A Midwestern Ghost Town: Times Beach, Missouri

Dr. Marilyn A. Dyrud, Oregon Institute of Technology

Marilyn Dyrud retired as a full professor in the Communication Department at Oregon Institute of Technology, where she has taught for nearly four decades. She has been a member of ASEE for 32 years and is active in the Engineering Ethics Division, as past chair, and the Engineering Technology Division, as the current program chair. She is an ASEE fellow (2008), winner of the McGraw Award (2010), winner of the Berger Award (2013), and serves as the communications editor of the Journal of Engineering Technology. In addition to ASEE, she is active in the Association for Practical and Professional Ethics and the Association for Business Communication.

A Midwestern Ghost Town: Times Beach, Missouri

Introduction

Most people associate ghost towns with the Wild West, locales that prospered during the rich gold and silver strikes, later forsaken when the veins ran out. In Colorado, Nevada, Arizona, Wyoming, and California, visitors can roam the long-abandoned dusty streets, imagining a rowdier and livelier past. However, the heart of the country has its own version: Times Beach, Missouri, no longer exists, although a mound marks the site of original structures and roadways dot the area. The population has long since vanished.

Times Beach shares a sad legacy with a number of cities around the world that have been exposed to lethal wastes, most notably Love Canal, in Niagara Falls, New York, fouled by toxic wastes dumped by the Hooker Chemical Company and subsequent businesses; Pripyat, Ukraine, irradiated during the Chernobyl disaster; and Fukushima, Japan, contaminated by releases from a nuclear facility that suffered extensive damage in 2011, spawned by a massive earthquake. But while these three events are virtually common knowledge, Times Beach, with its heritage of dioxin poisoning, remains relatively unknown.

Introducing students to a different case associated with environmental ethics yields tangible benefits, encouraging them to examine the current atmosphere regarding regulation as well as corporate and personal moral culpability. This paper highlights several areas: the usefulness of historical cases, Times Beach case details, ethical issues, and the role of regulation.

Using Historical Cases

While some might argue that a case like Times Beach, occurring in the 1970s, is too "old" to be a useful classroom vehicle, several reasons support the viability of using historical cases to teach ethics. First, students presented with an historical case discover that they are learning genuinely new information, since many are not familiar with the history of their chosen fields. For example, while all of my students know about the Titanic disaster, none has ever heard of the 1915 Eastland sinking, which resulted in the deaths of 844 passengers. The ship rolled over while docked in the Chicago River, partially due to the weight of extra required lifeboats in response to legislation passed following Titanic [1]. And even well-known historical cases can harbor new information: for example, most people assume that the barriers separating the classes in the Titanic were tall, unscalable, and locked, as commonly depicted in popular films. In fact, they were about waist-high and easily surmounted, as revealed in Daniel Buckley's testimony during inquiries following the event [2]. They only existed because of U.S. immigration policies, not White Star Line regulations.

Second, embedding history in the study of engineering ethics places it in context and connects it to other fields influenced by engineering. As Ronald Kline (2001-2) notes, it provides "a more in-depth picture of engineering practice and its wider ties with politics, economics, and other occupations" [3, p. 19]. Engineering does not exist in a vacuum but is influenced by and influences larger cultural and societal forces.

Third, historical analysis can, according to David Billington (2006), emphasize the centrality of ethics to engineering design and enrich appreciation of the field: "People who teach classical music, literature, or art all have a reservoir of classical works and artists to draw on for their teaching; it is now possible to do the same for the newest art form and thus begin to make engineering an educational experience not just a training in techniques" [4, p. 220].

Finally, historical cases function as mirrors to contemporary society, allowing us to examine if and how we have progressed. They often, however, reveal the unsettling truth that we simply repeat old mistakes. In a study of three fires occurring over nearly a century, Dyrud (2006) describes how the circumstances of the 2003 Station night club fire in West Warwick, Rhode Island, were eerily similar to those of New York City's 1912 Triangle Shirtwaist fire and the 1942 fire at Boston's popular Coconut Grove night club: the same technology failed, and the same internal building designs contributed to the deaths of 100 in 2003, 146 in 1911, and more than 500 in 1942 [5]. As these cases illustrate, while historical events offer solutions, we may fail to implement them.

The case of Times Beach, Missouri, is a study in environmental pollution that occurred in the 1970s and was finally resolved in 1997. It is included in an upper-division course in professional ethics to illustrate one aspect of engineering ethics and to have students engage in ethical issue identification.

Case Details

The town itself has a relatively short history. In 1925, a promotional campaign by the *St. Louis Star-Times* newspaper offered purchasers of a six-month newspaper subscription a 20' x 100' lot for a mere $67.50. But to build a house, buyers were required to purchase another lot, due to the small size. Thus began the small community of Times Beach, Missouri, 17 miles west of St. Louis. Over time, it grew to nearly 2,000 people, most of whom established weekend, summer houses on the banks of the Meramec River. The Depression and subsequent gas rationing during World War II, however, made weekend getaways impractical, and during the housing shortage of the 1950s, summer cottages became permanent homes for a small, lower-income population [6].

The pastoral setting attracted horse enthusiasts: several sizable horse farms and arenas dotted Times Beach and surrounding communities. Coupled with more than 16 miles of unpaved roads [6], the arenas created significant dust issues, particularly vexing during the long, hot summers.

Enter Russell Bliss, a local waste-oil hauler. Bliss had earned a fortune from his business. According to *The New York Times*, he was a millionaire, with "a 200-acre farm, a stable of prizewinning show horses and a fleet of custom-made cars whose celebrated former owners have included Elvis Presley, Howard Hughes and John F. and Jacqueline Kennedy" [7].

He contracted with the city to spray the roads during the summers of 1972 through 1976. Prior to his city contract, he also sprayed other venues, including several horse arenas, in surrounding areas. At 6 cents a gallon, waste oil was considered a "bargain" [6]. With the city's blessing, Bliss sprayed thousands of gallons of used oil on roads, parking lots, and horse arenas, as well as 29 other sites [8]. The roads turned purple, area residents recalled, and had an "awful odor" [6].

Bliss, however, was spraying more than the used motor oil he collected from service stations and stored in tanks at his farm [8]. He mixed it with sludge acquired from chemical manufacturer Northeastern Pharmaceutical and Chemical Company (NEPACCO), owned by Syntex, in nearby Verona. In the "Black Tank," NEPACCO had been storing dioxin-laced residue resulting from the manufacture of Agent Orange and subcontracted with Bliss to remove some 18,500 gallons [9], with dioxin concentrations of 350,000 to 2,000,000 ppb [10]. Although Bliss maintains that he never knew of the dioxin [11], one of his former drivers, testifying in a 1974 deposition, stated that "his former boss had told him 'to keep [his] memory fuzzy about things like that'" [12]. Other Bliss clients included Monsanto [13] and a St. Louis utility, American Can and Union Electric [7]. In 1978, he was implicated in the illegal burial in Illinois of a hole-riddled barrel of chemicals with levels of PCBs that, at 3,600 ppm, far exceeded the standard of 50 ppm [14].

Locals became interested in Bliss' business. At Timberline Stables, the manager's small son, playing in the arena, became ill with "chloracne, nausea, vomiting, and abdominal pain," as did his playmate [15, p. 109]. Judy Piatt, co-owner of Shenandoah Stables, paid Bliss $150 to spray 2,000 gallons in her arena. Shortly thereafter, her horses and pets became ill and died; her two daughters developed flu-like symptoms and one required hospitalization. Sensing a connection between the spraying and subsequent ailments, Piatt began following Bliss and his drivers and, for 15 months, observed him collecting waste from industrial facilities and dumping it in drums, spreading it over his land, and selling it as a "dust suppressant" [16], [17]. Bliss himself lost 70 chickens and a dog at his farm.

Overall, dozens of registered horses died agonizing deaths, characterized by lesions around the mouth, "anorexia, diarrhea, and abdominal bloating" [18, p. 367]; hundreds of birds succumbed [8]. And, most importantly, numerous people were sickened with an assortment of maladies. Piatt sent her list, supported by photographs and documentation, to various state and federal officials and waited for action [16], [18]. Nothing happened: there were no visits from officials, no one collected soil samples for testing, and no one contacted her.

Ten years later, in November 1982, EPA personnel visited Times Beach, collecting soil samples to test for suspected dioxin contamination. Tests were positive, and people in "moonsuits" appeared everywhere. The next month, torrential rains brought a 500-year flood, with the Meramec cresting at 43 feet, nearly 25 feet above flood level [19]. In addition to experiencing substantial structural damage, the town was re-inundated by the dioxin spread a decade before.

With a double blow of toxic contamination and a record flood, the EPA, after the waters subsided in December, ordered an evacuation. The CDC labeled the town as "uninhabitable" two days before Christmas [20]. According to former mayor Marilyn Leistner, the message was clear: "if you live in the community, you need to get out. If you're outside of the community, don't go back. And don't take nothing with you" [21]. Residents simply left; Gary Pendergrass, Syntex engineer in charge of the cleanup, noted, "Walking around the streets, walking into houses, many of them were like people had just simply stood up, walked out and never came back. Plates on the tables, Christmas trees, Christmas decorations outside, and just street after street of that" [22]. The extent of contamination surprised even the EPA site manager, Robert

Feild: “Dioxin was so widespread it was along virtually every road” [23]. The EPA bought all residences and businesses for $36.6 million [24], closed the town, and declared it a Superfund site in 1983; the town was officially disincorporated in 1985 [25].

Residents moved to nearby communities and found a surprising amount of discrimination. Once people discovered that they were from Times Beach, fear set in. In school, Times Beach students had to sit in a special section, just in case they were contagious. Marilyn Leistner recalls a dry cleaner worker who refused to accept her leather jacket for cleaning [17]. Another resident paid his bills via check; they were returned in plastic sheaths. Schoolchildren waiting for a bus were pelted with rocks and taunted by their peers [26]. The psychological impact of being treated as pariahs was a significant blow [17].

Cleanup commenced immediately, eventually completed in 1997. Overall, hundreds of structures were demolished [27] and 265,000 tons of contaminated soil, from the town and 27 other sites [17], were incinerated in the Times Beach area, paid for by Syntex [28].

The incinerator itself was the object of numerous protests by residents, who feared that vented exhaust would contain high levels of dioxin, worsening an already bad situation. They formed the Times Beach Action Group (TBAG). In a 1994 demonstration, TBAG members, dressed in moonsuits and lobbing smoke bombs, demanded that “the toxic waste be stored until a proven technology is developed to destroy the dioxin” [29]. Regardless of TBAG demonstrations lasting about six years, the incinerator was built and burned 40 tons of soil an hour, 24 hours a day, 7 days a week, for more than a year [30]. Initially over-estimated at $200 million, the final cleanup cost was $110 million [31], [32].

Former residents filed thousands of lawsuits against Russell Bliss and the major businesses involved: NEPACCO (defunct in 1972), the Independent Petrochemical Company (also defunct), and Syntex [33]. Syntex alone was the recipient of 1,230 suits [34]. The results of two involved significant money: in 1988, $19 million to 105 plaintiffs; in 1990, $26 million to 1,406 plaintiffs. A third major suit, involving 380 people, had a sealed settlement [35]. Russell Bliss, who was actually responsible for the problem, had no judgments against him, although he was sentenced to one year in prison in 1983 for tax fraud [36].

Currently, a state park graces the Times Beach site. Established in 1999, two years after cleanup completion, the site features trails for hiking, biking, and horseback riding; picnic areas; a boat ramp on the Meramec; and wildlife viewing venues. According to the EPA, the site poses no “significant health risks to public visitors or park workers” [37].

Even though the initial events at Times Beach and surrounding communities occurred more than 45 years ago, the incident has scarred both former residents and the land. Residents worry about long-term health effects for themselves and offspring, in addition to coping with significant psychological consequences. The environment suffered a major blow: first, the indignity of contamination and then the ignominy of a cleanup that may never be complete. In short, the case of Times Beach is ripe for ethical assessment.

Ethical Issues

Philosopher Paul Taylor (1986) defines environmental ethics as "concerned with the moral relations that hold between humans and the natural world. The ethical principles governing those relations determine our duties, obligations, and responsibilities with regard to the Earth's natural environment and all the animals and plants that inhabit it" [38, p. 3]. An important extension to note is that inflicting harm on the environment, such as illegally dumping toxic wastes, can also affect the well-being of flora and fauna in the area.

Using Taylor's comments as a prism for examining the Times Beach situation, several ethical issues are immediately apparent.

Safeguarding the Public Health

"Do no harm" is an ethical prime directive, as evidenced in most professional codes, regardless of discipline. In Times Beach, this dictum was not followed, as residents experienced physical harm via debilitating health effects from the presence of the dioxin that permeated their environment.

Dioxins are "the unwanted byproducts of industrial and combustion processes" [39, p. 16]; they are not produced intentionally but occur from common industrial actions, such as paper bleaching, waste incineration, even backyard burning [21]. Dioxins are found worldwide and result from natural burning, including forest fires and volcanic activity. They settle in human and animal fatty tissues and have an estimated half-life of 7 to 10 years, according to the World Health Organization [40]. The official standard for dioxin cleanup is 1 ppb; at the Shenandoah Stables, one of the first arenas to be sprayed, in 1971, scientists measured 31,000-33,000 ppb [16]. This reading was an anomaly, however, as typical measurements were far lower, "only" 100-900 ppb [18].

The effects of dioxins on humans are numerous, none of them beneficial. During the 1970s and 1980s, the period of the Times Beach contamination, dioxins were considered "one of the world's most dangerous chemicals" [21], dubbed the "doomsday chemical" [41]. While current opinion about the toxicity level has changed, there is little debate that dioxins adversely affect humans. The most common short-term exposure effects are chloracne and dark patches on the skin, with some liver damage. Long-term exposure is much more serious, including "impairment of the immune system, the developing nervous system, the endocrine system and reproductive functions." Worse, based on animal experiments, dioxins have been classified as "known human carcinogens," with no known genetic effects. Due to the prevalence of dioxins in the environment, all humans and animals have low-grade contamination [40].

Shortly after the spraying, the residents and animals of Times Beach started showing signs of what was later determined to be chemical poisoning. Dozens of horses died, and birds fell dead in such numbers that a horse arena owner "spent hours raking them up" in his indoor arena, where hundreds of sparrows nested. Children exhibited birth defects [42], flu-like symptoms, bladder infections, and chloracne [33]. Adults experienced hyperthyroidism, muscular problems [43], arthritis, endocrine and heart conditions [16], seizures, and assorted cancers [42].

Few accounts of the Times Beach situation are as compelling as Judy Piatt's 2009 account in *Killing Horses: A Personal Chronicle of an Environmental Disaster in Missouri*. She vividly describes the progressive effects of dioxin on her horses and pets, as in this recounting of the death of Louie, a prized stud: "The sun burned him; his skin had turned a bright, cherry red. The children took over my job of throwing cool water upon him every hour. And they took over the several times daily chore of wiping him down with fly repellant; he was being eaten by flies like a dead rabbit on the highway" [44, p. 70]. Then one of her daughters began hemorrhaging and was hospitalized, suffering permanent bladder damage. Piatt herself experienced blinding headaches, acute sensitivity to light, and debilitating joint pain [44].

Piatt's first-person narrative drives home the real effect of dioxin on the people of Times Beach, who watched their loved ones develop disturbing symptoms of chemical poisoning and their animals sicken and die. While scientific papers explain the situation in technical detail, Piatt's chronicle captures the drama of a town dissolving around her.

In the 1990s, scientists revisited the lethality of dioxin: some studies confirmed its dangerous properties, while others showed it to be relatively benign. In 1991, CDC official Vernon Houck, who initially recommended relocating Times Beach residents, stated, "Given what we know now about this chemical's toxicity and its effects on human health, it looks as though the evacuation was unnecessary. Times Beach was an overreaction" [15, p. 122]. Significantly, this widely reprinted comment was included in a presentation at a Syntex-sponsored convention [17], suggesting a rather substantial conflict of interest. Houck later confirmed that his information was "taken practically verbatim from paper industry documents" [45]. The pulp and paper industry produces dioxin as a byproduct of the bleaching process.

Robert Feild, EPA cleanup manager, stated six years later, "On the basis of the current information that's available, we still believe that the decision to relocate Times Beach [residents] was fully justified" [30]. To clinch the argument, in 2000 the EPA declared dioxin to be a carcinogen and found that, in animals, it "can alter the fundamental growth and development of cells," resulting in cancer and reproductive problems, both potential in humans [46].

According to the Agency for Toxic Substances and Disease Registry, "Environmental factors contribute to more than 25% of all diseases worldwide," and the annual cost of just four childhood diseases associated with exposure to chemicals approaches $54 million [47]. Exposure can occur from a variety of sources, ranging from schools to homes to hazardous waste dump sites, all the result of human action. Cruise ships dump raw sewage and debris in the oceans; businesses dump hazardous wastes on the land, lakes, landfills, and rivers in sealed containers, plastic bags, or simply loose. All pose a significant pollution possibility, threaten the public health, violate EPA regulations, and risk stiff fines, up to $20,000 per infraction in Missouri, a class D felony [48]. Federal fines can be punitive. Wal-Mart, for example, was fined a total of $110 million for violating the Clean Water Act in 2013 [49].

The solution is elusive, as businesses dump because it is cheaper than expensive treatment processes, as in the case of Syntex, which originally was acting responsibly by sending its dioxin waste for incineration. But hiring Russell Bliss to haul it away was more economical.

Accepting Responsibility

All actions have consequences, and we all have a duty to accept responsibility for those consequences, intended or not. Moral responsibility may be individual or collective, and the Times Beach case offers examples of each.

Individual. Russell Bliss has steadfastly maintained that he was unaware of the dioxin in the sludge he obtained from NEPACCO; as he stated in a 1997 interview, "The only thing I knew I was spraying was waste oil . . . I'm just the guy that hauled petroleum product from one point and put it another [sic]." He clearly views himself as a "scapegoat" [50].

Bliss' actions, however, belie his words. In addition to illegally dumping the barrel of chemical solvents mentioned earlier, he and his drivers disposed of PCB-bearing wastes in a pit near St. Louis in 1977, paying a $2,000 fine for the infraction [7]; buried "hundreds of drums filled with dioxin and poured industrial waste into open pits and storage tanks" on his own property in the 1970s [51]; sprayed a parking lot in Illinois with toxin-laced oil [7]. He also had his 1983 application for transporting hazardous wastes rejected, due to 10 prior violations [52]. Writing for the *St. Louis Post-Dispatch*, journalist Stephen Deere characterizes Russell Bliss as "one of the worst polluters in the nation's history" [51].

In the early 1970s, Bliss also contaminated locations in the St. Louis metropolitan area, spraying in truck terminals, church parking lots, a lumberyard, and various roads in suburbs [53].

Shortly after the incident at Shenandoah Stables, co-owners Judy Piatt and Frank Hempel, conducting covert surveillance, developed a list of 16 companies that were pick-up points for Bliss and 31 sites where he had illegally dumped or sprayed [15]. Since the list was accompanied by extensive documentation, this would seem to constitute evidence that Bliss was clearly at fault for the dioxin contamination that plagued Times Beach and surrounding communities. Yet he has spent his post-spraying life denying responsibility for his actions.

Corporate. Corporate responsibility is shared between several companies and dates back to at least five years prior to the spraying incidents. In the 1960s, Hoffman-Taft produced hexachlorophene, a component in Agent Orange, the controversial defoliant used in the Vietnam War, at its plant in Verona, a few miles from Times Beach. In 1969, the company sold the facility to Syntex Agribusiness, which, in turn, leased it to NEPACCO, which produced the same chemical, with dioxin as a byproduct [54]. NEPACCO stored the dioxin in tanks onsite. The dioxin-saturated sludge, known as "still bottoms," was initially shipped to Louisiana for incineration [55] as per a contract with Independent Petrochemical Company [53], but, in a cost-saving effort, was sold in 1971 to local waste hauler Russell Bliss.

Corporate social responsibility (CSR) is a relatively recent concept, emphasizing the need for businesses "to embrace responsibility for the company's actions and encourage a positive impact through its activities on the environment, consumers, employees, communities, stakeholders and all other members of the public sphere" [56]. CSR involves maintaining a small carbon footprint, practicing philanthropy, and instituting ethical labor practices [57].

The companies, hit with numerous lawsuits, finally accepted responsibility for the cleanup through a 1990 consent decree, with Syntex paying up to $118 million [58]. In the end, Syntex demonstrated a modicum of CSR, but it only occurred because the company was ordered to, not due to an inherent moral sense.

Protecting the Environment

All engineering codes of ethics include a sustainable development provision: Canon 1f of the ASCE code, for example, states, "Engineers should be committed to improving the environment by adherence to the principles of sustainable development so as to enhance the quality of life of the general public" [59]. Engineers function as stewards of the environment, practicing their craft in such a way as to minimize current and future harm. While Russell Bliss certainly was no engineer, Syntex personnel were. The company simply sold its dioxin-laced sludge to Bliss, without regard to outcomes of that action.

Oil spills. When we consider oil spills, we tend to think of the more dramatic examples: the 1989 Exxon-Valdez spill that fouled pristine Prince William Sound with more than 11 million gallons of crude [60]. Or, more grandly, the explosion of the Deepwater Horizon, which contaminated a significant portion of the Gulf Coast in 2010 with more than 200 million gallons [61]. But spills can occur on a much smaller scale, as Times Beach illustrates. Although Bliss' oil spreads weren't a "spill" in the traditional sense, they had the same consequences of damaging the environment and its inhabitants, causing irreparable harm to stable horses, smaller animals, and people.

And, as is the case with larger spills, the dioxin-impregnated oil will last for years. The EPA has returned several times for additional cleanup activities since declaring the town of Times Beach clean in 1997; currently, a consultant hired by residents in a nearby area has concluded that the EPA "left higher-than-acceptable toxin levels at the Bliss-Ellisville Superfund site after a cleanup two years ago" [62]. The initial spraying occurred in 1971, so the dioxin has persisted for nearly half a century, far exceeding initial WHO estimates.

Dust suppressants. Russell Bliss spread his toxic oil as a way to alleviate the town's dust issues. The problem is not unique to Times Beach; nearly 25% of the nation's unpaved roadways are treated with chemical suppressants, including "water, salts, asphalt emulsion, vegetable oils, molasses, synthetic polymers, mulches, and lignin products" [63, p. v]. While these items are successful in keeping down the dust, they are also unfettered by federal regulations and pose a "significant potential for other environmentally hazardous materials to be used" [63, p. 37], as occurred in Times Beach.

Disclosure

One interesting aspect of disclosure in the Times Beach case concerns real estate. While the town itself has been razed and converted to a park, sites in surrounding areas now feature upscale housing developments. Building homes on or near hazardous waste dumps is a trend not confined to Times Beach. For example, at Niagara Falls' Love Canal, infamous in the annals of

environmental ethics, homeowners in a 1990 development complain of the same maladies as did afflicted residents decades ago: rashes, miscarriages/stillbirths, urinary and kidney problems. Lawyers predict at least 1,100 lawsuits [64].

Rocky Flats, Colorado, is the former site of a plutonium plant that, for 40 years, produced the element used in nuclear weapon triggers. The Candelas subdivision lies in the foothills. Homes boast solar panels and other green amenities, accompanied by a high price tag: $300,000 to $1 million. But the introduction of a new parkway has residents uneasy about the possibility of stirring up plutonium dust buried in their land [65].

And so it goes. Throughout the nation, real estate developers are building family housing on the nation's cleaned Superfund sites, in addition to dump sites not so designated. According to a Florida study, residents in these areas are "6% more likely to be diagnosed with cancer than people living in counties without the sites" [66].

Thus homeowners in the areas surrounding Times Beach have good reason to express concern about their property's history. At Bubbling Springs, a former horse arena sprayed by Bliss, buyers were shocked to discover the area's past, although "no federal or state laws outline specifics as to when and how a buyer should be notified of a property's hazardous history" [67]. In another contaminated area, Turnberry Place, residents successfully sued a real estate firm for nondisclosure, winning a $500,000 judgment [67]. Wildwood, part of the lethal Bliss-Ellsville site, is near Caulk's Creek, where Bliss dumped thousands of barrels containing not only dioxin but also PCBs. As recently as 2012, the EPA hauled away three barrels filled with paint waste [68].

In neighboring Strecker Forest, a 31-house development adjacent to the heavily contaminated Callahan property was planned in the late 1990s (Grover Callahan was one of Bliss' drivers and dumped waste on his own property). Despite assurances that the area was "clean as a whistle," potential residents were understandably concerned, as prior to cleanup a nearby ravine was "filled 15 feet deep with rusty barrels" [69]. Since 2008, the EPA has returned twice to the area for additional cleanup, removing "hundreds of waste drums and thousands of tons of contaminated soil." In the most recent cleanup, 2015, the EPA removed 1,545 tons of dioxin-laced soil [70]. In spite of residents' concerns and required additional cleanups, the EPA recently removed the Callahan property from its National Priorities List [71].

Federal legislation regarding home environmental hazards is limited to lead-based paint [72]. Other disclosure laws are state-based, a pastiche of sometimes vague requirements. In Missouri, residents, sellers, and/or real estate agents must report known presence of lead-based paint and evidence of methamphetamine/controlled substances production, as well as general property condition and water issues [73]. Reporting information about the history of the home, such as its location near a former hazardous waste dump, is not mandatory.

Given the potential health effects of close proximity to former dump sites, as demonstrated by current Love Canal residents, more attention must be paid in the form of viable studies, close monitoring of residents, empirical evidence based on medical facts, and mandated disclosure.

The Role of Regulation

Since its inception in 1970, the EPA has established a variety of regulations to enforce its mission, "to protect human health and the environment" [74]. While critics of the agency complain that regulations are unwieldy, overly complicated, and extend beyond the EPA's jurisdiction [75], there is little doubt that some actions, such as the Clean Air Act, have dramatically improved the environment, even though they may have an economic impact on business and delay projects due to required environmental assessments.

Students may have certain negative biases about EPA regulations, and the current political atmosphere reinforces those. To date, the Trump administration has rolled back numerous regulations that will result in environmental harm, such as repealing the ban on coastal oil drilling, which has an aesthetic, as well as an environmental, impact. Declaring that regulations hurt manufacturing, Trump has also lifted a ban on new public land coal leases, allowed for coal companies to dump debris in local streams, approved the construction of two controversial pipelines, and canceled an order to protect the Bering Sea region, in addition to 20 other provisions that regulate industrial pollution and reporting requirements. In process is the repeal of another 28 with similar outcomes. Some have the potential to affect public health, such as allowing higher methane emissions from landfills and oil/gas drilling sites [76].

The Times Beach situation gave rise to two major EPA regulations: the Resource Conversation and Recovery Act, which regulates transport/disposal of hazardous wastes, and the Comprehensive Environmental Response, Compensation, and Liability Act, which established the Superfund program [77]. Both have increased the public good as well as protected the environment, making it illegal to negligently distribute a toxic substance, as did Russell Bliss.

Conclusion

Times Beach, Missouri, while a mystery to our students, has been characterized as "one of the best-known obscure places in America" [42]. As one of the first Superfund sites [78], Times Beach offers a study in early cleanup efforts, a snapshot of community reaction, and an example of the effects of reckless dumping.

Presenting this information in class helps students to understand the human toll of environmental pollution, as well as contemplate our relationship to the land and the flora and fauna inhabiting it. They are genuinely startled by the lack of legislation governing toxic waste disposal at the time and express concern regarding the very delayed action of federal agencies. Some even mention the case in their course evaluation comments, noting their surprise that such a situation actually happened. From these responses, it is clear that using an historical case such as Times Beach makes an impression.

Viewed through an ethics lens, Times Beach has lessons to teach about respecting and protecting the environment, dealing with toxic substances of our own creation, expecting businesses that foul the environment to clean up their messes, and managing the baser impulses of individuals who set profit as their primary aspiration. Russell Bliss, spreading his poison, ignored the land and its inhabitants, and, as a result, the once close-knit town of Times Beach no longer exists.

It is a dreary December day. The last mayor of Times Beach, Marilyn Leistner, drives through the remains of her town, as she does weekly. Instead of a state park, she sees the past: friends and neighbors, the large oak tree where her children played, her home. She pauses by what she calls "the burial ground," a 400-yard long area that holds "the dioxin-tainted remains of every Times Beach residence, article of clothing, furniture and vehicle" [79], sad reminders of what once was.

References

[1] "The history: what happened," Eastland Disaster Historical Society. 2017. [Online]. Available: http://www.eastlanddisaster.org/history/what-happened

[2] "United States Senate inquiry, day 13." Titanic Inquiry Project. May 3, 1912. [Online]. Available: www.titanicinquiry.org/USInq/AmInq13Buckley01.php

[3] R. R. Kline, "Using history and sociology to teach engineering ethics," IEEE Technology and Society, vol. 20, no. 40, pp. 13-20, 2001-2.

[4] D. P. Billington, "Teaching ethics in engineering education through historical analysis," Science and Engineering Ethics, vol. 12, no. 1, pp. 205-222, 2006.

[5] Dyrud, M. A., "Fire! Three case studies in ethics." Proc. of the 36th Frontiers in Education Conference. New York: IEEE, 2006. [Online]. Available: doi: 10.1109/FIE.2006.322284.

[6] M. Leistner, "The Times Beach story," Synthesis/Regeneration, vol. 7-8, 1995. [Online]. Available: www.greens.org/s-r/078/07-09.html

[7] "Business sideline puts oil dealer in the spotlight in Missouri's dioxin case," The New York Times. Jan. 24, 1982. [Online]. Available: www.nytimes.com/1983/01/24/us/business-sideline-puts-oil-dealer-in-thespotlight-in-missouri-s-dioxin-case.html

[8] "U.S. v. Bliss." May 14, 2015. [Online]. Available: www.justice.gov/enrd/us-v-bliss

[9] Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides, Veterans and Agent Orange, Health effects of herbicides used in Vietnam. Washington, D.C.: National Academy Press, 1994.

[10] U.S. Department of the Interior, "Missouri dioxin sites." 2018. [Online]. Available: https://www.cerc.usgs.gov/orda_docs/CaseDetails?ID=119

[11] "Toxic town," CNN. June 26, 1997. [Online]. Available: www.cnn.com/US/9706/26/times.beach/transcript/index1.htm

[12] "Witness says driver lied about spraying dioxin," The New York Times. Jan. 27, 1983. [Online]. Available: www.nytimes.com/1983/01/27/us/witness-says-driver-lied-about-spraying-dioxin.html

[13] P. Downs, "Cover up: Story of dioxin seems intentionally murky," St. Louis Journalism Review. 1998. [Online]. Available: https://www.thefreelibrary.com/Cover+up%3a+story+of+dioxin+seems+intentionally+murky.-a020857892

[14] "Hauler in Missouri had site in Illinois," The New York Times. July 1, 1983. [Online]. Available: http://www.nytimes.com/1983/07/01/us/hauler-in-missouri-had-site-in-illinois.html

[15] A. Wildavsky, But is it true? A citizen's guide to environmental health and safety issues. Cambridge, MA: Harvard University Press, 1995.

[16] R. Reinhold, “Missouri dioxin cleanup: A decade of little action,” The New York Times. Feb. 20, 1983. [Online]. Available: www.nytimes.com/1983/02/.20/us/missouri-dioxin-cleanup-a-decade-of-littleaction.html

[17] W. Powell, “Remember Times Beach: The dioxin disaster, 30 years later,” St. Louis Magazine. Dec. 3, 2012. [Online]. Available: https://www.stlmag.com/Remember-Times-Beach-The-Dioxin-Disaster-30- Years-Later/

[18] M. Sun, “Missouri’s costly dioxin lesson,” Science, vol. 291, pp. 367-369, Jan. 1983.

[19] T. O’Neil, “A look back: Times Beach disappeared after 1982 flood,” St. Louis Post-Dispatch. Dec. 5, 2010. [Online]. Available: www.stltoday.com/news/local/a-look-back-times-beach-disappeared-afterflood/article_06941751-5727-589a-8a72-79ad13cd15f5.html

[20] S. Smith, “Times Beach residents win fight for relocation from contaminated dioxin sites,” Global Nonviolent Action Database. Feb. 25, 2017. [Online]. Available: https://nvdatabase.swarthmore.edu/content/times-beach-residents-win-fightrelocation-contaminated-dioxinsites

[21] J. Hamilton, “A chemical conundrum: How dangerous is dioxin?” Jefferson Public Radio. Dec. 28, 2010. [Online]. Available: https://www.npr.org/2010/12/28/132368362/a-chemical-conundrum-how-dangerousis-dioxin

[22] K. Eschner, “How Agent Orange turned this American small town into a toxic waste-ridden deathtrap,” Smithsonian. April 3, 2017. [Online]. Available: www.smithsonianmag.com/smart-news/times-beach-wasfounded-newspaper-promo-demolished-toxic-waste-ridden-ghost-town-180962693/

[23] T. B. Wheeler, “The little river town dioxin killed,” The Baltimore Sun. Nov. 13, 1996. [Online]. Available: articles.baltimoresun.com/1995-11-13/news199663180081_dioxin-times-beach-eastern-missouri

[24] “Federal buyout of Times Beach, MO., begins,” The New York Times. Sept. 7, 1983. [Online]. Available: www.nytimes.com/1983/...buyout-of-times-beach-mo-begins.html

[25] “Dioxin-laced Times Beach folds,” United Press International. April 3, 1985. [Online]. Available: https://www.upi.com/Archives/1985/04/03/Dioxin-laced-Times-Beach-folds/3815481352400/

[26] B. Brodt. “Bitterness is a legacy of a town that died,” Chicago Tribune. July 27, 1987. [Online]. Available: articles.chicagotribune.com/1986-07-27/features/860220233_1_times-beach-russell-bliss-dioxin

[27] C. Bukro, “As town is razed, some think danger wasn’t real,” Chicago Tribune. Feb. 27, 1992. [Online]. Available: http://articles.chicagotribune.com/1992-02-27/news/9201180789_1_times-beach-dioxin-drvernon-houk

[28] Office of Technology Assessment, Background paper: Dioxin treatment technologies. Washington, D.C.: GPO, Nov. 1991.

[29] C. D. Stelzer, “Beach brawl: The Times Beach Action Group begins its protest in earnest,” Riverfront Times. April 6, 1994. [Online]. Available: https://stlreporter.wordpress.com/2015/01.15/beach-brawl-thetimes-beach-action-group-begins-ts-protests-in-earnest/

[30] L. S. Walters, “The legacy of an unnatural disaster,” The Christian Science Monitor. April 23, 1997. [Online]. Available: https://www.csmonitor.com/1997/0423/042397.us.us.4.html

[31] “Clean up of Missouri toxic waste site complete, Times Beach Superfund site last of three toxic waste sites to be cleaned up that spurred creation of the Superfund law,” July 31, 1997. [Online]. Available: https://www.justice.gov/archive/opa/pr/1997/July97/281enr.htm

[32] EPA, “On-site incineration at the Times Beach Superfund site Times Beach, Missouri,” 1997. [Online]. Available: https://clu-in.org/download/remed/incpdf/times.pdf

[33] M. Gough, Dioxin, Agent Orange: The facts. New York: Springer, 2013.

[34] "8 from contaminated town lose illness suit," The New York Times. June 9, 1988. [Online]. Available: www.nytimes.com/1988/06/09/us/8-from-contaminated-town-lose-illness-suit.html

[35] "The New York Times and dioxin," Waste Not #233. March 1993. [Online]. Available: www.americanhealthstudies.org/wastenot/wn233.htm

[36] "Waste oil hauler gets one year for tax fraud," The New York Times. Aug. 20, 1983. [Online]. Available: www.nytimes.com/1983/08/20/us/waste-oil-hauler-gets-one-year-for-tax-fraud.html

[37] EPA, "Superfund sites in reuse in Missouri," Jan. 16, 2018. [Online]. Available: https://www.epa.gov/superfund-redevelopment-initiative/superfund-sites-reuse-missouri

[38] P. W. Taylor, Respect for nature: A theory of environmental ethics. Princeton, NJ: Princeton University Press, 1986.

[39] R. A. Hites, "Dioxins: An overview and history," Environmental Science & Technology, vol. 45, no. 1, pp. 16-20, 2011.

[40] World Health Organization [WHO], "Dioxins and their effects on human health," Oct. 2016. [Online]. Available: www.who.int/mediacentre/factsheets/fs225/enwww.who.int/mediacentre/factsheets/fs225/en

[41] J. M. Zimplemen, "Dioxin, not doomsday," J of Chem Ed, vol. 76, no. 12, p. 1662, 1999.

[42] S. Cohen, "Ex-residents pay final respects to Times Beach, a town ready for burial," Los Angeles Times. April 7, 1991. [Online]. Available: articles.latimes.com/1991-04-07/news/mn-30_1_times-beach

[43] J. Flock, "Clean-up ends in toxic town," CNN. June 26, 1997. [Online]. Available: www.cnn.com/US/9706/26/times.beach/times.beach/index.htm

[44] J. Piatt, Killing horses: A personal chronicle of an environmental disaster in Missouri. Bolivar, MO: Lightnin' Ridge Books, 2009.

[45] V. Monks, "See no evil," American Journalism Review, vol. 15, no. 5, pp. 18-25, 1993.

[46] M. Cimons, "EPA report declares dioxin a cancer-causing agent," Los Angeles Times. June 13, 2000. [Online]. Available: articles.latimes.com/2000/june/13/news/mn-40471

[47] Agency for Toxic Substances and Disease Registry [ATSDR], "Safeguarding communities from chemical exposures," 2007. [Online]. Available: https://www.atsdr.cdc.gov/docs/apha-atsdr_book.pdf

[48] Missouri Department of Natural Resources, "Enforcement and illegal dumping video surveillance," April 24, 2017. [Online]. Available: https://dnr.mo.gov/env/swmp/dumping-videos.htm

[49] J. O'Donnell, "Wal-Mart pleads guilty to dumping hazardous waste," USA Today. May 28, 2013. [Online]. Available: https://www.usatoday.com/story/money/business/2013/05/28/wal-mart-waste/2366999/

[50] CNN, "Toxic town: Russell Bliss interview," June 26, 1997. [Online]. Available: https://edition.cnn.com/US/9706/26/times.beach/transcript/index1.htm

[51] S. Deere, "Fears of pollutants hold up new homes: Wildwood retests site where Bliss dumped toxins decades ago," St. Louis Post-Dispatch. Nov. 5, 2009. [Online]. Available: www.stltoday.com/fears-of-pollutantshold-up-new-homes-Wildwood-retests-site-/article_b00aa7fa-9b24-5e0b-991d-6b6437289763.html

[52] J. H. Wolf, “Waste pit world’s only source of rare toxic pollutant,” United Press International. Jan. 27, 1983. [Online]. Available: https://www.upi.com/Archives/1983/01/27/Waste-pit-worlds-only-source-of-rare-toxic -pollutant/2882412491600/

[53] A. Hurley, “Floods, rats and toxic waste: Allocating environmental hazards since World War II,” in Common fields: An environmental history of St. Louis. St. Louis: Missouri Historical Society Press, 1997, pp. 241-262.

[54] Ecology and Environment, “Technical study and remedial action for Denny Farm site 1, Aurora, Missouri: Final report,” Sept. 15, 1980. [Online]. Available: https://nepis.epa.gov/Exe/ZyPDF.cgi/9101Q6WZ.PDF?Dockey=9101Q6WZ.PDF

[55] EPA, “Syntex facility, Verona, MO,” 2018. [Online]. Available: http://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.topics&id=0700881

[56] University of Washington Center for Leadership & Social Responsibility, “Corporate social responsibility,” [Online]. Available: www.corporatesocialresponsibility.com

[57] N. Fallon, “What is corporate social responsibility?” Business News Daily. Dec. 29, 2017. [Online]. Available: www.businessnewsdaily.com/4679-corporate-social-social-responsibility.html

[58] C. D. Stelzer, “Dioxin continues to haunt Mark Little and his neighbors on North Second Street,” Riverfront Times. Sept. 21, 1994. [Online]. Available: https://stlreporter.wordpress.com/tag/syntex/

[59] ASCE, “Code of ethics,” July 29, 2017. [Online]. Available: https://www.asce.org/codeofethics/

[60] NOAA, Exxon Valdez oil spill. Jan. 29, 2018. [Online]. Available: https://response.restoration.noaa.gov/oiland-chemical-spills/significant-incidents/exxon-valdez-oil-spill

[61] “BP oil spill timeline,” The Guardian. July 22, 2010. [Online]. Available: https://www.theguardian.com/environment/2010/jun/29/bp-oil-spill-timeline-deepwater-horizon

[62] K. Taketa, “Consultant warns Wildwood that dump site remains unsafe,” St. Louis Post-Dispatch. March 28, 2016. [Online]. Available: ww.stltoday.com/news/local/metro/concultant-warns-wildwood-that-dumo-siteremains-unsafe/article_e0914d32-f016-55ad-a395-398390bcac34.html

[63] T. Piechota et al., “Potential environmental impacts of dust suppressants: ‘Avoiding another Times Beach,’” March 2004. [Online]. Available: nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=113039

[64] “‘Love Canal’ still oozing poison 35 years later,” New York Post. Nov. 2, 2013. [Online]. Available: https://nypost.com/2013/11/02/love-canal-still-oozing-poison-35-years-later/

[65] N. Durham, “Toxic suburbia: Fantastic Rocky Flats vistas, plutonium breezes,” The Colorado Independent. Jan. 3, 2014. [Online]. Available: www.coloradoindependent.com/145376//toxic-suburbia-fantastic-rockyflats-vistas-plutonium-breezes

[66] D. Johnson, “Do you live near toxic waste? See 1,317 of the most polluted spots in the U.S,” Time. March 22, 2017. [Online]. Available: time.com/4695109/superfund-sites-toxic-waste-locations

[67] D. M. Richardson, “Cleaning up the past,” Riverfront Times. Nov. 13, 2002. [Online]. Available: https://www.riverfronttimes.com/stlouis/cleaning-up-the-past/Content?oid=2484108

[68] S. Deere, “Leftover waste barrels sparks Wildwood debates,” St. Louis Post-Dispatch. Dec. 28, 2012. [Online]. Available: www.stltoday.com/news/local//metro/leftover-barrels-spark-wildwooddebate/article_3229a81c-a1e0-59d0-ba6c-d771fce32ec6.html

[69] C. D. Stelzer, “Tangled up in Wildwood,” Riverfront Times. June 23, 1999. [Online]. Available: https://stlreporter.wordpress.com/category/the-times-beach-chronicles/

[70] K. Taketa, “Wildwood unconvinced as EPA moves to shrink Superfund site,” St. Louis Post-Dispatch. May 16, 2016. [Online]. Available: www.stltoday.com/news/local/metro/wildwood-unconvinced-as-EPA-movesto-shrink-superfund-site/article_26ee6036-3b4f-5bd7-a01b-0ebb77c69045.html

[71] EPA, “Real estate disclosure,” May 31, 2017. [Online]. Available: www.epa.gov/lead/real-estate-disclosure

[72] EPA, “National Oil and Hazardous Substances Pollution Contingency Plan; National Priorities List: Partial deletion of the Ellisville Superfund site,” July 14, 2017. [Online]. Available: https://www.regulations.gov/docement?D=EPA-HQ-SFUND-1983-0002-0751

[73] Missouri Realtors, “Disclosure forms index,” 2018. [Online]. Available: www.missourirealtor.org/missourirealtor/risk-management/forms-index/disclosureforms

[74] EPA, “Our mission and what we do,” Dec. 20, 2017. [Online]. Available: https://www.epa.gov/aboutepa/our-mission-and-what-we-do

[75] J. E. McCarthy and C. Copeland, “EPA regulations: Too much, too little, or on track?” Congressional Research Service. Dec. 30, 2016. [Online]. Available: fas.org/sgp/crs/misc/R41561.pdf

[76] N. Popovich, L. Albeck-Ripka, and K. Pierre-Louis. “66 environmental rules on the way out under Trump,” The New York Times. Jan. 29, 2018. [Online]. Available: https://www.nytimes.com/interactive/2017/10/05/climate/trump-environment-rules-reversed.html

[77] B. Unesco Hens, P. H. Dyke, and L. Hens, “What can we learn from ‘dioxin incidents’”? Int J of Environment and Pollution, vol. 60, pp. 34-62.

[78] EPA, “Superfund history,” May 15, 2017. [Online]. Available:http://www.epa.gov/superfund/superfund-history

[79] S. Giegerich, “Gone over 30 years, the spirit of Times Beach lives on social media,” St. Louis Post Dispatch. Dec. 5, 2016. [Online]. Available: htmlhttp://www.stltoday.com/news/local/metro/gone-over-years-the-spritof-times-beach-lives-on-in -social-media/article_df1ce674-2e9d-53c5-9e8a-954d93988459.html