, with a stop in Toronto, and then on to Montréal —coming to rest on top of a hill overlooking Lac-Mégantic on the night of July 6, 2013. A fire in the locomotive required the engines to be shut down, thus allowing air to leak out of the pneumatic braking system. Shortly after the train was secured overnight by MMA employees, it slipped its brakes and became a runaway, ending its journey in an explosive derailment in the heart of downtown Lac-Mégantic (TSB, 2014b). There are many lessons from this accident, which still have not translated to U.S. rail safety.

The people of Lac-Mégantic will never be able to go back to the way things were physically, emotionally, or return to a pre-accident level of awareness. Their sense of community safety was shattered, and a sense of anxiety is likely reinforced every time a train rolls through town. This is an understatement because, without being there, it is impossible to appreciate the magnitude a cargo train has in the valley. One afternoon, I witnessed a mixed-freight train of roughly 20 wagons transit Papineau Street. It was so loud that it made conversation impossible, shook the full row of shops and restaurants, and echoed through the entire valley. Keeping in mind that large numbers of residents still suffer from PTSD, it was disheartening to observe. Burawoy (2013) believes that "ethnography is on the front-line in the battle to save society from market fundamentalism.... And those struggling to defend their access to unpolluted water, land and air and those struggling to defend themselves against the machinations of finance

capital" (p. 534). The Commemorative Mass of 2017 had the prayer of "Lord, hear us," and I hope that my work has aided in communicating critical voices from Lac-Mégantic. Oil-by-rail derailments are emblematic of large systemic issues, which are driven by social and economic costs the public has to shoulder through the use of fossil fuels. My research has made me a cynic, but I still hold out hope that publics have a voice that can hold private oil and rail interests accountable.

The next three chapters examine what I believe to be core issues on regulatory oversight and community education. For instance, one of the discoveries from the LM accident was inadequate liability insurance carried by the railroads. According to the U.S. Department of Transportation (DOT), "Regulations do not include a minimum financial responsibility requirement. . . . In comparison, federal aviation regulations, trucking regulations, and Canadian rail regulations all require carriers to maintain minimum insurance coverage to operate" (DOT, 2017b, p. 24). The report mentioned Lac-Mégantic 18 times and emphasized the inability of insurance to cover more than 5% of the damages incurred by MMA Railroad's negligence. There are crucial lessons here, which have the potential to save lives in the rest of North America. However, as time passes, the likelihood of a major derailment accident increases due to the lack of systemic hazmat-by-rail policy change. A reduction of train speeds is an incremental change, whereas the removal of volatile organic compounds from tankers carrying flammable liquids under pressure would be a systemic change. The following chapters will examine some of the incremental changes that have occurred.

## Chapter 5: Hazmat Lessons from Graniteville

It is the middle of the night in Graniteville, South Carolina when a shipment of chlorine is due. The town sits in a sleepy hollow, just thirty minutes up the road from Augusta, and residents are asleep in their beds—dreaming of all the things a New Year brings. What they were not prepared for was a weapon of mass destruction being unleashed on U.S. soil, in the part of America where it was least expected it. On Thursday morning of January 6, 2005, a Norfolk Southern train of 42 cars hit a parked locomotive and derailed at 41 m.p.h. (U.S. National Transportation Safety Board, 2005, p. 10). A manual switch had been left in the wrong position, which connected the main line to a siding, and 400 tons of steel collided. The derailment happened at 2:40 a.m. with enough inertia for the ninth car to rupture, thus spilling its content of 90 tons of chlorine gas (NTSB, 2005, p. 11). What was termed the Graniteville wreck, unleashed a chemical bomb on 7,000 civilians.

Eerily similar to the Lac-Mégantic accident chain, the Graniteville wreck was caused by human error. This disaster also happened in the middle of the night, in a rural community, where two rail lines bisect the town. The outcome was the largest chlorine gas exposure in U.S. history (Girardeau, 2018). To put the size of the release into perspective, during World War I the German army released an 88-ton weapon containing a chlorine/phosgene gas mix on British soldiers causing 120 deaths and 1,069 casualties (Croddy & Wirtz, 2005, p. 214). In contrast, Graniteville's citizens were lucky. Toxic inhalation of chlorine gas that day only caused 9 deaths. There were 529 cases of medical care, with 71 people hospitalized for an average of 4 days, including 24 individuals in intensive care (Mackie et al., 2014, p. 412). The train also carried a tank

car of sodium hydroxide, and had it ruptured, it is possible that a hydrogen gas fire (New Jersey Department of Health, 2015) could have ignited chemical storage tanks at the Avondale Mills textile plant, which was the epicenter of the derailment.

What is significant about the Graniteville case is that it demonstrates the degree of hazard that a single tank car of toxic material can have on a community. In my investigation, it has become clear that lessons learned remain mitigated to government reports designed for emergency management. Had the findings from this particular derailment not been contained to rhetorical documents shielded within bureaucracies, it is conceivable that lives could have been saved from future rail accidents in North America. For instance, the NTSB recommended immediate replacement of the DOT-111 tank cars, which were found to be puncture prone in derailments (NTSB, 2005). Eight years later, it was the exact same tanker car design that contributed to the deaths of 47 people in Canada (Byblow, Harper, & Blyschak, 2014). To spotlight the slow creep of regulatory change, a 1995 derailment in Québec had 28 wagons release 230,000 liters of sulphuric acid. That was a primary case where the Canadian TSB identified the DOT-111 as a derailment risk when transporting hazardous material (Sorensen & Lunau, 2013, para. 18). Twenty years later, in a 2015 letter of safety recommendations, the NTSB listed 9 accident investigations that "demonstrates the destructive effects of large numbers of derailed DOT-111 tank cars" (NTSB, 2014, p. 4). Included in the list was the Graniteville accident. It took 18 years of high-profile derailments, and environmental destruction, for North American officials to finally ban the DOT-111 rail car. Technically, it is not even a ban, but a phased retirement with mandatory replacement by 2025 (DOT, 2016c).



Not only does this case demonstrate the wide-ranging impacts that a single car of hazmat can have on a community, it underscores the inadequacy of information availability. These facets of the Graniteville study demonstrate an aspect of the trope of containment, which is best described by agnotology—the study of "the scope and structure of our ignorance" (Pynchon as cited in Proctor, 2008, p. 1). One of Proctor's three classifications of ignorance is one of a strategic ploy or active construct. Proctor (2008) stated, "The focus here is on ignorance—or doubt or uncertainty—as something that is made, maintained, and manipulated by means of certain arts and sciences" (p. 8). In particular, ignorance as a product of secrecy is critical to the public's understanding of hazardous materials (hazmat) safety. For example, there have been 788 derailments of chlorine tanker cars between 1965 and 2006. Just one year prior to the Graniteville wreck, there were three deaths in Macdona, Texas from chlorine inhalation during a train derailment (DOT, 2010a, p. 61388).

From a rail industry security perspective, maintaining community ignorance has been an effective form of containment. Oil trains carrying Hiroshima yields of thermal energy, and tanker cars with toxic inhalation hazards (TIH) on par with weapons used during the Great War, constantly crisscross America. There are 1.2 million cars of hazmat transiting the U.S. rail network daily (Branscomb et al., 2010, p. 3). Industry logic is that the recovery expense of an occasional accident outweighs the cost of making public, to every community that could be exposed to a catastrophic derailment, the location and frequency of hazmat shipments. The security argument is that bad actors would use this information to commit acts of violence and/or terrorism.

However, the Graniteville wreck is a clear case where community education of hazmat would have prevented serious injury. In a critique of corporate social responsibility for oil companies, Watts (2005) stated,

States in turn are happy to blame private companies (with whom they operate contractually) in order to absolve themselves and to impose expectations (infrastructural development, community outreach) on companies that should be in part or whole their own responsibility; and in any case, they claim the legitimate right to protect strategic resources. In general, the entire operations of all the parties are shrouded in a secrecy. (p. 16)

What Watts is demonstrating is a contractual double-exclusion that allows government and corporate agents to circumvent the Federal Emergency Planning and Community Right-to-Know Act (EPCRA), which covers hazmat storage (Lattanzio & Bearden, 2017). Proctor (2005) asked, "How important is the genesis of ignorance for modern corporations? Many companies cultivate ignorance as a kind of insurance policy" (p. 24). Within this frame, agnotology is a method that allows industry a cognitive out from a duty to keep the public informed. Case in point is the ignorance displayed by the very employees who ship hazmat. Like the Lac-Mégantic accident, the Graniteville engineer was unaware that his train's derailment caused a massive toxic spill. The conductor and engineer stumbled through a green cloud of chlorine gas while trying to ascertain the freight damage. Unfortunately, their ignorance (which was no fault of their own due to inadequate training) cost one man his life and the other sustained permanent debilitating injuries. Going up the scale of injury, damage to Graniteville will affect the community for generations to come.

## **Overwhelmed in 18 Minutes**

Incidents that involve an urban spill of hazardous materials fall into the category of no-notice evacuations. According to the U.S. Department of Transportation, Federal Highway Administration (FHA), this class of evacuations includes earthquakes, hurricanes, tornadoes, forest fires, and terrorist attacks (Zimmerman, Brodesky, & Karp, 2007, p. 5). These are the most difficult public emergencies for agencies to handle, and the following timeline will clearly demonstrate the reasons why. In a review of the Graniteville accident, the FHA published several findings. The foremost was that swift action by the fire chief to recognize the severity of the threat saved lives (Wilson-Goure, Houston, & Vann Easton, 2006, p. 31). However, there was a great deal of confusion and poor communication, which delayed decisive action by county officials. A Clemson University study on the evacuation stated,

The emergency response community has recognized a need to reduce the chaos of the type experienced in Graniteville. Poor communication between agencies and lack of clear decision-making authority exacerbated the disaster. Responders disagreed over how to evacuate the town, and this disagreement resulted in inaction. (Dunning & Oswalt, 2007, p. 131)

The Aiken County hazardous materials team arrived 40 minutes after the rupture, and the first search and rescue team was dispatched 1 hour and 10 minutes into the incident (NTSB, 2005, p. 14). The full evacuation of a 1-mile radius of the derailment took all of Thursday and concluded 15 hours after the initial spill. The town was shut down for 9 days with 5,400 residents unable to return to their homes for 5 days and 200 residents were sheltered for the entire period (Wilson-Goure et al., 2006, p. 33).

The immediate emergency response from firefighters and hospital staff was excellent. However, a limitation was reached "by 2:57 AM [where] the sole physician covering the emergency department (ED) was inundated with patients seeking treatment for exposure to the unidentified gas" (Mackie et al., 2014, p. 411). The fire department was unable to verify the contents of the derailed tank car for 40 minutes (NTSB, 2005, p. 14). Within 18 minutes of the spill, the county's emergency response capabilities were overwhelmed.

Fortunately, that morning had little to no wind and the chlorine vapor remained in a confined space. Despite years of continuous shipments of chlorine to the Avondale Mills textile plant, residents were generally unaware of the local hazard. Aiken County 911 received 100 calls within the first hour and citizens were given mixed messages that varied between sheltering in place and "get out of the area, we've got people on the way" (Dunning & Oswalt, 2007, p. 133). Roger Boyd, a lifelong resident, stated, "It was horrible. The strongest bleach smell you've ever smelled in your life. I could not breathe. It cooked my breath" (Girardeau, 2018, para. 11). When inhaled at high concentrations "chlorine breaks down in the lungs to form hydrochloric acid that burns lung tissue, causing pulmonary edema and essentially causing drowning as liquid floods the lungs" (Branscomb et al., 2010, p. 9). Incapacitation happens in a matter of breaths. If the town's communication networks had not been neglected, this info would not have been new to anyone who saw green fog on the ground at 3 a.m. that morning.

Had there been a fire caused by the derailment, the accident would have been much worse. The epicenter for casualties was the Avondale Mills textile plant located one block from the GVW Fire Department headquarters, which was inaccessible due to

the chlorine spill (Wilson-Goure et al., 2006, p. 35). Even if the fire equipment could have been recovered, it was destroyed by the caustic gas, which also disabled the station's siren system to alert the public (pp. 40-41). According to Fire Chief Napier, "Had it been in the day time ... we'd have had a middle school full of students, people on the roads traveling, and there would have also been a lot more people within the plants working, so it could've been a lot worse" (Long, 2015a, para. 24). Even so, the wreck was a tragic life-threatening situation and caused long-term degenerative damage to the lungs of hundreds of residents.

The technology that failed Graniteville's residents the most was the Aiken County Reverse 911 Emergency Notification System, which delivered its first message three hours after the spill (Wilson-Goure et al., 2006, p. 32). The initial 911 call was from a mill worker near the tracks who reported the derailment within minutes of the collision. That person fled, however, another worker near the epicenter "stayed on hold with a 911 operator for 28 min. The operator advised him to stay inside and wait for help while the caller labored to breathe and screamed in agony" (Dunning & Oswalt, 2007, p. 133). It took first responders over one hour to reach the Avondale Mills plant, and two hours to find survivors in the neighboring steam plant, which had an emergency coal fire in progress (NTSB, 2005, p. 15). In after action reports from various Aiken County agencies, communication was a consistent and high-priority problem for emergency response coordination. Again, the accident could easily have been worse, if not for a Bell South HazMat team. A switching station was less than 100 yards from the spill, and the team responded rapidly to ensure phone lines remained functional (Wilson-Goure et al., 2006, p. 39). Despite the mixed messages from 911 operators, the ability to communicate

did save lives but increased injuries. This case highlights a national problem of emergency networks using outdated communications technology.

The Graniteville wreck has many narrative parallels to the Lac-Mégantic tragedy. They are both small towns, nestled in a shallow valley, where the majority of the residents work in a single factory. The derailment "siphoned the life from tiny Graniteville" (Fretwell, 2015, para. 2) and residents "described the mill as the heart of the community" (Ingram et al., 2018, p. 290). The town was a location for multi-generational work since the 1800s, but Avondale Mills closed two years after the accident with 1,000 jobs terminated. This "left the community on the verge of becoming a ghost town" (Fretwell, 2015, para. 33). However, unlike social welfare in Québec, which supports the physical and mental health of residents, many of Graniteville's residents lost their company-funded health insurance. The exposure to toxins became a critical juncture in their lives, during a time of great medical need. For example, two years after the accident self-pay was 41% of all hospital discharges in the area, whereas only 5% were self-pay the year prior to the spill (Ingram et al., 2018, p. 293). There was also the lasting effect of post-traumatic stress disorder (PTSD). A University of South Carolina public health study found the following:

Some participants expressed concerns about the mental health of their children and the impact that the accident would have on them. One participant stated: "I had to take Thomas the Train down out of his room when we finally got back home. My son loved trains. He had five train sets. I had to get rid of all the train sets. When that train come through the first time, my son nearly—he was like

five. He literally ran through the house screaming, shaking. He's scared to death of trains now." (Ingram et al., 2018, p. 292)

William Wright, the train conductor, lost his career due to injury along with his mental well-being. He and engineer Chris Seeling did not have an emergency breathing apparatus and staggered through the chlorine cloud in search of help. Wright and Seeling both collapsed near the tracks. It is believed that Seeling encountered Fire Chief Phil Napier as he was fleeing the epicenter. Napier was asphyxiating and had to leave Seeling behind. He stated, "I regret every day that there was nothing I could do [to save Seeling]" (Long, 2015, para. 16). Wright was eventually found by mill workers who took him to the hospital (Fretwell, 2015). Ten years later, Wright suffers from PTSD "which sometimes causes him to awaken at night — anxious and upset [but] has medication for the disorder" (Fretwell, 2015, para. 24). The public health costs is still unfolding with residents being the first population group to undergo longitudinal studies on TIH treatment for chlorine gas since World War I (Long, 2015b). The FRA placed the total cost of the Graniteville accident at \$126 million (Branscomb et al., 2010, p. 20) which only accounted for the cost of equipment and property damage. One of the recurring problems with containment rhetoric is that public health is rarely the primary concern in a post-911 world.

### **Security as Containment**

From a security frame, chlorine gas is a chemical weapon, which is routinely transported near population centers with minimal physical safeguards for its content. The justification is that deaths from spills are rare. Specifically, there have been four major rail accidents in the U.S. since 1978 involving chlorine, which killed 21 people (Mackie

et al., 2014, p. 414). The most recent data from the American Poison Control Centers shows 4,070 cases of chlorine gas exposure (typically inside buildings) in a single year resulting in 2 deaths (Gummin et al., 2016, p. 1213). Therefore, transportation risk is not the primary concern in this case. The problem is how governments react after a major accident, and the ways in which they focus accident prevention discourse.

Aiken County conducted a weapons-of-mass-destruction exercise three months prior to the chlorine spill (Wilson-Goure et al., 2006, p. 36). However, even in light of that level of preparedness, the state struggled to handle a single rail car of hazmat. The spill, albeit in a relatively small county, required 75% of the state's emergency support apparatus (p. 40). Had the derailment been part of a terrorist plot, or occurred during a natural disaster, the state would have been incapacitated by multiple scenarios. The underlying rationale for rail security is that hazmat represents a prime target for terrorism. Richard Falkenrath, former Deputy Homeland Security Adviser to G.W. Bush stated,

Chemicals, several of which are identical to those used as weapons on the Western Front during World War I, are routinely shipped through and stored near population centers in vast quantities, in many cases with no security whatsoever. . . . I am aware of no other category of potential terrorist targets that presents as great a danger as toxic industrial chemicals. (Branscomb et al., 2010, p. 23)

The response to such admissions is that secrecy operates as security, which is reminiscent of war propaganda. The phrase "loose lips sink ships" is a holdover from Nazi-era security ideology, which still exists in transportation. However, logic that is used to keep communities in the dark breaks down under scrutiny. Branscomb et al. (2010) have a compelling argument to counter the secrecy and security frame,



Denial of an attractive target could also be enhanced by assuring a more effective response to attack, in order to mitigate death and injury. . . . This would require a much better program of public education in disaster response behavior than is in place today in U.S. cities. (p. 26)

Their study, funded by the Harvard Kennedy School of Government, is the only document I have encountered that recommends public education as a method to proactively deal with hazmat risk. The rationale is that targeted attacks circumvent containment strategies; therefore, public education should trump secrecy. Branscomb et al. (2010) further stated,

Placards to identify hazardous materials are communication tools that are easy to understand and are recognizable by the first responders and workers that handle over 1.2 million hazardous materials movements daily. However, the same qualities that makes such placards useful— their simplicity and accessibility to observers — may also facilitate attacks, by assisting terrorists in identifying TIH tank cars. (p. 56)

An alternative method to high-visibility placards are radio frequency identification (RFID) tags, but they would not work due to cost and operational complexity. In the Graniteville wreck, markings were vital to identifying the punctured rail car and its contents in order to effect a swift response (NTSB, 2005, p. 15).

From the perspective of a single bad actor, secrecy is easily penetrated through legwork to identify hazmat shipments. The codes are widely published and it is no secret that tank cars painted black, and connected in a long series of wagons, are carrying shale oil or ethanol—not milk. The volume and frequency of hazmat, particularly shale oil

through population centers, negates the benefit of containing public risk information. In the Twin Cities, every commuter between St. Paul and Minneapolis, on a weekly basis, sees a hazmat train parked over a major interstate.

My argument is not to publicly unveil industry business practices. For example, contract rates are not openly published. According to Branscomb et al. (2010) a single tank car of chlorine ships for \$9,173, which "suggests that rail carriers may be trying to recoup part of the cost of the risk for TIH shipments" through price inflation (p. 15). However, "a major stakeholder is the public, because the public at large would be endangered if there is a TIH release" (p. 7). What is compelling, and something I hear at every citizen meeting, is people demand to know what is being shipped through their backyard and what their options are when something goes wrong. My argument is that containment is a strategy to socialize risk. It has been actively maintained through long-established social norms between government agents and private rail operators.

## **Public Safety & Early Warning**

### **Systems**

Public awareness of hazardous material transport within communities is problematic. In Dunning and Oswald's (2007) study of the Graniteville gas spill, they discovered that a critical number of residents did not know that toxic chlorine was being shipped to their town on a regular basis. Again, there are striking similarities here to the Lac-Mégantic disaster, and a common theme in these cases. Government agencies, who are responsible for public safety, lack a commitment to hazmat preparedness beyond first responder duties. Essentially, public safety practices from the all-hazards approach to civil defense have fallen into complacency. Public agencies are not completely fulfilling

their role to ensure the preparedness and safety of citizens. Within governmental discourse, there has been a consistent emphasis on in-house training with first responders to the detriment of public awareness. This redirection of resources functions as a financial pivot away from citizen preparedness and public education. As an illustration,

The 2004 tsunami [in Thailand] brought a relevant example of the effectiveness of public education on evacuation: an 11-year-old British schoolgirl, Tilly Smith, recognized the characteristics of a tsunami from geography lessons and successfully evacuated 100 people from a beach in Phuket. (Dunning & Oswalt, 2007, p. 134)

Can the same be said for North American children who live near the tracks and may witness a derailment next to their school, church, or home? There were an astonishing 111 agencies that used 600 federal, state, and local personnel in the Graniteville accident response effort (Wilson-Goure et al., 2006, p. 33). A focused campaign on public education, to include evacuation planning through an all-hazards perspective, was recommended years later and buried in the Aiken County Emergency Response Plan (Aiken, 2017, p. 130). It is unclear how effective those education dollars are, but at least South Carolina includes hazmat as part of evacuation preparedness. This level of commitment has not been demonstrated in any other agency reports regarding this case. What does this say about at-risk communities near rail lines? To be clear, anyone living within two miles of the track lives within a zone of exponentially higher risk during a hazmat derailment. A two-mile blast zone is generally the physical limit discussed in documents addressing emergency evacuations. Unfortunately, major hazmat accidents have established a precedent where they are treated as one-off events. In a recent radio

interview, this was an early question I had to answer for a statewide audience. There are two contested realities between a risk-reduction process vs. a risk-education process. My conclusion is that risk-reduction (containment) treats hazmat derailments as a one-off event. Conversely, risk-education (prevention) views hazmat as a daily threat to community safety.

Three fatal accidents where TIH was released into the atmosphere all occurred late at night, when people are most vulnerable to poor judgement. Rail companies call these areas "dark territory" for several reasons, but primarily because there are no signaling devices on the track (Branscomb et al., 2010, p. 20). The public is also kept in the dark about the rolling stock risk that exists in their community. For instance, a 2001 tunnel fire in Baltimore, MD was caused by a train derailment where 11 cars spilled hazmat, including hydrochloric acid and tripropylene, which fueled a chemical fire. The city activated emergency sirens but "many residents did not know that the sirens meant they were to return home to seek information from television and radio, which would have told them to shelter in place. Instead, many residents chose to evacuate the area" (Branscomb et al., 2010, p. 22). Without understanding the nature of the emergency, it then becomes a gamble of risk exposure. If I flee, will it increase or decrease my exposure, or should I stay put? In Graniteville, the confusion between evacuation and taking shelter led to the injury of hundreds of residents. Some left the safety of their homes, which were outside the toxic cloud, and drove into areas of high-risk exposure.

One of the recommendations from the Graniteville wreck was to have municipal governments create clear evacuation plans along with public education campaigns explaining hazmat shipments and their local risks. According to Dunning and Oswalt

(2007), "Avondale Mills routinely received shipments of chlorine gas; therefore, local public education could have taught people how to react to chlorine spills. Such education might have resulted in residents recognizing the situation early" (p. 134). However, state agencies continue to be remiss in their duty to keep the public informed, because hazmat rolls through towns every day in North America without clear evacuation plans in place.

As a child of the Cold War, I was taught that preparedness for unlikely yet catastrophic events is a necessary part of public education—even when it scares kids. Growing up in California, we had drills for earthquakes and atomic bombs. Why is it so difficult to integrate hazmat derailments into public education and evacuation campaigns? Over the next 50 years, the volume of hazmat carried by rail is projected to increase dramatically. For example, one rail tank car carries as much as four tractor-trailer trucks (Branscomb et al., 2010, p. 5). The economics of business-as-usual insure that hazmat-by-rail is here to stay for generations.

Beyond public education, there are technology solutions to help communities respond to disasters. In the Federal Highway Administration's (FHA) review of evacuation cases, the use of a Safe Community Alert Network (SCAN) was mentioned (Wilson-Goure et al., 2006, p. 10). It is one of several technologies that operate off the internet-of-things to send zip code based public safety alerts. There is also Safe Community Alert Network (SCALE) funded by the White House. The very first line on their web site states, "One of the primary goals of any local government is to ensure a safe environment for residents" (Smart America, 2018). However, these systems are not fail-safe or foolproof, which is why public education is critical. In particular, some Graniteville residents did not have transportation and were unable to evacuate, or were

missed by the initial sweep from emergency services personnel. According to the FHA, "The impression received from all of the interviews was the general public was on its own when evacuating" (Wilson-Goure et al., 2006, p. 34). Is this the neoliberal message for the 21st century? We are on our own.

Another concern is that even when states do have the technology to send alerts to geolocated cell phones, they have a tendency to fail or send the wrong message due to operator error. Case in point are the 2018 panics in Hawaii and Oregon caused by false and/or incomplete emergency alerts. In the Oregon case, Salem area residents were warned of a "civil emergency" and to "prepare for action" with no further instructions (James, 2018, para. 1). The problem was an algae bloom in the local water supply, which could threaten people with compromised immune systems. The Hawaii incident warned of an incoming ballistic missile strike, which the public believed was launched from North Korea. Although both cases are seemingly innocuous, they highlight the complexity of the communication role that emergency management agencies serve for public safety. Lastly, communities who have Reverse 911 also have the limitation of alerts not reaching unlisted numbers. It is for these reasons that school based hazmat education can circumvent technology limitations. I want to conclude this chapter with the most frustrating and disappointing safety outcome from the Graniteville wreck, which is the protection of rail employees.

### **Graniteville Safety Outcomes**

One of the Graniteville accident recommendations from the NTSB (2005) was for rail companies to provide crews with an emergency escape breathing apparatus (EEBA) (p. 54). This call to action was in response to several crew deaths from chlorine gas

exposure. The NTSB requested that oxygen masks become a legal requirement for train crews, Congress agreed, and the rail industry refused to adopt the device as required equipment. As a former airline pilot, following the lifespan of this commonsense safety recommendation was a frustrating research endeavor. It took weeks of sleuthing to figure out what happened to this mandated safety rule. Why was a simple thing like an oxygen mask so difficult to institutionalize?

For background, I survived a smoke-in-the-cockpit incident one night in Florida. I was the flying pilot, and we were fortunate that the fire started immediately after takeoff from Tampa International Airport. Had the fire started five minutes later, over the Everglades on a moonless night, I would probably be dead. After my incident, I had many flashbacks of the ValuJet crash and knew that we got lucky by a matter of minutes. Having an emergency breathing apparatus can be critical to safe operations, and it is probably an emotional issue for anyone who has experienced a toxic inhalation hazard (TIH). The fact that train crews carrying hazmat, especially chlorine, do not have this essential life saving device is inexcusable from a zero-defect safety perspective. What is even more frustrating is that a NTSB recommendation to install EEBA's failed through policy implementation. Right now, train crews transporting hazmat, especially TIH, are not required to have breathing devices supplied by their employer, despite a Congressional mandate. According to Burton and Egan's (2011) study on rail safety regulation,

Legislative mandate is only the first step. Without continuous implementation monitoring, the public has no way of knowing whether the advice rendered by the NTSB and written into law will be implemented. Overseeing the implementation

process in the operational arena is just as important as keeping track of systemic changes at the level of collective choice. (p. 536)

Their study advocated for a process to track safety policy after the NTSB recommends a change to industry best practices. The hope is that doing so would transform a business-as-usual safety culture, especially in cases like EEBA implementation. I discussed this issue with a certified safety professional in the rail industry, and his opinion was that money to implement EEABs would be better spent on hot loaders who work with manganese and similar hazmat exposures (Nascentia, personal communication, June 6, 2018). His rationale was that the risk is too low to justify expensive operational changes across all rail operators, which mirrors the rail industry's position.

The U.S. has a long history of this very mechanism played out repeatedly. Resolution often does not happen until public outrage forces the DOT and industry to improve their safety practices, often at a cost greater than had the safety devices been installed when first recommended. The ValuJet crash into the Everglades was a high-profile case, which forced regulatory change. Prior, there had been dozens of cargo fire accidents leading to a loss of life in the airlines. The NTSB had been recommending cargo fire detection and suppression systems to be installed in commercial aircraft for decades. What is tragic is that the jet age started with the Boeing 707 in 1957, and it was not until 1997 that adequate fire systems were installed in airline cargo holds for an industry cost of \$300 million (Anderson, 2006). Unforeseen at that time was the invention of LiPo batteries, which have been involved in dozens of aircraft fires. Expensive safety equipment has saved countless lives due to an increase of fires. In contrast, what future unforeseen disasters await the rail industry?



The Rail Safety Improvement Act of 2008 included a Congressional mandate for EEBA's to be installed in the cabs of all rail freight locomotives carrying hazmat. In response, the Federal Railway Administration (FRA) funded a study on the usefulness of various emergency escape breathing apparatus devices. Their conclusion was that "the implementation of EEBA's would pose a significant financial burden on the railroads regardless of the method of assignment (i.e., locomotive or employee) or the type of EEBA" (Chambers, Kimbel, & Misiaszek, 2009, p. 36). The requirements for EEBA's were part of the DOT's 2010 notice of proposed rulemaking, which then sat unimplemented for four years. Since then, several mandates of the 2008 Safety Act have gone unmet "due to competing priorities and the need to consider more economical alternative ways to comply with statute" (DOT, 2014, p. A1). As of 2018, rail crews continue to transport chlorine gas with the real potential for another Graniteville wreck, inviting the exact same outcomes.

Unfortunately, this is a case of business-as-usual between the NTSB and the DOT. Notably, adequate rest and duty-time limits have been spotlighted by the NTSB's Most Wanted safety recommendation lists for decades. This very problem contributed to the Graniteville wreck, and there has been no significant legislative change to solve for it. This scenario falls within the trope of containment, which treats major hazmat accident as one-off events. During a critical time of human performance, on that fateful Thursday morning in Graniteville, the local railroad crew exceeded their legal duty-time. In a rush to get off work, they failed to check the main line switch, which was never discussed during their safety debrief (NTSB, 2005, p. 9). The airline equivalent would a flight deck crew thinking they lowered the landing gear, not checking for three green lights, and then

crashing the plane gear-up on the runway. As stupid as this sounds, there is a prolific accident history of innocent passengers dying due to a flight crew's momentary negligence with the landing gear. Had the Graniteville switch been checked there would have been no collision, no loss of life, and no poisoning of the town.

Another problem demonstrated by the Graniteville case is the time lag involved with research and lessons learned after an accident. For example, one conclusion on medical treatments was that "with appropriate supportive care, the majority of patients recovered completely from acute exposures" (Mackie et al., 2014, p. 413). However, beyond a university study, there is little to no support for the long-term care of Graniteville residents. In addition, an appropriate level of care is questionable with the loss of personal insurance and the economic collapse of the town. The county is hoping for several large businesses to move into the area, specifically, an appliance recycling plant and a tire factory (Long, 2015b). However, the potential growth would not replace all the jobs lost from the mill closure.

Lastly, healthcare impacts and associated costs were not included in risk modeling in any of the documents I reviewed while researching this case. Public health education campaigns are necessary instruments to safeguard public safety, and the responsibility of the majority of the 111 agencies that responded to the Graniteville wreck. It was only in academic literature that I found calls to action for public education on community hazmat risks. This evidence supports my thesis that government documents, which are primary artifacts in risk response, fall within the trope of containment. Due to their lengthy and complex nature, these documents function as agnotology devices. Civilian deaths in Graniteville catalyzed a policy change for rail safety, and made it all the way to the 2008

Congress. Regulatory changes that were mandated have since been contained by industry and economic pressure. This pattern thus creates the conditions for the reinstatement of ignorance, which sustains business-as-usual practices until a future accident forces a review of industry safety culture. This style of tombstone regulation is exceedingly frustrating to witness again, and again, and again with transportation safety accident cases. The next chapter focuses on technology as a method to circumvent myopic regulatory practices, which have become institutionalized as part of railroad safety culture.

## Chapter 6: Risk Rhetoric & Prevention in Minnesota

The Twin Cities of Minneapolis and St. Paul were once envisioned as becoming the geographic center for global trade. Today, that vision has become a reality in the transportation of shale oil. This hydrocarbon shipping network stretches from Texas up to North Dakota and Alberta, then out to ports in the Pacific, Atlantic, and Gulf Coasts. Due to developments in hydraulic fracturing, domestic oil production has boomed to levels not seen since the Reagan administration. To gauge the growth in the U.S., for every one carload of crude oil shipped in 2008, there were 50 carloads on the national rail network during the 2014 peak shipment period (Moore, 2015). Due to inadequate oil pipeline infrastructure, rail companies have transformed a 150-year-old network into the 21st century's virtual pipelines. Even with a 99.9% industry safety margin (Tate, 2014) the increased volume and frequency of hazardous materials (hazmat) shipments coincides with a rise in accidents—six explosive derailments occurred in 2015. This was a hallmark year for rail in North America, where two key components for my investigation transpired. The Minnesota Department of Public Safety (DPS) issued a report on the state's preparedness for an explosive derailment, in response to the Lac-Mégantic disaster, and the grassroots organization Citizens Acting for Rail Safety (CARS) was formed.

From a public safety standpoint, the potential for an accident like Lac-Mégantic is what drives CARS and their safety advocacy in Minnesota. Since the Twin Cities are a conduit for shale oil transport, the risk of a catastrophic accident in a dense urban neighborhood is within the realm of possibility. Trains carrying hazmat, typically ethanol or shale oil, transit the metro area in multiple locations, which are close to large public

sites like Target Field and TCF Bank Stadium. Catherine Door, a member of the CARS leadership council, lives within sight of a rail line. Many of the CARS members, who live in Minnesota and Wisconsin, have a rail line literally in their back yard. When I asked Door why anyone in town should care about oil trains, she stated the following:

My concern is that I can look out my kitchen window and my deck, and from here, I am within a 100-foot blast zone. All of my side of the street is in the blast zone of the eight blocks of town houses. I am two blocks from the [water] and when it crosses the river, [trains] goes over two channels of our great Mississippi River. So, I am also concerned about the water pollution and all the other large venue structures, whether it be the U of M campus, or the TCF Bank Stadium, or Target field. These are all publically financed structures that our people use and enjoy every day and these are under great risk as well. (C. Dorr, personal communication, September 4, 2015)

This statement echoes a fundamental public perspective, which has a focus on prevention as a means to mitigate risk. This point of view also represents a consistent narrative from citizen groups who want to see hazmat derailment risk treated as a top priority. An all-hazards approach to rail safety would place it in the category of tornadoes for impact scale, along with appropriately funded public education campaigns. In particular, the state has a Tornado Drill Day, which has occurred for the last 20 years (DPS, 2018) and is part of Severe Weather Awareness Week. However, no such public awareness campaigns exist for hazmat-by-rail. The state has recognized that such a campaign would cost a mere \$25k. This is roughly half the cost of maintaining the siren system, which is tested on a weekly basis (DPS, 2017, p. 2).

The proliferation of trains carrying hazmat, such as flammable ethanol and crude oil, near public spaces has increased media coverage of derailment risk. However, overall public awareness is questionable. In a Minnesota Department of Public Safety (DPS) survey of first responders, 23% of the 157 agencies polled ranked in the lowest category for awareness of freight train cargo in their area (DPS, 2015, p. 150). Only 9% were able to answer very high on a scale of 1 to 5 (p. 164). If fire departments are unclear about the contents of hazmat trains in their jurisdictions, the public is even less aware.

Over the last five years, I have done a handful of presentations to local organizations and public audiences about my research. One of my favorite events was hosted by the University of Minnesota Institute on the Environment Sustainability Symposium. I created a giant map of local rail lines and evacuation zones (see Angelich, 2015). People were shocked to discover how close their homes and schools are to shale oil trains. Almost everyone I engaged at the event pointed at the map and said, "My kid goes to school here!" or "Wow, I used to live right there." These engagements reinforce how important proximity is for environmental communication. One of the critiques from those presentations was that they lacked policy information. However, mapping out government rhetoric on a poster is incredibly difficult. The concern raised by citizen groups is that a glaring lack of attentiveness to our changing energy landscape carries deadly risks in the event of explosive derailments. This chapter is devoted to examining some of those gaps.

The difficulty of overcoming regulatory capture is a recurring theme in rail safety regulation. In Campbell's (2015) study on the Lac-Mégantic disaster, he described

regulatory capture as "de facto industry self-regulation, that companies [are] given the freedom to make rules that trade off costs against public safety" (p. 33). One of the problems for the State of Minnesota is that it depends almost entirely on private rail to police and maintain its safety culture. According to Burton and Egan (2011), "The story of the rise of the American administrative state and the nineteenth century origins of railroad regulation are nearly one and the same" (p. 541). This work will not attempt to separate the state from industry. Instead, having conducted a close-textual analysis of Minnesota's disaster preparedness, I discovered a stark contrast between public perceptions of derailment risks vs. government rhetoric describing the risk.

The focus of this chapter is to examine the ideological disjuncture between the ways in which community members view risk and how government agencies manage risk. What I am interested in is the structural problem inherent with our relationship to oil. For example, North America's high standard of living exists because of oil. Conversely, it is the feedstock for climate change, which is a primary threat to our quality of life. How does public discourse grapple with such hazards? This chapter unpacks rail safety policies that strategically position prevention through the framing of derailment as a containment problem. My critique is that prevention efforts typically focus more on the act of emergency response (i.e., crisis management) versus a dynamic and proactive risk reduction campaign of the sort that the public would apparently prefer for greater long-term safety.

In response to the Lac-Mégantic disaster, the State of Minnesota commissioned a series of public safety studies. I argue that these documents represent a consistent shaping of discourse on oil train safety into a trope of containment. Evidence exists to

support the perception that progressive rail safety policy depends on a body count. Essentially, until another Lac-Mégantic disaster happens, the business-as-usual rail safety culture remains in effect. Some call this tombstone regulation. One of the problems with the body count ideology is that it reinforces a political environment that depends on regulatory capture. Therefore, safety policies are shaped to strategically position prevention through a rhetorical focus on containment. What this means is that government response works to shield private rail interests from public outrage. When an oil train explodes, resources are used to contain the accident—which is treated as an outlier event. Strategies of containment have the effect of supplanting opportunities for robust public education. The concession is that increased public awareness of hazmat would pressure rail industry profit margins. Therefore, government prevention efforts are pressured to focus on emergency response, versus a more expensive and long-term risk reduction campaign.

One of my concerns is that the Lac-Mégantic tragedy is becoming a "Black Swan" incident. Taleb (2007) described Black Swans as "outliers" or events with the "combination of low predictability and large impact" that are "endemic in social matters" (pp. xvii-xviii). There is only a single case of catastrophic loss of life from a shale oil train derailment. Therefore, the Lac-Mégantic story is often assigned the frame of a Black Swan—a rare event. However, since 2010 there have been 23 explosive derailments in North America (NTSB, 2016). In 70% of those cases, civilians were forced to evacuate from the blast zone. Instead of sustaining discourse on progressive policy, the conditions that precipitated the Lac-Mégantic tragedy are allowed to resurface. Containment is a prudent policy response, but it falls short when enacted



through an all-hazards public safety perspective. Lastly, Minnesota hazmat policy does not account for an understanding of oil as a social penetrator. The idea that a bomb train can be contained raises critical questions on ideology, bodies, toxins, capital growth, and public dissent.

### **Civic Buzz**

Of all the public rail safety events I have attended in the last five years, the most emotionally engaging was hosted by the League of Women Voters (LWV) Minneapolis in 2017. A monthly dinner discussion called Civic Buzz provides the Twin Cities community a public forum to discuss critical events. Being in a banquet hall filled to capacity reminded me of the public sphere theorized by Habermas (1964), which is "arduously constructed case by case" (p. 55). The guest for the evening was State Rail Director Alene Tchourumoff, and this was a rare opportunity for citizens to confront their government representative. The LWV event flyer positioned Tchourumoff as "the point of contact for citizens worried about the potential for dangerous crashes from the oil trains rumbling through their communities" (C. Dorr, personal communication, February 3, 2017). This case will demonstrate several core issues within the trope of containment, and situates an examination of the tensions between prevention and risk reduction. Tchourumoff was also surprisingly candid about the power of the rail industry, along with the limits of state authority.

What made the evening's discussion heated was the county's plan to co-locate hazmat freight next to light rail service. The Kenilworth Corridor project will join a section of light rail with a main line that crosses the Mississippi River, runs under Target Field, and bisects a recreational wetland area. The corridor is a popular recreational

thoroughfare, with bike trails crossing the rail line at several points, along with a section of Interstate 394. It is also an essential part of a pedestrian traffic network that sustains the public sphere. There are hundreds of restaurants, coffee shops, and public spaces connected to the trail. Personally, the potentially impacted area is also part of my extended backyard. Like many residents near downtown Minneapolis, I live next to the Kenilworth Trail and use it for exercise and grocery shopping. A community fear is that intensifying traffic near oil trains increases the risk of an accident. For example, Cedar Lake Parkway is a busy road and crosses the rail line where there are no signal gates. It sits between three lakes and is surrounded on all sides by houses and apartments. A crossing accident at that spot would be devastating. For my neighbors and me, there is a direct and visceral connection to the question.

The LVW is worried that "a train accident could cause a hazardous freight train disaster. As we build more LRT routes in the Twin Cities, this will become a more prominent and widespread concern" (LWV, 2017, p. 4). For the record, there have been three light-rail train (LRT) derailments since 2011 in the Twin Cities (Harlow, 2017). The Kenilworth Corridor project is also contentious for a variety of reasons (see Angelich, 2017). A few of note were proposals to dig a tunnel under the lake, displacing a school, forcing residents to move through eminent domain, and being the state's costliest public works project (Callaghan, 2014). As of 2018, development is stalled due to funding issues (Moore, 2018).

There was another concern on the minds of several people at the Civic Buzz. During the prior June, in the Columbia River Gorge National Scenic Area, a shale oil train derailed near Mosier, Oregon. Not only did the accident threaten a cherished

wetland, which required 28 fire departments in order to contain 7 ruptured tank cars, but it also shut down a major interstate. The accident is geographically comparable to the Kenilworth Corridor, but has a significantly lower population density. According to the U.S. Environmental Protection Agency (EPA), the accident spilled 47,000 gallons of oil, with the city sewer lines absorbing 13,000 gallons (EPA, 2018). All of that oil entered a protected system through a single utility hole. In addition, each of the 16 derailed cars were the upgraded CPC-1232 variety, which are jacketed and theoretically more puncture resistant (FRA, 2016). The fire burned for 14 hours and required 2 million gallons of water to cool the tankers. For reference, this is about half the volume of water used to frack a single oil well.

Water conservation concerns aside, Oregon lucked out that day. According to Fire Chief Jim Appleton, "I have a high degree of confidence that the school building would have been at a minimum affected, if not completely incinerated" had the weather been typical with high winds for that time of year (Halsey, 2016, para. 45). According to the EPA (2018), no significant volume of oil was release into the river, and there were "no observable impacts to fish or wildlife" (para. 2). Of the dozens of agencies involved in the investigation and cleanup, missing from the collective effort was the NTSB. U.S. Senator Ron Wyden (D-OR) stated, "I find it very disturbing that the NTSB did not appear to have enough resources to send an investigative team to Oregon to more closely examine the Mosier accident" (Schick, 2016, para. 7). The senator's statement echoed some concerns expressed at the Civic Buzz that government is not doing enough to safeguard it citizens.

Case in point, Tchourumoff's presentation was a brief 10 minutes covering the state's efforts to train 780 local fire departments in response tactics for a flammable liquids derailment (DPS, 2017, p. 7). The floor was then opened to the audience, and there were no softball questions or breaks for the state rail director. One of the first questions from the room was, "Is there any regulation to protect small towns from extremely long trains?" Tchourumoff responded with the following statement:

The short answer is not really. They are federally regulated through the Surface Transportation Board. It's really difficult for us at a state level to make any kind of comments about the way in which railroads operate on their Right of Way. They own, they operate, and they maintain it. So, however many trains they want to run they are pretty much welcome to do so. . . . One of the ways we try to mitigate those impacts to communities is making grade separations . . . to minimize the impact from at least a roadway perspective, but not necessarily from a quality of life perspective. (A. Tchourumoff, personal communication, February 7, 2017)

A very enlightening call and response discussion ensued, which I have transcribed from a videotaping of the event. The bulk of my Minnesota government case on containment rests in a handful of documents that Tchourumoff's office helped create. Rather than pick them apart, I think it is more useful to lay out a conversation spotlighting the complexity of Minnesota's rail environment. It demonstrates how state officials have been put in a difficult position through regulatory capture. In other words, this is the policy environment that sustains containment. Specifically, time and legal precedent have

worked to contain rule changes that could fundamentally upset the structure of private rail.

During the meeting, I wanted to know if the governor's office had modeled a worst-case scenario derailment event. I asked if there were any hard numbers on potential casualties, and how long it would take to evacuate at-risk areas like the Cedar Lake Parkway crossing. Tchourumoff stated,

I don't believe that we have ever quantified it to that extent. One of the things that we had proposed with the railroads ... is really trying to take a look at it through an all-hazards approach ... especially for a big Ag state like Minnesota. One of the things we will look to do in the coming months is to have more location specific vulnerability assessments. ... Through this Freight Council, we have been doing a lot of the work with the railroads at the table. ... We really need them wanting to be almost partners, in a sense, of really trying to say that this is a problem our communities are facing. How do we tackle it together, instead of it being adversarial? (personal communication, February 7, 2017)

One of the reasons for an adversarial relationship between private rail and communities is over a NIMBY fight. In this case, the back yard is the Twin Cities. Also in attendance at the Civic Buzz was Representative Frank Hornstein (DFL). He has been a vocal advocate for rail safety in the state, and I have seen him at every town hall related to the topic since I began my research in 2014. A consistent topic at all of these meetings comes from private citizens wanting to know the contents of the tank cars passing through their neighborhoods. Hornstein's most provocative comment at the LWV event was the following:

One of my themes tonight ... is transparency and the lack of it in the railroad industry. One of the things we've wanted from the railroads is their worst-case scenario plan. . . . This is one of the things we can't get. The PCA [Pollution Control Agency] has this information when it comes to environmental problems, but we don't have it if there is an issue in a densely populated area like Minneapolis. . . . Having worked on this for three years and this is my take, my opinion, I like to say to folks, 'Not a lot has changed since the days of James J. Hill' [shocked laughter]. We are constantly pushing. They exempted themselves from the Community Right to Know Law in the 80s. Specifically, the railroads went to Washington, DC, lobbied, and exempted themselves. (F. Hornstein, personal communication, February 7, 2017)

For background, James J. Hill was known as the "Empire Builder" having been a member of the Jekyll Island Club, which instituted the Federal Reserve Banking system (J.J. Hill, 1916). According to Burton and Eagan (2011):

By the 1870s, however, the honeymoon was over. Outraged farmers and their allies no longer saw the railroads as a beneficent river of commerce, but rather as a monstrous industry strangling everything within its grasp through the use of monopolistic rate-setting practices, real-estate market manipulation, and pervasive government corruption. (p. 541)

It is obvious that railroads have an instrumental role in American life. What Hornstein referenced was a schism, which had ruptured the public's trust and is again occurring with the rail industry. However, he closed his comments with a positive spin on community action by stating the following:

There was a routing question in New Hope and Crystal, just a couple years ago. The citizens were going up against Canadian Pacific and Burlington Northern. The community never found out [about] the decisions to reroute these trains until local realtors contacted City Council and City Hall. So the railroads didn't even tell the Mayor of Crystal what was going on. . . . When the citizens get active and 400 people show up at a meeting, and then you had Hennepin County doing something extraordinary, which was getting some legislation passed at the state level, to stop this whole process. That's what we have to do more of if we're going to defeat these plans. This is a pitch to get involved in groups like CARS and to get active in local communities. Because then these private companies and local elected officials can't ignore 400 people at a community meeting. There are bright spots here and we can see where good grassroots organizing can make a difference. (F. Hornstein, personal communication, February 7, 2017)

Grassroots organizing is fine and good. The story of citizen groups like CARS effecting change at the national level is a bit different, and I will discuss that case in Chapter 7.

One quick example is the Rail Security Act of 2007, which was a vote to move hazmat away from urban centers and at-risk communities—it failed. Hornstein stated, "This speaks to the power of the railroad industry and the railroad lobby, whether it is in St. Paul or in Washington, DC" (personal communication, February 7, 2017). The bill requested spending of \$1 billion, to be used over the course of four years, to improve transportation security. One of the requirements was to have railroads provide to the government "a list of routes used to transport high hazard materials, addressing temporary shipment suspension options, and assessing risks to high-consequence targets"

(U.S. Senate, 2007, p. 15). The Committee was also concerned that "very little of the existing DHS rail security grant funds have been available to intercity passenger rail security and no funds have been made available for freight railroad security" (p. 19). Freight rail security has a history of being passed over for more high-visibility issues.

The request for alternate routes was eventually dropped from the final bill. Current legislation in 49 CFR 1580.103 simply requires shippers and rail companies to keep spreadsheets on the location and quantity of hazmat, to be made available within 30 minutes in the event of an accident. This is exactly what happened in Graniteville, but as we know, that critical period costs lives. Included in the same bill was the requirement for emergency escape breathing apparatus. That became public law, but not an operational requirement enforceable by the FRA. Personally, I have to say that it is very frustrating to watch transportation safety issues become contained once they pass the visibility of public outrage.

I will come back to these points on prevention in a later section of this chapter. Some background work showing the size and scope of rail in Minnesota needs to be done next. This is important because it establishes the impact that hazmat transportation has on the state. An opportunity existed in Minnesota to lead the nation by pushing for progressive rail policy. However, concentrated power of the railroads contained state policy to an incremental shifting of influence on the nation's rail network.

## **Conditions in the Upper Midwest**

### **Compared to Other Zones**

Minnesota is a distinct place in terms of rail safety discourse. The Twin Cities are a central hub for BNSF and Canadian Pacific, which can route 60 shale oil trains through



the region on a weekly basis (Kessler, 2015, para. 12). Most of these are unit trains, an industry term for the carriage of a single commodity. Not included in this number are mixed freight which carries ethanol, and other hazmat such as anhydrous ammonia for the agriculture industry. According to the Canadian Association of Petroleum Producers (2015), the Midwest is Canada's largest export market for oil from the Alberta tar sands, which is projected to grow continually through 2030 (pp. 1-2). Concurrently, rail traffic through Minnesota is projected to grow by 40% in volume during the same period (Office of Governor, 2015, p. 2) and overall freight values by 161% (MnDOT, 2015, p. 2-35). Demand pressure on transportation infrastructure is expected to grow for the foreseeable future, with shale oil unit trains (typically lengths between 60 and 110 tanker cars) placing the greatest physical stress on track owned by Class I operators like BNSF (Gunderson, 2015).

The Minnesota Department of Transportation (MnDOT) 2014 report on rail safety lists Bakken crude as the single largest volume of hazardous material transported through the region (2014, p. 5). Bakken shale oil production "accounts for significant new rail business" (p. 6) which has increased from virtually no rail transport in 2005 to nine daily unit trains in 2014. If the price of oil reaches prior record highs, is possible to exceed 12 trains a day in the Twin Cities metro area. Currently, the only limits to network capacity are profit margins and public outrage. There was an average of 52 oil trains per week in 2015, which crossed the neighborhoods of 326,170 residents living within a half mile of the track (Brooks & Shaffer, 2015). Concurrently, there were 45 derailments in Minnesota during the peak accident season of 2015, which counted for 3.5% of all rail incidents in the United States that year (Collins, 2015). The concern voiced at several

town hall meetings is whether conditions are being set for a disastrous accident in the Twin Cities.

The winter of 2015 was a peak season for disturbing news on explosive train derailments. There were two oil train fires in February (cities of Dubuque and Mount Carbon) and three fires in March (towns of Gogoma, Galena, and Heimdal). Even more concerning, the majority of the oil spilled and ignited during these derailments came from CPC-1232 tankers, which were an updated designs resulting from the Lac-Mégantic accident. These accidents became a trend that caught the attention of the *Los Angeles Times* national desk. The paper conducted a study on 31 hazmat derailments between 2013 and 2015 and discovered that most of the accidents occurred in below freezing temperatures (Vartabedian, 2015a). According to Ed Dobranetski, a former National Transportation Safety Board rail accidents investigator, "You get real cold weather like this and a rail can just snap ... a wheel will shatter like a piece of glass" (Lowy, 2015, para. 11). This string of accidents raised new questions about rail safety in northern latitudes, where the majority of shale oil is being produced and transported.

The Upper Midwest is unique for the density of its rail traffic, but also due to regional weather. Most transportation accidents have weather as a contributing factor. During the heightened press coverage in 2015, an interesting phenomenon was observed in a *U.S. News & World Report* FAQ:

Many factors can cause an accident, from too great a speed to operator fatigue.

We won't know the cause of the most recent ones until investigations are complete, but weather may be a factor. When it is very cold, as it has been across much of North America, steel rails and train car wheels can contract and become

brittle. If the steel has a manufacturing flaw, no matter how small, it can spread rapidly in the cold weather. (Lowy, 2015, para. 11)

Preliminary findings from the Mount Carbon, VA accident, which occurred during below freezing temperatures, showed that visual inspection of the rail missed a vertical crack in the railhead. In a short period, that fissure developed into a wide gauge scenario, which is the leading outcome for inspection errors (Moore, 2015). A train's wheels can leave the rails after three inches of increased gauge width, and many derailments have occurred within days of a visual inspection. There is also a lack of consensus on what effects temperature has on steel and wheel composition. Even though the Federal Railroad Administration (FRA) sets strict gauge standards, they do not require threshold limits for railhead metallurgy. Consequently, each operator sets replacement standards with their own varying guidelines for grinding and reshaping worn track (Liu, Saat, & Barkan, 2012).

The NTSB has been pressuring the FRA to improve rail inspections since a famous 1992 Duluth spill. The accident was caused by a failure that was "typical of long-term exposure of a fatigue crack to the environment" (Vogt, 1994, p. 2). Three tank cars of benzene and butadiene derailed and crashed into the Nemadji River. The rail on that section of the network was supporting up to 18 freight trains per day, which is roughly 28 million gross tons of annual traffic (p. 2). The FRA classification for the rail line was based on speed, not weight, and did not require a yearly inspection. However, the segment that failed was inspected 6 weeks before the accident by its private owner and was flagged for replacement (p. 2).

The Duluth wreck is significant because it sits in the middle of a generation long case history established by the NTSB, where inspections failed to prevent major accidents (Vogt, 1994, p. 4). In a letter to the FRA, Carl W. Vogt, Chairman of the NTSB, stated,

Instead of strengthening the 1975 track safety standards, the FRA (in 1982) weakened the standards by deleting several sections that related to rail inspection and remedial action. The Safety Board opposed the proposed changes and commented that the proposed amendments to the track safety standards would adversely affect rail safety. (p. 4)

One outcome of regulatory capture in 1992 was polluting the Twin Ports of Duluth and Superior. The ruptured tank cars created a vapor cloud 20 miles long and required the evacuation of 40,000 residents (NTSB, 1994). Federal oversight at that time was not strict enough to protect Minnesota and Wisconsin residents from toxic exposure. The investigation was closed in 1997 and categorized as an unacceptable response from the FRA.

The change in demand that Bakken crude places on a centuries old rail system, including dilapidated bridges, increases dynamic loads. These were key factors in the Duluth derailment. During 2015, there were 1,286 rail accidents in the United States, which coincides with a boom in demand placed on an aging system. This number represents a 6% increase in accidents over the prior three years (Vartabedian, 2015). I call this an aging system because rail conditions and technology improvements have been slow to mature. There are also the long-term infrastructure maintenance problems of America's transportation network. For example, half of Minnesota's railroad bridges

were built before 1940 (Gunderson, 2015). Along with human error and geological displacement, perfect track conditions are a constantly moving target.

Following the Lac-Mégantic accident, the FRA did an audit of the entire 140,000-mile freight rail network, and discovered 24,000 defects resulting in 1,118 violations (Brown, 2017). Steven Ditmeyer, director of the Office of Research and Development at the FRA, stated, "One defect or one violation of the right kind can cause a derailment. . . . These statistics give a good indication of the track quality" (Brown, 2017, para. 9). What is unclear is just how safe 1 defect per 5.8 miles of track is for the transportation of hazmat. Marc Willis, an FRA spokesperson, stated, "Although many minor defects still are being identified . . . both FRA and railroad inspectors are finding fewer serious conditions, resulting in significant safety improvements" (para. 22). Jessica Kahanek, a spokesperson for the Association of American Railroads, stated that hundreds of violations were simply "paperwork-related" due to rail companies not providing required forms to FRA inspectors (para. 12).

Paperwork errors and loose rail ties are one thing, but metallurgical faults are serious defects that still plague the industry. In particular, the use of handheld ultrasonic equipment to detect fatigue cracks has been a problem for decades. The NTSB's safety recommendations from the Duluth accident were similar to their recommendations from the 2013 Casselton, North Dakota derailment. Both cases required better detection of internal material defects in order to prevent large-scale derailments. The Duluth case was railhead failure from fatigue cracks (Vogt, 1994, p. 5) and the Casselton case was wheel axel failure from fatigue cracks (NTSB, 2016, p. 15).

Another example of slow to change industry safety practices is the lack of upgraded tanker cars. According to the Minnesota Department of Transportation (MnDOT), "Of the reported 90,000 tank cars currently used to transport Bakken crude oil, only an estimated 15,000 are the 1232 specification or 16% of the fleet" (MnDOT, 2014, p. 7). The 1232s are upgraded hulls that improved the DOT-111 design, but also have a history of explosive ruptures during derailments. Shale oil fires are so intense that they cannot be extinguished. They are typically contained with foam and burn themselves out over the course of several days ("BNSF," 2015). There is also an oversight issue from a lack of inspectors in the state. Prior to 2015, MnDOT had only one track inspector for all of Minnesota. During 2015, there were two inspectors, with a third addition due to a temporary budget increase. A very small department is responsible for 4,450 miles of track (MnDOT, 2014, pp. 7-8). This is a bit of a misnomer, because the railroads employ hundreds of inspectors to maintain tracks that they own. However, the limited oversight powers of the state upsets residents who believe their tax dollars should be paying for a greater peace of mind.

State governments have a well-established paper trail, which employs the trope of containment to manage the public's response to oil accidents. Derailments are the leading category of train crashes in the U.S., with broken rails and welds accounting for 40% of all accidents (Liu, Saat, & Barkan, 2012). According to MnDOT, there are substantial risks to public safety due to the increase in traffic and large volumes of hazmat transiting urban areas. About two-thirds of unit train accidents result in spills, fires, or explosions, which has prompted regulators to demand stronger tank cars, speed reductions, and rail crossing upgrades. Several recent proposals have been either put forward or enacted to

mitigate risks by: 1) increasing the amount of rail inspectors, 2) increasing funding for accident response and potential future spills, 3) requesting transparency from rail companies, 4) accelerating the upgrade of oil tank car design, and 5) enforcing speed restrictions. The following section examines how the State of Minnesota frames rail safety in a manner that supports corporate strategic interest.

### **Prevention vs. Containment**

Minnesota's 2014 Hazard Mitigation Plan placed a derailment of Bakken shale oil into a natural disaster ladder. At the time, the state ranked the probability of a hazmat spill somewhere between earthquakes and dam failures (DPS, 2015, p. 26). Because there had been zero "crude-by-rail-related fatalities in the entire U.S. since 1990," the state's perspective on derailments was outdated (p. 34). Then Lac-Mégantic happened, but it was considered an isolated event. This is one of the reasons elected officials "indicated that constituents as a whole may not view preparedness for a possible oil transportation incident as a significant issue" (p. 10). A few years later, after a slew of winter derailments in 2015, the state adjusted the way it framed hazmat-by-rail risk. A safety official stated, "We place too much emphasis on responding to accidents and not enough on preventing them" (DPS, 2017, p. 13). I am cherry picking a couple quotes out of 400 pages of reports, but they represent an important dichotomy for the ways in which government can respond to public threats. According to Burton and Egan (2011), "Any regulatory frameworks established to protect the public from any form of disaster (whether economic, environmental, or health and safety-related) generally fall into one of two categories: *reactive* or *preventive*" (emphasis original, p. 537). My thesis mirrors

this position, but will widen the lens to include containment as a form of reactive and/or passive policy.

Oil has a long history of being an effective penetrator, one that is able to escape barriers designed to hold it in place. For instance, a policy outcome from the *Exxon Valdez* disaster was to improve the container by requiring supertankers to have double hulls (Shignaka, 2014, p. 57). The rail industry has reacted in a similar fashion to the Lac-Mégantic disaster. A consistent containment based argument from regulators is that oil car construction is outdated. The vast majority of the existing tank car fleet is DOT-111 tankers based on a design from the 1960s. The main problem is their thin single-hull design and valve placement are prone to puncture during derailments. Even the latest CPC-1232s are simple DOT-111 hulls that have been upgraded with either a head shield or an additional thermal layer. This is a little more metal welded onto a frame that was not originally designed to haul crude. The thickness and composition of the material used is relatively unchanged (Sumwalt, 2016). The Federal Railroad Administration issued a new DOT-117 standard in May 2015, requiring fleet conversion by 2025 at a cost of \$2.5 billion (Thomas, 2015). A year later, the NTSB held a safety roundtable to determine if the upgrades could be expedited due to a spate of accidents with the 1232s. Robert L. Sumwalt, Chair of the Rail Tank Car Safety Roundtable, stated,

To mitigate these risks we need a holistic approach. We need to keep trains on the tracks. If a derailment occurs, we need to contain the liquid in the tank car. Finally, we need an adequate emergency response if there is a derailment and spill. While each of these elements is critical to improving tank car safety, today's



roundtable will only focus on the second—keeping the flammable liquid from spilling by using more crashworthy tank cars. (Sumwalt, 2016, para. 5)

These are necessary and positive steps, but a focus on the container is the epitome of containment policy.

Hazmat-by-rail is a profitable delivery system for chemicals that run the national economy. However, when they are not safely contained, they have the power to destroy local economies—like the Graniteville wreck. A puzzle to unravel is how state governments are caught up in the production of containment. Rhetorical scholars, like Jennifer Peeples, examine the ways in which democracies socially construct the role of fossil fuels. Peeples (2013) stated, "As opposed to time—and space—specific catastrophes (tornados, hurricanes, fires, or famines), toxins are not so easily contained. They move between elements (water, air, soil, bodies) and are transported to sites far from their production" (p. 206). This is an important point on issues of scale. From a transportation perspective, where toxins leave protected locations, it is obvious that containment (i.e., a reactive policy) is poorly suited to environmental protection. However, Minnesota's preparedness plans focus almost entirely on containment vs. proactive and preventative strategies.

One of the problems with such policies is they are passive measures. When seen from the perspective of activist citizen groups, it is a government not doing enough to protect communities. For example, due to Bakken shale output and line upgrades, BNSF silently rerouted a significant number of oil trains into the western suburbs of the Twin Cities. In 2015, there were as many as 23 unit trains per week rolling through neighborhoods. The new routes increased hazmat exposure for an additional 99,000

Minnesotans. Prior to the shift, these residents did not have oil cars in their backyard. The railroads also did not inform the state, and people started to complain about traffic disruptions (Condon, 2015). Simultaneously, the state was responding to the Lac-Mégantic and Casselton accidents. A series of community meetings were held across Minnesota to support new railway safety laws (Office of Governor, 2014). During this time, Governor Dayton publicly criticized the rail companies for not being transparent about the routing changes. Dayton stated in a widely seen press conference,

Nobody could predict where a catastrophic eruption could occur. I'm not trying to scare people, but it's a fact of life that they have occurred, and therefore we want to be doing everything we possibly can to prevent them from happening.

(Mahoney, 2015, para. 4)

The governor was campaigning to sustain support for a public safety budget increase. The most visible policy was to increase spending on crossing grade improvements, including updated signage, markings, and gates at 100 locations. There was a \$42.6 million bond measure to build bypasses at three critical intersections in order to separate vehicles from rail traffic. Two of those projects were funded in 2018 (Office of Governor, 2018). There was also an increase in safety inspections, with budget improvements for two additional state rail inspector with each position costing \$120k per year in compensation and equipment (Louwagie, 2014). The state also enacted speed controls through sensitive areas. However, speed and collisions have not been a primary factor in the majority of unit train derailments. They occur due to failures in infrastructure, inspection, and maintenance.

The governor also worked to shift liability to the railroads. In the Lac-Mégantic case, MMA Railroad filed bankruptcy thus placing the cost burden on Canadian taxpayers. In Minnesota, the railroads are responsible for accident and cleanup costs. Requirements are also in place for rail companies to provide equipment to contain future spills. For instance, several sites along the Mississippi River house containment booms (DPS, 2017, pp. 142-145). As part of a good faith effort, railroads funded 250 firefighters to attend specialized training at a facility out of state (p. 108). The Railroad and Pipeline Safety Account was created in 2014 with \$9 million in funding from assessments levied on Class I and II railroad and pipeline operators. One of the critiques from the railroads questioned, "What has been done with the money that [we] have paid via the hazmat fee?" (p. 23). The money is used for intense hazmat training of first responders, and during 2015-2017 the fund spent \$2.328 million. As of 2018, there was \$6.746 million left in the account (p. 9). These are funds the state spends to augment the railroad's private recovery and emergency response teams.

However, there is no additional money being allocated to the fund (DPS, 2017, p. 102). Based on interviews and surveys done by the state's in-house Management Analysis and Development (MAD) group, "The public sector viewed the end to the assessments as problematic given that preparedness needs will continue even after the assessments ends" (p. 103). This is another example of time working to reproduce containment. With a sense of crisis fading, the steps Minnesota took to prevent a major rail disaster have run their course. The state temporarily increased budgets for fire departments near oil train routes to have emergency response training every three years. Administration costs are \$250k per year and each classroom session is roughly \$3,700 (p.

19). The assessment program ended in 2017, and the effectiveness of the remaining funds is unclear.

With funding running out, the rail industry will be happy to be left alone, and regulators will feel that proper actions were taken. That is, until negligence caused by a lack of sustained attention leads to a major accident. Another key point is that the railroads do not share their spending habits, even when requested by the White House to submit statistics on safety budgets (DPS, 2017, p. 107). The state has increased focus on containment by requiring railroad companies to prepare disaster prevention plans for the governor's office. Emergency response plans are also required to be filed with the Minnesota Department of Public Safety and the Minnesota Pollution Control Agency with continual updates. However, these plans have been criticized for lacking detailed and site-specific assessments. According to MAD,

Others interviewed for this report, however, criticized the railroads for refusing to estimate their spending on response preparedness, arguing that total funding nationally and by state likely falls short of what is needed but can't be analyzed if cost figures are unavailable. (p. 108)

Railroads also have no statutory requirement to share their inspection reports or structural analysis data on the bridges and equipment they own with the state (Gunderson, 2015).

A decreased risk of derailment within urban centers and environmental impact zones (e.g., Mississippi River wildlife habitats) has immeasurable cost benefits through prudential stewardship. Brigham McCown, the former chief of the U.S. Department of Transportation, stated,

I hear people say, "It happens, they derail." I think that is an untenable position. As a safety regulator, I don't think you can ever say, "Things blow up," or "Things crash." I believe the Department of Transportation has myopically focused on incident mitigation. Prevention should be the first question they should address. (Vartabedian, 2015, para. 21)

The improvement of rail transit safety oversight, and safe shipment of hazardous materials, is on the NTSB's Most Wanted List for 2017-18. According to NTSB Chairman Christopher Hart, it is "our roadmap from lessons learned to lives saved. It represents actions which, if taken, will reduce property damage, prevent injuries, and save lives in all modes of transportation" (Hart, 2016, para. 3). Burton and Egan (2011) went a step further when they stated, "Democracies are frequently criticized for doing a better job of cleaning up after the last disaster rather than preventing the next one" (p. 569). Based on my analysis, the most effective prevention strategy would be a large public education campaign. The State of Minnesota does mention education, but it limits the mission to policy makers and public safety employees. Their conceptualization of education is an internal act for the state's benefit—not a visible campaign. Therefore, public agency becomes contained through bureaucracy. This a tiny segment of state actors when compared to the hundreds of thousands of citizens who live with oil trains in their backyard. The next section examines what a community education campaign looks like using site-specific analysis.

### **Como Avenue Crossing**

The Transportation Safety Board findings and recommendations from the Lac-Mégantic accident have yet to be fully realized in the United States. From the

perspective of CARS, the zero risk method to ensure public safety is not to have bomb trains roll through urban centers. For example, most of the oil trains that pass through Minneapolis skirt the University of Minnesota Twin Cities campus. This falls within a 1/4 mile evacuation zone of that rail line, and cargo transfer yard, which is adjacent to the TCF Bank Stadium. However, if a unit train were to have an explosive derailment next to the stadium, how well could public agencies handle 50,000 Gopher fans running for their lives? This predicament was presented to Tim Busse, the University of Minnesota's Director of Communications. He stated, "Operations plans [are] in place to deal with just about any kind of emergency you might imagine here at the University" (Mahoney, 2015, para. 10). He also made it clear that city agencies are "trained to handle emergencies with crude oil trains" (para. 11) and the stakeholders at the University are "comfortable with where we are in terms of our continuity operations plans and our emergency operations plans" (para. 10). Do policies of containment make the public feel comfortable and safe? The rail line that skirts the university continues to St. Paul and a community along Como Avenue, which has no idea of the risk present in their backyard.

Close-textual analysis of the state's oil incident preparedness plan showed the term containment an average of every 3 out of 192 pages (DPS, 2015). This is policy language that consistently focused on containment versus prevention. In contrast, first responders interviewed for the report generated 13 major safety recommendations, which were prevention oriented. The DPS stated, "It is notable that many of these suggestions are geared towards *preventing* an incident rather than responding to an incident" (emphasis original, p. 177). It is useful to visualize the potential area of impact if an urban derailment were to occur in Minnesota, which has ten times the population density

of Lac-Mégantic. The Como Ave. crossing represents one of the highest risk areas in the Twin Cities. According to MnDOT (2014), "Grade crossing blockages on high traffic railroad mainlines, especially those railroad mainlines shipping crude oil, pose a substantial risk for emergency responders and the community" (p. 20). The Como Avenue crossing is particularly problematic due to the layout of city streets, which obstruct access to first responders in the event of a catastrophic derailment. It is a 10x10-block area with three schools and a prison, where most of the residents would be completely unprepared for an evacuation.

In order to better understand shale oil from the perspective of a community groups, I sat in on several CARS meetings and interviewed members of their leadership council. One of the interesting aspects to this group is the committee is entirely composed of women, several of whom have graduate degrees. Their focus is to engage public officials in order "to achieve a rail transportation system that respects health, safety, and quality-of-life for people, wildlife, and the environment" (<http://saferails.org/>).

One of the pressing dilemmas for CARS is how to break an institutional focus on containment in order to further an environmental justice agenda. Initially, I thought my study was a cut and dry case of two disparate points of view: a position on acceptable risk (policy stakeholders) versus a position on zero risk (citizen publics). From the perspective of CARS, the zero risk method to deal with shale oil transport is not to have hazmat trains (sometimes referred to as bomb trains) roll through population centers. This desire is possible for smaller operators that utilize North America's secondary rail network. However, the primary network designed for heavy long-haul freight is route

restricted. After speaking with a rail logistics expert at Cambridge Systematics, it became obvious that it is physically impossible to reroute the majority of oil trains. It is also unrealistic to break them into smaller units, because both options are cost prohibitive (A. Aepli, personal communication, November 16, 2015). This is the same firm that compiles the Minnesota Comprehensive Statewide Freight and Passenger Rail plan every five years (see MnDOT, 2015). During my interviews, a more important question surfaced, and that is whether citizen groups can effectively resist Big Oil's hold on the status quo for energy movement in the 21st century.

The trope of containment encompasses an inclusive culture that has a history of avoiding transparency, such as BNSF not informing the State of Minnesota on their route changes, which increased shale oil traffic through the heart of Minneapolis. CARS has worked to hitch transparency to their derailment prevention strategy. They stated the following:

We have to take the system we have and ensure that we're taking the best preventative measures, and that the industry involved with railroad freight is being held accountable in the same way that other corporations have to be held accountable for their actions—and that there's transparency in what they do. (C.

Reubek, personal communication, September 4, 2015)

Often, there is an emotional tug-of-war with our relationship to oil. Transparency is a prime area that citizen groups like CARS struggle with when trying to wrest power from entrenched private interest. As can be seen in Lac-Mégantic, "The town needs the railroad to survive economically, and CMQ [railway] needs to ship oil on it to be profitable" (Feith, 2015, para. 7). In order to better understand our relationship with oil,



we have to listen with an open mind to the stories it tells. Voice is important, especially coming from people who have suffered. There is a perspective that Lac-Mégantic offers which should be heard more clearly in the United States. Accidents are often the result of cost avoidance (e.g., not paying for rail inspectors and safety equipment) yet they incur huge financial, emotional, and environmental losses when they occur.

CARS had a technology-working group that held quarterly meetings in 2016. I participated in every meeting as an observer and research contributor. This process confirmed my premise that the structure of the railroads is too complex for five people to effectively intercede. Ulrich Beck has a useful framework for the ways in which public actors view risk, and I think the working group was caught in an ideological trap. Beck (2009) stated,

Social movements measure risks according to the potential for catastrophe involved and try to avoid risks which could entail a threat to present and future quality of life. The effective irreconcilability of these various risk assessments transforms concrete decisions over acceptable risks into struggles for power. (p. 111)

I believe the CARS working group spent too much time looking for ways to challenge the railroads, instead of working to better inform at-risk communities. I will discuss this problem further in Chapter 7, but my favorite meeting held a discussion on enhancing Minnesota's emergency alert system. For illustration, the Federal Highway Administration (FHA) advocated for the Safe Community Alert Network (SCAN) in its review of evacuations, including the Graniteville case. Push notifications to a registered and connected device, like a smartphone, is technology that public warning systems can utilize (Wilson-Goure, et al., 2006, p. 11). The State of Minnesota may not have the

power to intervene in national rail safety policy, but it has the funds and authority to improve its emergency communication systems. There was no language in any of the state documents I reviewed suggesting this course of action until the DPS issued its 2017 preparedness plan. In that report, the DPS focused on the Integrated Public Alert and Warning System (IPAWS), which was employed by half of Minnesota counties at the time. They requested an additional \$62,000 to integrate every county in the state into the communication system (DPS, 2017, p. 18). Two years later, that plan appears to be working. I wrote several requests for information about this system, but received no replies. In fact, dealing with government public information officers has been totally unproductive. Maybe a reliance on machines is the way to go. Trends in transportation safety include the wide-scale adoption of automated software, which has the promise of solving for human error.

### **The Digital Eyeball**

Transportation industry culture is to get shipments to market as quickly and safely as possible. Unlike trucking, rail lines require exhausting maintenance and precision. Like all transportation sectors, time has a way of pressuring methodical safety practices. For instance, an investigation found rail dispatchers rushing safety inspections to expedite traffic flow in order to avoid costly delays to cargo shipments (Stockton, 2011). Accidents have also increased regulatory pressure, with speed reductions as the quick fix outcome from nearly every hazmat derailment. There are no formal studies that quantify methods to reduce track and equipment damage with corresponding reductions in accident probability. There were 9,000 derailments over the last decade, with a cost to industry of \$2 billion in damages (Moore, 2015). However, with new technology

improvements, much of the inspection process can be automated. There is clear evidence that increased inspection frequency and accuracy reduce derailments (Liu, Saat, & Barkan, 2012). With new technology improvements, the inspection process can also be partially automated.

Inspections that do not disrupt and/or slow freight traffic would solve some of the time pressure dilemmas. One of the criticisms of increased inspections is that false positives add a financial burden on companies that already operate with high safety margins. However, improvements in automation would offset time loss from equipment upgrades through network efficiency. For example, there are algorithms (e.g., simple greedy heuristic method) that solve for efficiency issues (Konur et al., 2014, p. 48). Even with hundreds of inspectors in Minnesota, employed across 3 agencies and 22 railroads, derailments will continue to happen. A temporary policy fix was to increase the amount of rail inspectors employed by the Minnesota Department of Transportation. In 2014, the level of inspection was seen as not adequate, so MnDOT hired two additional track inspectors to oversee 4,500 miles of track. It sounds safer, but one of the hires replaced a retiring inspector who was overwhelmed and had been working alone for a decade (Sommerhauser, 2014). The state also used a three-year tax to improve training for local emergency personnel to combat oil spills, fires, and to improve road crossings. The legislative intent was for increased rail volume to pay for commensurate safety improvements to match demand. However, this has not been the case with physical inspections.

Safety efficiencies from Autonomous Track Geometry Measurement Systems (ATGMS) could decrease accidents and reduce environmental impacts. With network-

wide implementation, unit costs would also decrease over time. There are two obvious proposals, one of which could be championed by the Transportation and Public Safety Committee in the Minnesota Senate. It would call for an increase of rail inspectors employed by the state, to a level determined by MnDOT to meet the demands of projected freight growth. With the increase in shale oil traffic, specially trained inspectors are required for oversight of hazmat transiting the state. The cost could be covered by renewing the assessment levied on rail companies, and stipulating that the state's rail safety account have mandatory funding for inspectors for a period that exceeds the prior three-year window.

The second recommendation is to have at least one unit train per week, which transits the state, to carry an ATGMS device. There have been several recent high-profile explosive derailments that occurred within days of track inspection. The brunt of safety work is prone to human error, because visual inspections cannot detect fatigue cracks in a timely manner. Automated systems would greatly increase detection of faults in the track, and the results are reported back to the rail operators in real time. Railroads abandoned the caboose decades ago, but the reappearance of a sensor-scanning caboose may have utility. ATGM devices are dedicated measurement and analyses systems that scan the quality of rail while checking for defects in track material. They perform rail gauge measurement, track level checks, along with grade and ballast measurements (Wanek-Libman, 2013). These inspections are conducted by the Federal Railroad Administration (FRA) and Class I operators, but the benchmark is a once-per-year scan of major corridors. In the United States, freight railroads are privately owned and responsible for the track maintenance and upkeep of the rail that they own. The FRA is

responsible for regulatory oversight. According to the General Accounting Office, the FRA is able to inspect less than 1% of the railroads' operations each year. Larry Mann, a rail safety lawyer who also serves on the FRA's Rail Safety Advisory Committee, stated, "So the ability to inspect the track regularly is impossible ... and some areas of track are probably never inspected" by the federal government (Federman, 2014b, para. 32). The major concern here is track that sees frequent hazmat shipments, but is in remote areas of the country that receive little to no inspection.

The explosive derailment outside of Galena, Illinois in the winter of 2015 is one such location. The Pipeline and Hazardous Materials Safety Administration (PHMSA) spotlighted Galena as a problematic area because the only way to access the accident site was to build custom roads supporting heavy equipment (PHMSA, 2016a, p. 70). An emergency permit was required by the U.S. Army Corps of Engineers under the Clean Water Act. By the time that happened, the fire had burned itself out over the course of three days. There were 21 cars that derailed spilling 110,543 gallons of crude oil. Of the 94,929 gallons that did not combust, the remaining oil spilled into a wetland surrounding the Mississippi River and Witkowsky State Wildlife Area (PHMSA, pp. 7-8). The cost to the State of Illinois was \$187k for the collection of 165k/gallons of an oil and water mix, along with and 3.5k tons of contaminated soil from 20-square-yards of wetland (EPA, 2015, p. 3). The EPA did not have estimates on the extent of toxic leaching or impacts to local wildlife. Considering the amount of time it took to recover the oil, it is likely there was migration away from the pileup of 12 scrapped tanker cars. PHMSA has been asking for the same routing information that Rep. Hornstein wanted at the state level. He stated,

There are 14 criteria that have been laid out in federal rail routing information.

One of them is this very criterion, how do the railroads make routing decisions?

Of course, we ask for that information from the railroads and they will not give it to us. (F. Hornstein, personal communication, February 7, 2017)

PHMSA's site-specific response plan request was in a Notice of Proposed Rulemaking (NPRM) that is still sitting on the Federal Register without action, and Hornstein's bill failed to gain enough votes in the State legislature. The big picture is that without worst-case scenario plans, based on private routing information contained within railroad records, government agencies become handicapped in their ability to respond to catastrophic accidents.

Railroad safety is regulated by the Federal Railroad Administration (FRA), which employs 72 rail safety inspectors tasked with oversight of the nation's 160,000 miles of track (Moore, 2015). The FRA targets five areas of rail operations for inspection, including hazardous materials, locomotives and equipment, operating practices, signals and train control, and track condition. Currently, two federal rail inspectors cover Minnesota. In addition, the state employs two rail inspectors and one hazmat inspector. The private rail companies utilize a larger number of safety personnel, with BSNF employing 30 inspectors to oversee its 1,600 miles of track in Minnesota. According to BSNF, key routes that handle crude oil are visually inspected four times per week (Kessler, 2015). Since the primary cause of derailments is track condition, one of the concerns is whether safety inspection standards are high enough for the increase in volume and frequency of unit trains. The cost of this additional safety equipment would be borne by the Class I operators. There are several manufacturers of ATGMS along

with research projects at several universities and the Association of American Railroad's technical branch. ENSCO, Inc. delivered two ATGMS units in 2016, including the first ever deployed by a Class I railroad. The sad note is that this technology was prototyped for AMTRAK in 2008, and has yet to be adopted by freight operators (Dick, 2016). This is another example of slow to change practices in the transportation industry.

Similar systems are widely employed in passenger rail service (particularly in Europe) but the freight industry has yet to adopt this technology. Increased transparency and data sharing between operators would have the added benefit of employing algorithms to increase predictive control of rail quality. The average derailment has an equipment cost of \$272k, which does not reflect environmental or health impacts (Zarembski, 2015, p. 25). Early error detection leads to substantially increased safety by reducing the leading cause of derailments on primary track. There are also long-term network efficiencies that can be employed through this technology. States would benefit through fewer derailments, which shift containment funds toward better prevention systems. Citizens living near rail tracks would benefit from greater peace of mind and protection of the commons. As previously mentioned, the savings in prevention of large-scale environmental disasters is immeasurable.

Accidents constantly happen due to semi-active inspection, so why not initiate continuously active forms of inspection. ATGMS technology is a digital eyeball that has fixed costs, unlike shifting safety budgets. It is a clear and direct method to monitor hazmat, which is always working to become uncontained. Morton (2013) stated, "When the BP Deepwater Horizon disaster happened in 2010, non-humans and humans alike were coated with a layer of oil, inside and outside their bodies. While the media has

moved on to other spectacles, the oil continues to act" (Viscosity section). Rail networks are constantly in a state of change that leads to disasters. Chiseled into the entry of the NTSB Academy is the following dedication: "From tragedy we draw knowledge to improve the safety of all" (NTSB, 2005). Because most derailments do not happen in the middle of a town, they are quickly forgotten. BNSF was responsible for the maintenance of the railhead that failed outside of Chicago, and their repair costs are unknown. Apparently, it is more cost effective to run hazmat on unmonitored rail than it would be to implement 21st century safety technology like the digital eyeball. This issue applies to all Class I operators, not just the railroad owned by Warren Buffet. The next chapter will further examine the difficulty of public safety decisions that are caught between ethical choice and market logic. This discursive contest represents the ideological heart of the trope of containment, which is a neutralization of threats to the marketplace.



## Chapter 7: Conclusion

While discussing my research with a colleague, he asked, "How do you sleep at night?" We all laughed, because it was a great question for stripping away fluff. It also made me think about a basic tenet for safety culture—the status quo is not the end goal. The motto for transportation safety should be: "Do Better." Yes, the rail system works and (when compared to other industrialized countries) the network does a great job of keeping Americans safe. However, the transportation sector has thin margins, and big business "special-interest groups [are] trying to undermine safety for the sake of profits and other looming threats mean our work is never done" (ALPA, 2019, para. 5). According to the Airline Pilots Association, the "fight is never over" (para. 5). Because ALPA is one of the largest and most vocal groups of transportation professionals in North America, and I personally learned about safety culture as an airline pilot, their perspective fairly represents my final argument about a total safety mindset.

Chapter 5 made the case that safety dollars are in a constant tug of war. After the Graniteville accident, Congress mandated that emergency escape breathing apparatus be installed in all locomotives moving hazmat. Rail companies countered with better uses for those safety dollars, such as drug and alcohol testing. They argued that a larger number of workers are protected through standardization, versus expensive and specialized equipment (Vantuono, 2016). That may be true, but oil and rail workers still die every year from toxic inhalation. Recently, a string of asphyxiation cases made headline news where pipeline workers standing near wells, or rail workers cleaning oil tankers, have died (Soraghan, 2015; Simmons, 2017). When it comes to worker safety near volatile organic compounds, the industry can do better.

Another safety problem that shocks most people is unattended trains. Immediately after the Lac-Mégantic accident, there was a Canadian emergency directive preventing trains carrying dangerous goods from being left unattended on a main track. This new policy was applauded by the rail industry. The CEO of Canadian National Railway (CN) stated, "The government's new safety rules will help to reduce the risk of unintended train movements that can lead to catastrophic accidents such as the one in Lac-Mégantic" (Hallman, 2013, para. 3). However, working in the background was the rail lobby, whose current president is the former chief legal officer from CN (Gullo, 2018). According to Campbell (2015), "In November 2013 the Railway Association of Canada (RAC) proposed instead a set of enhanced securement rules, which would expressly allow trains carrying dangerous goods to be left unattended on the main track. Transport Canada approved the industry change at the beginning of January 2014, reversing the earlier directive" (p. 18). This move upheld the status quo practice of parking trains overnight in unsecured locations. For example, Figure 5 in Chapter 4 shows unattended box cars parked on the hill above Lac-Mégantic. Currently, CN overnights hazmat trains somewhere along that line. The location of those parked trains is not public knowledge, but it is local knowledge. For a myriad of reasons, the industry depends on safety practices done outside of national discourse. With the aid of regulatory capture, business-as-usual practices continue unobstructed.

I have argued numerous times that rail operates in ways that have not fundamentally changed since the industry was established 150 years ago. When it comes to national security, other scholars argue that the industry has not changed since World War II, when a team of Nazi agents landed by U-boat on Long Island. For instance,

it might be said that thinking about rail security had not progressed much from the era of Operation Pastorius. Rail security was thought of largely in terms of cordoning and policing approaches: build barriers—physical and/or legal—around the rail system. (Plant & Young, 2017, p. 60)

That operation involved foreign agents committing acts of terrorism inside the United States. At the time, strategic transportation targets were railroads and bridges. It has been 75 years since Operation Pastorius, yet the most recent safety study advocated for more "private investment in shared and secure information systems" (p. 55). The rhetoric of containment is inescapable when discussing rail safety, and it is unreasonable to expect secrecy to continue to protect the public.

Case in point, the physical barrier preventing access to a parked and unattended locomotive is a door lock. As far as I know, there is nothing to keep a bad actor from releasing the handbrakes of a train parked on a hill. Through accidents alone, Canada has seen over 120 runaway trains since 1996 on its main tracks (TSB, 2014b, p. 157). However, there is technology to prevent runaways (i.e., electronic brakes) which I will discuss in the next section. The runaway freight train scenario at Lac-Mégantic occurred because not enough handbrakes were set. The primary cause was human error by the engineer, but the next runaway could be caused by a terrorist act. This is the world we live in, but with full knowledge of these risks, the Railway Association of Canada lobbied to continue parking trains unattended. RAC eventually got the regulation they wanted and train security has been sent back to the World War II era (Transport Canada, 2017, sec. 62). When it comes to the physical security of trains, the industry can do better. I

will come back to this line of reasoning, but I also want to do better by asking the right questions of a century-old ideology.

### **Questioning Containment**

The solution typically given to solve for a containment problems is—more containment. Therefore, I want to use this final chapter to reinforce the thesis that containment cannot solve for disasters of its own making. A difficult thing about risk research as a communication scholar is how to quantify risk. When I attend talks on explosive derailments, there is always someone in the audience who wants to know the exact risk. Can we, as researchers, measure the threat to their person? They also want to know how worried they should be about their home and their kids. Essentially, these are the "how do I sleep at night?" questions. The basic answer is that the personal risk is very low, roughly on par with being hit by a train. As a kid, I was taught to Stop, Look, and Listen at crossings. As a scholar, if I am paying attention to public rhetoric, I am not looking at individual risk. There are plenty of other researchers measuring risk using quantitative models. After five years of looking at the risk of hazmat-by-rail, I have not found a quantitative model that asks the important question.

Should we be doing this at all? In other words, can we imagine ways of changing a century-old ideology to decouple the economy from fossil fuels. Problems of the Anthropocene effect all forms of life on a global scale to include insects, coral, fungi, etc. Human imagination, and the public discourse that results from its limitations, are often framed through ignorant narcissism. Case in point, when I was in high school sitting in Los Angeles traffic, I never imagined that CO<sub>2</sub> emissions from my car floated to the other side of the planet and could activate CO<sub>2</sub> on the ocean floor. This mechanism leads

to coral die-offs, sea level rise, and species extinction (Glikson, 2018). At the time, I had a poor environmental imagination. At public rail safety meetings someone usually asks, "Why are we still doing this?" Why are we shipping life-destroying hydrocarbons through our cities? They want to know if the rail lines, which have been in place for 150 years, can be moved. That is the wrong question and I have never heard a decent answer, but I have found a typical response.

The Northwestern University Transportation Center has hundreds of public safety projects. One that stood out was the Savage (1998) study, which examined if the rail industry was doing its best to safeguard America's towns and cities. It was written by an economist, who gained some fame with the following summation:

The fact that we observe over 2,000 collisions and derailments a year is not necessary [sic] an indication that there is a 'safety problem' on the railroads.

There is only a problem if this level of accidents is different from the socially optimal levels. (Savage, 1998, p. 197)

That argument is the rhetorical turn—or clash—where qualitative analysis fails to meet a public need for discourse. For background, Savage has done consulting work with three major railroads, the FAA, and the NRC. I thought he might be a man behind the curtain character, because of his role as a transportation guru. Oreskes and Conway (2010) link a revolving door of government and industry leaders to conflicts of interest, which perpetuate structural inequality. Personally, my Dorothy moment of discovering the man behind the curtain never happened. I have not found a single transportation conspiracy, or key individual, to personify Savage's inverted logic. However, this is a classic containment-style of argument and something I want to unpack in the next section. I will

also make a case that technology can solve for some of the problems of hazmat-by-rail. However, containment has serious and glaring failures when used as a safety-based ideology.

### **The 99.99% Rule**

Across the transportation industry, it is common to find cost-benefit calculations that show the problem of paying for the final 0.01% of accident prevention. Last year, BNSF published a rail safety overview, proudly stating, "BNSF moved hazardous materials 99.99% of the time without an accidental release" (Howell, 2018, p. 2). They are spending more on safety and equipment upgrades than at any other time in their operational history (p. 8) and accidents are at the lowest level in decades (p. 4). This perspective is consistent across the industry, and one that private rail uses to resist regulatory change. In May 2015, PHMSA required railroads to equip trains hauling crude oil with electronically controlled pneumatic (ECP) brakes by 2021. Rail industry insiders responded, "The requirement [is] a classic example of regulatory overreach" (Halsey, 2016, para. 4). Currently, a network wide adoption of ECP brakes has been postponed pending further testing. My educated guess is that technology adoption will be postponed until another accident generates massive public outrage.

There is a vocal group of regulators and scholars who believe that ECP brakes will save lives, and could have prevented the Lac-Mégantic accident from occurring. This technology is a safeguard for the 0.01% of accidents that become public spectacle. FRA Administrator Sarah E. Feinberg stated:

We specifically require the better braking systems on [hazmat] trains because in the event of an incident, fewer cars will derail and fewer cars will puncture, which

means you're less likely to have a fire that will endanger lives. The science is there, the data is there ... their argument is, despite that data, [the railroads] don't want to spend the money on it. (Halsey, 2016, para. 19)

A month after the ECP brake rule was announced, NPR ran a story with the headline "Battle over new oil train standards pits safety against cost" (Schaper, 2015). ECP brakes are a complex rabbit hole, which I will not cover in detail, because there are valid arguments from both sides of the controversy. What I did find, which is pertinent and interesting, was how pneumatic brakes became an industry standard. It was because of an oil train accident. It should not be surprising, by now, to know that 150 years ago the rail industry opposed new brake technology. The railroads have a long-established history of resisting change.

Modern unit trains, which haul 100 plus tankers of shale oil, use an air brake system based on the original 1869 patent by George Westinghouse (Levine, 1962). One of the most important rail networks at the time connected Chicago to New York City, and was owned by Cornelius Vanderbilt. Westinghouse was convinced that his invention would save lives, and wedged himself into a meeting with Vanderbilt to give a 19th century version of a PowerPoint presentation. His goal was to sell the country's most influential railroad tycoon on the value of upgrading trains with advanced brake technology. Vanderbilt's response was, "If I understand you, young fellow, you propose to stop a railroad train with wind. I'm too busy to listen to such nonsense" (p. 83). What eventually did convince Vanderbilt was a horrific accident where "America's Number One Train" (p. 94) which he owned, collided with a derailed freight train hauling crude oil—on a bridge, at night, in bad weather.

While researching Westinghouse, I was surprised to learn that an 1871 oil train disaster was a catalyst for significant regulatory change for the railroads. On a freezing February night outside of Poughkeepsie, an oil train with 25 tank cars derailed on a drawbridge spanning Wappinger's Creek. Shortly thereafter, a Pacific Express passenger train (Vanderbilt's flagship service) came around the bend and collided with the derailed tankers. The Express was caught on the bridge in a massive oil fire, which buckled the trusses, and dropped its five sleeper cars into the river (Musso, 2015). The death of 22 passengers, with an equal number of injured, was national news and created public outrage regarding rail safety. Shortly thereafter, the rail industry was pressured to equip all passenger trains with air brakes and the technology was eventually mandated by the Safety Appliance Act of 1893. Prior to this public loss of life, brakemen had to literally hop from one car to the next, and manually crank a wheel to apply the brakes. By modern standards, this was a shockingly risky practice and caused unconscionable deaths and injuries for rail workers. According to the FRA, in the eight years prior to the passage of the Safety Appliance Act, more employees were killed than employed by all the railroads during a calendar year (DOT, 2010b, p. 38433). Westinghouse was convinced that his design would save lives, and that public support for rail safety would intervene against business-as-usual industry practices. He stated the following:

From personal experience I know how conservative the railroads can be. On the other hand if we win the people the train-riding public to our side, they will do the job of convincing the railroads far more effectively than we could ever hope to do. (Levine, 1962, p. 92)



Westinghouse was partially correct, because time has shown that nothing in transportation safety forces change more quickly than a body count. Rail accidents continued to cost lives, and he continued to adjust his design to operate as a foolproof system. The final design, which is still used today, is a pneumatic system that holds the brake pads off the wheels. In the event of a loss of power or pressure (e.g., a punctured hose) the brakes are mechanically applied. Under normal conditions, air brakes apply in sequence down the line from the locomotive to the final railcar.

During the days of Westinghouse, trains were less than a dozen cars and the stopping distance was measured in seconds and hundreds of feet (p. 105). During the Pacific Express accident, both trains had to be stopped by muscle power and a bell rope was required to be strung across the length of the train. The freight train crew failed to install this simple signaling device. When a rear tank car broke an axle, the crew was unable to signal the engineer to stop (Musso, 2015). Had the bell rope been in place, it is possible that the derailment would have been prevented. Today, the difference with ECP brakes is that the stopping signal is simultaneously sent to every brake assembly at the speed of light vs. sequentially at the speed of sound. During emergencies, ECP brakes can prevent an accordion style derailment. Because the braking signal starts at the locomotive, it is typical to have the back of the train collide with the front under heavy braking (Kessler, 2018). Another reason I harp about 150 years of stagnation is that Westinghouse invented ECP brakes in 1886, which he termed an "electro-pneumatic system" (Levine, 1962, p. 108). However, wire sheathing was decades behind useful application and ECP was not a reliable system at that time, whereas ECP brakes are now widely used in Australia and South Africa for passenger rail (GAO, 2016, p. 23).

However, after all the intervening years, adopting passenger rail technology to freight rail is still a contentious practice (Thomas, 2015).

The Transportation Safety Board of Canada stated that ECP brakes could have prevented the Lac-Mégantic runaway (TSB, 2014b, p. 104) and it has been found that ECP brakes would have substantially lessened environmental damage from the Mosier, Oregon derailment (DOT, 2016, p. 2). The NTSB has also shown that electronic brakes with fail-safe features can significantly reduce stopping distance (NTSB, 2015).

However, the technology continues to be opposed by rail industry lobbying. Burton and Egan (2011) believe that

successful industry lobbying against regulatory implementation of some key NTSB recommendations has cost dozens of rail commuters their lives over the course of the last fifteen years, as we came to experience the full effects of industry deregulation. (p. 562)

The question remains, will more civilians have to pay in blood for the rail industry to adopt price intensive safety upgrades? The industry is typically unwilling to spend large sums on theoretical safety upgrades, without corroborating evidence on its need and lifecycle cost linked to accident prevention. Therefore, ECP brake technology has an uncertain future in North America. Discursively, it is a fantastic example of how rail safety discourse becomes contained to technical spheres of knowledge.

A U.S. Government Accountability Office study showed how contentious technical claims have become. Here is a short summary of the points upon which government and industry disagree: 1) ECP saves money vs. increases operating costs; 2) stopping distance significantly decreased vs. unconfirmed data; 3) reduces derailment

severity vs. no physical verification testing; 5) dedicated fleet implementation vs. variable fleet use; and 6) low fixed cost of \$493 million vs. high continuous cost of \$3,042 million (GAO, 2016). Currently, one of the factors holding up implementation is the demand for a physical train crash to test the theory that ECP brakes reduce pileups and tank car punctures. According to John Risch, a BNSF veteran engineer,

it was deliberate and intentional by the railroad industry to try to make this study as expensive as possible.... You wouldn't see that in maritime, you wouldn't see that in aviation; they do this stuff computer-simulated, without causing this chaotic crash that's going to cost all kinds of money. (Halsey, 2016, para. 6)

Domestically, BNSF was the first company to operate ECP brakes on freight rail in 1994 (GOA, 2016, p. 13) and several companies experimented with ECP using various loads. By 2016, only one railroad still used ECP for freight and the industry has largely abandoned the technology (p. 11).

To summarize, I am not saying that rail technology has made few advancements over 150 years. My thesis is that containment has remained consistent over time, because it has a precedent of working for industry's maintenance of the status quo. A deregulation playbook relies heavily on containment rhetoric. I hope to have clearly demonstrated key moments, where the trope of containment enabled the petroleum complex to maintain market dominance. However, every oil train derailment is an opportunity for communities to resist this hazardous mode of transportation.

### **Research Opportunities**

Time can also function as a form of containment. Being six years post-Mégantic, I anticipate another large-scale derailment. The case studies in this work have shown that

public outcry incentivizes regulators to augment public safety—or create the appearance of improvement. However, as time drags on regulatory momentum slackens, and the same types of accidents tend to reoccur within a decade. For oil-by-rail, one of the ongoing prevention issues is track inspection. There are no formal studies that quantify methods to reduce track and equipment damage, along with data corresponding to a reduction in accident rates.

As the prior chapter showed, there have been hazmat derailments where track inspections occurred within weeks or days of the accident. In the Superior and Duluth wreck, the NTSB (1995) found the following:

Multiple layers of cracking [and] damage on the head of the rail from the failure location made it impossible for an ultrasonic beam to penetrate the rail head, even under laboratory conditions ... severely limiting any opportunity for detection before failure.... The safety board continues to believe that research to develop more effective inspection methods is needed. (para. 3)

Similar language is also used by the Transport Safety Board of Canada in their accident summaries, where stress fractures in the railhead caused derailments and oil spills (TSB, 2013). One of the great improvements in the last 20 years has been scanning technology. North America uses advanced imaging systems every day in our airports and shipping facilities. Autonomous Track Geometry Measurement Systems (ATGMS) could bridge the gap for inspections, and eventually decrease unit cost with system-wide implementation. There is clear evidence that increased inspection frequency and accuracy directly corresponds with a reduction in derailments (Liu et al., 2012). The FRA also ran a campaign to "embrace technology for track inspection" (Carr, 2014).

Requiring at least one hazmat train per week to carry an ATGMS device attached to the chassis of a forward car would dramatically enhance network inspections. These devices are dedicated measurement and analyses systems that scan the rail being crossed, while checking for hidden defects in track materials, grade and ballast, rail gauge measurement, levelness of the track, missing fasteners, etc. Similar scans are conducted by the FRA and Class I operators, but typically have a frequency of one scan per year. Currently, visual inspections bear the brunt of the work and are prone to error. Automated systems would greatly increase detection of faults, with results reported to the operator in real time. Increased transparency and data sharing between operators would have the added benefit of employing algorithms to increase predictive control of rail quality. There are several manufacturers of ATGMS along with research projects at several universities and the AAR's technical branch (Wanek-Libman, 2013). The systems are employed in passenger rail service (particularly in Europe) but the freight industry has yet to adopt this technology. Railroads run on slim margins, as does most of the transportation sector, where additional equipment is seen as a loss to their bottom line.

However, inspections that do not disrupt commercial traffic win in every category except implementation cost. Early error detection leads to substantially increased safety by reducing the leading cause of derailments on primary rail lines. There are also long-term network efficiencies that can be employed through this technology. Lastly, states would benefit through fewer derailments, which could free up containment funds. I feel compelled to mention ATGMS again, because the railroads have a history of failing to divulge information about the quality of their infrastructure. Chapter 6 made the case

that bridges owned by the railroads are in a state of disrepair in Minnesota. During the summer of 2018, two locomotives derailed on the Hoffman Swing Bridge in St. Paul at 2 a.m. spilling 3,200 gallons of diesel fuel into the Mississippi River (Olson, 2018). When it comes to inspections, the industry can do better.

The second significant opportunity for rail safety is community education. This is where neighbors could be helping neighbors. It happens during natural disasters, and states spend substantial resources on disaster education and preparedness. Why is hazmat-by-rail missing from state preparedness for at-risk communities like Minneapolis, Chicago, and Seattle? The reason I included evacuations in Table 1 was to demonstrate the reoccurring impact hazmat puts on communities. Many of those evacuations from toxic gases rival the size of communities displaced by wildfires, which are a major "natural" disaster. Unfortunately, industry created disasters lack the same level of attention. When it comes to public education on hazmat, local governments can do better.

### **Utilizing Social Movements**

Chapter 6 mentioned some of the efforts Citizens Acting for Rail Safety (CARS) put into liability insurance with the railroads. They submitted public commentary to the Pipeline and Hazardous Materials Safety Administration's (PHMSA) rail insurance liability study of 2016. Their concern is that the minimum insurance post-Mégantic for Class II operators has not changed. The \$25 million of liability insurance carried by MMA Railway was grossly insufficient (by a factor of 20) in covering the accident (DOT, 2017b, p. 25). The lesson from Lac-Mégantic did not translate to U.S. insurance practices, which still have a \$25 million liability floor for secondary operators. This is a

legitimate issue for groups like CARS, but none of their leadership are lawyers. I have also noticed that social movements within the field of environmental justice tend to get stalled by legal rhetoric.

A significant portion of the CARS public commentary to PHMSA was a definitional argument about the term "appropriate level" concerning liability coverage (Ruebeck, 2016, pp. 2-4). Unfortunately, their document had no legal references to federal code. This tied the hands of PHMSA, who are bound by federal regulation, and there is no statute requiring minimum insurance for hazmat-by-rail. However, the government acknowledges that "the projected costs of simulated worst case hazmat rail incident scenarios are extremely high due to the potential liability for personal deaths and injuries, property damage, environmental contamination and cleanup costs" (DOT, 2017b, p. 24). The second problem is there are no requirements for the railroads to have a worst-case scenario, which means there is no baseline to establish liability requirements. Insurance practices are opaque, inconsistent, and not part of public record. The DOT acknowledges this, but PHMSA's response to CARS was that "any potential for reducing safety behavior is mitigated by the requirements in the HMR and FRA regulations" (DOT, 2017b, p. 76). Without engaging existing regulations on grounds to which PHMSA can act, there is no legal recourse. The result from the Department of Transportation (DOT) was a study of the problem calling for more study of the problem.

CARS spent months educating themselves on rail liability, and meeting with government and industry representatives in preparation for that document. As far as I know, the only tangible outcome was a few lines in a government report (DOT, 2017b). When I asked for comment, CARS seemed unaware of this document and that PHMSA

had responded to them. In preparation of this chapter, I also reached out to CARS leadership to hold an exit interview. My intention was to get their perspective on five years of activism, along with a forward-looking statement about the future of rail safety. Unfortunately, I was unable to get their comment on record. Some of their members felt that my reporting threatened their safety, even though their names are public record.

Therefore, I believe efforts from citizen groups are better spent on community education vs. legal engagement with the federal government. What ever happened to knocking on doors and asking, "Do you know that high-hazard flammable liquids are going through this neighborhood?" A Certified Safety Professional, who has helped me on background, canvassed a neighborhood and said the following about community hazmat awareness.

I talked with most of the households in the wealthy Como Park Neighborhood in St. Paul about the railroad tracks behind their house ... [and] nobody knew what those trains hauled.... As the heavier tank cars with fluids started coming through, households literally started falling apart. Grain doesn't slosh side to side like crude. As I canvassed one cul-de-sac, two owners were actually repairing vibration damage as I was talking with them. They said, someday, there will be a big accident, and they will all die. They knew exactly how many cars came through, took pictures of the HAZMAT placards, and wanted me to do something about it.... What made these two groups different. Well, for one thing, there's a lot of former railroad workers on the North End. I met a lot of railroad employees and people who knew someone who worked for the railroad ... the biggest



advocates I ran into are current or former railroad employees. (D. Nightengale, personal communication, Oct. 17, 2018)

Using retirees to educate the public on oil-by-rail is a fantastic idea. Not only is there a public awareness gap, but also a knowledge gap which expertise can fill. According to Kahlor et al. (2006), "Knowledge gap researchers contend that education is among the most powerful mediators of knowledge gaps because when less educated individuals do access text-based media, they may lack the analytical skills needed to tackle more complex topics" (p. 186). This is something I witnessed at every public rail safety meeting. Even though many in the audience were actively educating themselves, environmental issues are complex and it does wonders to have citizens with hands-on experience in the room. When it comes to personal education, the public can do better.

Community education and ATGMS are my top picks, because I believe they have the most potential for improvement with immediate results. There are ancillary efforts that should also get more attention. Chapter 5 mentioned early warning systems, and the potential that telecomm has for community safety awareness. This is the 21st century and metro areas like Minneapolis still use Cold War air raid sirens for tornado warnings. The system had a malfunction, which I experienced one morning, and caused mass confusion (Harlow, 2016). There was also a time lag of several hours to get the correct information to the public. What if this was a real emergency with no internet? I would have to leave shelter, get in my car, and turn on the AM radio. Cold War tech makes for good backup systems, but seems laughable in the face of existing technology. For example, the Pacific Northwest Earthquake Preparedness Act of 2019 is working to implement the latest technology developed in Japan post-Fukushima. This is an

awesome undertaking, but does not include hazmat as part of the communication system (Andrews, 2019).

When I started this research in 2014, a slew of derailments during the winter received national press coverage. This was also a heated time of debate over the Keystone XL pipeline. I was closely following the comment sections of major newspapers, and discovered a social media opportunity for the papers and NGOs like the Sierra Club. Every time there was a derailment and fire, like the BNSF accident in Galena, IL, a consistent trend appeared where public outrage got pushed to the bottom of the comment stack by pro-pipeline advocates. I know from personal experience, having administrated a website, that corporations manage online commentary. There is a need for communication research on paid shills hijacking the comment sections of legacy newspapers. When I first read those accident threads, I wanted to know if tragedy offered lessons for public discourses and/or environmental justice. However, a better investigation might be on the pro-oil opportunities created by public relations firms after an accident. One crafty individual can contain public discourse when an oil train explodes, and surreptitiously reframe the issue to a position where oil wins. I spoke with a regional director for the Sierra Club about the phenomenon, and they did not have the resources to track these activities. I would love to see a study done, in cooperation with mass media, to track IP addresses on controversial stories. The depth of corporate influence on public commentary needs to be fully unmasked.

Lastly, hazmat tends to be an add-on feature for public alert systems—if it is included at all. First responders have networks like the Allied Radio Matrix for Emergency Response (ARMER), but those systems place the communication burden on a

limited number of safety professionals (DPS, 2017, p. 21). New alert systems should include and/or prioritize hazmat as part of the buildout package. Public disaster education campaigns also need more focus on hazmat. Finally, there are a slew of engineering challenges and opportunities beyond the scope of my study. One example is measuring the dynamic forces caused by oil sloshing in a tank car and how that energy transfers to the railhead. There is a need for studies with clear language on that effect, because data showing the stress caused by the weight of unit trains is unclear. To finish, I want to come back to the idea of the 99% rule, and express some philosophical skepticism about how society accepts the violence of a carbon economy.

### **Petromelancholia**

The fundamental question is not if oil-by-rail can be done more safely, but whether it should be done at all. The second question is whether a dirty chain of energy production can be fundamentally re-structured within one generation. The 1.5°C global warming cap given by the UN has a target date of 2040 (IPCC, 2018). In all the cases discussed in this book, containment as a barrier technology failed every time. Will the efforts to contain global warming to a 1.5°C cap have similar outcomes? When I say fail, I mean that containment is a broken method for protecting the environment. In other words, oil crashes every environment into which it is released. The wellhead failure from *Deepwater Horizon* and the single hull vessel failure of the *Exxon Valdez* caused devastating outcomes for the Gulf Coast and Prince William Sound ecosystems. The big picture is that we, as an industrial society, are not able to effectively contain the long-term violence of fossil fuels.

Lac-Mégantic was the epicenter of the hazmat-by-rail controversy, and I initially anticipated that it would become a primary site for oil resistance. I was wrong. What I discovered is a town more reliant on fossil fuels post-accident than it was prior. The railroad caught most of the anger, attention, lawsuits and politicking, while oil quietly continued to operate to its own economic benefit. In many ways, Lac-Mégantic became captured and isolated by oil. For example, the trauma of the fire caused a lifetime of PTSD for many residents, which emotionally isolates individuals. Conversely, we all need oil because there is no reasonable alternative and oil-by-rail is cheap. The word which best describes this state of dissonance caused by a fossil fuels is petromelancholia. Stephanie LeMenager (2014) coined the term and described it as follows:

The feeling of losing cheap energy that came relatively easily, without tar sands extraction, ultradeep ocean drilling, and fracking, has not been collected into one movement or even named in criticism. Provisionally, I will name it 'petromelancholia,' although melancholy, as psychoanalysts understand it, fails to fit, exactly, the twenty-first-century condition that remains my object of concern. Before ideologies harden into hegemony, there are structures of feeling that contain potential ideologies and not yet solidified, aspirant cultural norms. (p. 102)

The struggle for progressive energy policy is to win the cognitive gap, which can be seen as the time lag between awareness and action. Policies like the Green New Deal were first conceived over 15 years ago (Kurtzleben, 2019), and it is uncertain whether a single-generation solution can solve for the multi-generational problems of oil. Research tells

us that North America has to get off fossil fuels, but we cannot form the political will to do so in a timely manner.

After all my research, one of the statements that really sticks with me is when Bill McKibben (2012) said, "Most of us are fundamentally ambivalent about going green ... since all of us are in some way the beneficiaries of cheap fossil fuel, tackling climate change has been like trying to build a movement against yourself" (para. 23). This is my favorite interpretation of the paradox of petromelancholia, because a very human attitude has created the crisis. However, this is a serious claim for environmental communication and when it comes to dealing with nihilism, the public can do better.

What is interesting to me, as a scholar of rhetoric, are the transition periods when forms of technical argument start to break down. Rhetorical setbacks have been created through generations of conservative tropes. Society has been indoctrinated to the belief that all forms of energy production are cheap and safe. For instance, when I coached collegiate debate, the Cross Examination Debate Association (CEDA) topic for 2012 was incentivizing U.S. energy production across all market segments—including coal! Thankfully, clean coal arguments were uniformly crushed. However, during that school year, university teams across the country were advocating for a "nuclear renaissance." Shale oil was poorly understood, so the safe nuke argument kept winning regional finals because it had been established for two generations. Lakoff (2010) brilliantly described this phenomenon:

Have you ever wondered why conservatives can communicate easily in a few words, while liberals take paragraphs? The reason is that conservatives have spent decades, day after day building up frames in people's brains, and building a

better communication system to get their ideas out in public. Progressives have not done that. As a result they have a hard time building up the appropriate system of frames from scratch. And if they make the mistake of thinking that words are frames, they will assume that all they need are the right words or slogans. (p. 73)

Case in point, there is more evidence showing nuclear power to be safe and reliable versus evidence showing that it poses a grave threat to large populations. While nuclear power was flourishing, solar power was poorly developed and stagnated. That is, until Fukushima fundamentally changed people's minds, especially citizens of Japan, and 54 nuclear reactors were taken offline (Slater-Thompson, 2016). When it comes to the 99% rule, one of the most persuasive arguments is a position against nuclear reactors being placed within city limits. The catastrophic meltdowns at Chernobyl and Fukushima gave new meaning to paying for safety.

The business rationale for risk, which was succinctly described by the President of the Minneapolis Federal Reserve Bank, is that "we as a society have decided on how much safety we are willing to pay for" (N. Kashkari, personal communication, May 16, 2016). Does this business logic also hold true for the Fukushima accident, which has become "the most expensive industrial accident in history" (Burnie, 2017). I believe there will be a day when oil goes the way of nukes. Westinghouse Nuclear recently went into bankruptcy, and market logic shows that continued investment in nuclear power is cost prohibitive. South Carolina spent \$9 billion adding two Westinghouse reactors to an existing facility, and ten years later generated no additional electricity. They taxpayers poured billions into a literal money pit. Former Nuclear Regulatory Commissioner

Gregory Jaczko stated, "It's insane for a project that's done nothing, and never will. And is just a giant hole in the ground" (Lacy, 2019). Technically, it is a giant covered money pit, because the foundations for the reactors were covered and construction ceased. Given enough time, market logic eventually catches up by quantifying risk with across-the-board costs such as environmental, social, political, cultural, economic, etc.

The 2012 CEDA season taught me that institutionalized forms of education tend to favor and incentivizes technical rhetoric. Keep in mind, this was just one year after the Fukushima disaster, and every month brought alarmist headlines about nuclear waste. At the same time, collegiate debate undergrads were working hard to win pro-nuke arguments. Their cases were technically accurate, but their arguments were ethically bankrupt. Team after team ignored a slew of generational risks. Fortunately, my team did not and they placed third in the nation. What I hoped to see from collegiate debaters was an awakening consciousness that cheap energy has significant environmental and social costs. Instead, I kept hearing arguments about safe and easily disposable nuclear waste that comes in the size of a soda can. The smart teams attacked that evidence by asking, "Does this technology actually exist in the real world?" My point is that there are multi-generational tradeoffs to the ways in which we create energy.

No one knows how many generations will be living with the burden of radioactive material containment and cleanup from the Fukushima Daiichi Nuclear Power Plant (FDNPP). I want to invert Kashkari's business logic by asking, "How much is ignorance costing us?" The fallout from Fukushima was not limited to Japan. Everyone who consumed sushi that year ingested an extra 7% dose of cesium-137 from Pacific sourced fish (Smith et al., 2015, p. 1314). Existing research shows the dosing outside of Japan's

territorial waters was not dangerous. However, there is no baseline for strontium-90 which bioaccumulates (p. 222). Therefore, when human activity is poorly measured, can the full costs of industry be absolute? Aliyu et al. (2015) stated, "Contamination of the marine environment following the FDNPP accident represents the most important anthropogenic radioactive release into the sea ever recorded, on par with fallout from atomic bomb testing" (p. 221). That single accident release was greater than the total cesium-137 fallout from 66 nuclear detonations in the Bikini and Enewetak Atolls (Buessler, et al., 2017, p. 1194). An airborne radioactive bloom also crossed the Pacific Ocean, and cesium-137 deposits spread from Alaska to Tennessee to Iceland and back to Japan (Aliyu et al., 2015, p. 218). From this perspective, I hope to have demonstrated how the 99% rule is shortsighted and myopic.

Containment has a history of failing both as an ideology and as a physical barrier technology. Westinghouse started as an air brake company and eventually became the world's largest manufacturer of nuclear reactors (Westinghouse, 2019). There are rare moments, sometimes called Black Swan events, where business-as-usual practices (which effectively worked for generations) suddenly yield disastrous multi-generational outcomes. The 3/11 tsunami killed 16,000 people, but what cannot be carefully measured is the depth of radiation poisoning across the biome. A similar analogy applies to oil-by-rail. When compared to any industrial activity, deaths associated with rail are so low that they are statistically insignificant. Since 2008, the total number of deaths on or near a track has been 762 people (<https://safetydata.fra.dot.gov>). Most of those deaths have been trespassers, with a significant portion being teens struck by locomotives. It could



also be argued that electric scooters, currently a fad on college campuses everywhere, pose a greater transportation safety risk than oil trains (Notopoulos, 2019).

Framing risks empirically (i.e., through market logic) masks generational damages caused by the burning of fossil fuel. I want to end with a nod to one of my mentors, Ron Greene (1999) who said the following:

Containment has a unique role in the creation of public policy. It attempts to identify those practices and populations that threaten the health of the social body. As a discourse strategy, containment creates a relational logic in which the individual subject must monitor how particular practices contribute to his or her individual health at the same time as he or she must account for how those practices affect the health of the social body. (p. 113)

Again, we come back to a paradox. If the precautionary principle (as a moral logic) was strictly applied to shale oil extraction, as done by the State of New York, the outcome would be a moratorium on oil trains. Instead, the U.S. continues to pile resources into fossil fuel containment practices, which is a case of market logic winning against moral argument. There might be a day when the mythical logic of a nuclear renaissance applies to a fossil fuel economy. If climate change impacts could be quantified, shale oil extraction and shipment will become the most costly industrial activity of the last 150 years.

LeMenager (2014) said, "The story of petroleum has come to play a foundational role in the American imagination (p. 4), [but] when I came to southern California twelve years ago from Massachusetts, I did not place petroleum at the center of environmental imagination" (p. 20). What is it going to take until we get to the point where oil plays the

villain? I have trouble imagining a succession of derailments ending the practice of oil-by-rail. There have been plenty of opportunities for communities to organize against the deployment of unit trains. Even a series of Lac-Mégantic level accidents would be unlikely to get North Americans to kick the oil habit. It would take an epic disaster in a major city, on the scale of Fukushima, to disrupt an entrenched energy system. To answer Savage's (1998) point about the "socially optimal" level to reduce risk, I believe that level is dysfunction.

The market incentive that will most likely force change is unbearable financial burdens from climate change. What I do imagine are a series of extreme weather events causing the shutdown of key coastal refineries during critical periods. However, as long as the market contains the threat of oil, it contains disruptions to a carbon economy and the ability to transition to a zero emissions economy. The trope of containment works effectively against environmental mobilization, because our lives are run by market logic. However, when it comes to disrupting containment strategies, climate change will force civilization to do better. If oil trains epitomize a carbon economy, then containment-based solutions fixed to the secure movement of fossil fuels are destined to fail. There will never be a regulatory magic wand solution for oil-by-rail, because it cannot be separated from capital. The current model for the energy economy of North America depends on hazmat-by-rail. If capital could decouple from oil, and fix transportation to a zero emissions structure, many of the containment problems examined in this dissertation would be solved.

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