Injustice Through Inaction: A Case Study of the Tar Creek Superfund Site

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Claire Sharp
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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisor
Rider W. Foley, Department of Engineering and Society

Introduction

From 1942 to 1953, the Hooker Chemical Company dumped chemical waste into Love Canal, a partially finished canal project off of the Niagara River (Kleiman, 2024). Hooker Chemical Company then covered the landfill with clay and sold the land to the Niagara Falls School Board. In the late 1970s, newspapers began reporting abnormally high rates of various illnesses within the community surrounding the Love Canal landfill. These high illness rates were found to be caused by the leaching of chemicals into the basements and yards of the Love Canal community and even into the playground of the elementary school built directly on top of the buried toxic waste. The Love Canal tragedy, and the subsequent slow response from government officials, brought the concept of toxic waste dumping to the forefront of many Americans' minds and led to new legislation regarding the handling of these sites.

In 1980, the United States Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (US EPA, 2015a). CERCLA addressed the nationwide issue of hazardous waste dumping and created the superfund program to finance emergency responses and cleanups.

Superfund sites may be identified through requests by the EPA, state agencies, local, state, or federal health departments, or private citizens. Sites that are identified as superfund sites are subjected to a complex clean-up process. The first step in this process is a site assessment (US EPA, 2015b). Historical information about the site is reviewed, and a site visit is conducted to understand the potential threat more clearly. After this assessment, the site may be placed on the National Priorities List (NPL), which is a list of the most hazardous superfund sites. A remedial investigation begins next, which involves a more in-depth characterization of the site and an initial consideration of possible remediation technologies. After this stage, a remedial plan

is developed and implemented at the site. Routine monitoring continues after remediation is completed to ensure that the cleanup continues to be effective and to help determine whether the site is able to be used again in some capacity.

Many contaminated sites in the United States experience significant delays between the original contamination, identification of contamination, and remedial action. These delays can place the health of the public at risk for unjustifiable lengths of time. This thesis will investigate the delayed remediation of the Tar Creek superfund site and examine how this delay has exacerbated environmental injustice in Ottawa County, Oklahoma.

Mining in Oklahoma

Oklahoma is a mineral-rich state that has profited greatly from mining for many decades. In 1833, the U.S. government began to acquire land from indigenous peoples in order to relocate tribes. One such tribe, the Quapaw Tribe, was moved from their land on the Red River in exchange for 150 sections of land "west of the state line of Missouri" in modern-day Oklahoma and Kansas, including modern-day Ottawa County, Oklahoma (Bandy, 2021).

In 1891, ore was discovered in Ottawa County, Oklahoma (US EPA, 2024). Ottawa County is located in the northeast corner of Oklahoma and holds 485 square miles of land and water (O'Dell, 2010). Significant mining activities followed this discovery of lead and zinc on the land that the Quapaw tribe initially held the rights to. However, companies quickly began to buy this land, and soon it was owned by a few large corporations. The United States Department of Interior (USDOI) worked through the Bureau of Indian Affairs (BIA) and the Bureau of Mines to issue leases. Certain tribal members gained considerable wealth during this period; however, the US government made the Quapaw landowners wards of the government and

exercised control over members' decisions surrounding financial matters (Quapaw Nation, n.d.). By 1958, most of the high-grade ore had been depleted, and a majority of mining activities in Ottawa came to a halt.

In the process of mining lead and zinc ore, mine tailings, known colloquially as chat, were produced and deposited into mounds that reached up to 200 feet in height. In 2005, an inventory in Ottawa County identified 83 chat piles occupying 767 acres of land (US EPA, 2024). Ponds containing fine tailings were also created during the height of mining activity. Most of the ponds have since evaporated, but the waste that was contained in the ponds still remains.

Groundwater infiltration in the mines was a significant obstacle in the mining process, and groundwater had to be consistently pumped out of the cavities while mining activities were taking place. However, this pumping ceased when mining came to a halt. The abandoned mine shafts flooded with groundwater, and oxidized minerals in the shaft began to dissolve. The dissolution of these minerals increased the acidity of the water, and the minerals dissolved further. As a result, the water underneath Ottawa County became thoroughly polluted with heavy metals.

Environmental Justice

For this case study, I will be drawing upon David Pellow's (2004) environmental justice (EJ) framework, as introduced in "The Politics of Illegal Dumping: An Environmental Justice Framework." Pellow's framework has four dimensions: the importance of viewing environmental inequality as a sociohistorical process rather than as a discrete event, a focus on the complex roles of the stakeholders involved, the effect of social inequality on stakeholders, and agency, or the power of populations faced with environmental inequalities to shape the

outcomes of these conflicts. He uses this framework to highlight the causes and nature of environmental inequalities.

The first dimension emphasizes the need to perceive environmental inequality not as an isolated occurrence but rather as an intricate sociohistorical process. By focusing on the history surrounding inequality, it may become clearer what the processes are behind the creation of the environmental justice issue. This dimension will also allow for a more thorough understanding of the interconnected relationship between social, economic, and political forces over time. This approach provides insight into how certain communities have been disproportionately burdened with environmental hazards, often as a result of systemic injustices embedded in historical policies and practices.

The second dimension deals with a focus on the stakeholders involved in environmental inequality and their varying goals, interests, and ideals. Local communities are often the most directly impacted stakeholders and play a central role in the search for an equitable solution. Local businesses may also be a relevant stakeholder due to their economic interests that may conflict with environmental justice solutions. A third stakeholder is government agencies that are entrusted with regulatory oversight and policy implementation. These agencies have control over powerful actions that can contribute to or alleviate environmental injustices.

The third dimension of Pellow's framework involves the effect of social inequality on stakeholders. Examples of this social inequality include institutional racism, class and gender inequalities, and political hierarchies. Recognizing and addressing these social inequities is crucial for developing strategies that not only mitigate environmental hazards but also foster a more just and inclusive society for all stakeholders involved.

The fourth and final dimension is agency, or the power of marginalized groups to actively shape the outcomes of conflicts related to environmental justice. Marginalized groups often demonstrate resilience and resourcefulness in navigating the challenges posed by environmental inequalities. Through grassroots organizing, community mobilization, and advocacy efforts, these populations can create openings in the political process to address and mitigate environmental injustices. This agency empowers communities to challenge the status quo and assert their right to a healthy and safe environment.

I will use the four dimensions included in this framework to investigate the Tar Creek superfund site through the lens of environmental justice. By viewing environmental inequality as a sociohistorical process, it becomes clearer how the delay in remediation contributes to this environmental injustice. With this framework, the role of and the effects on the stakeholders and the power of the populations who face these environmental inequalities can also be analyzed.

Research Question and Methods

There is often a delay in the remediation of contaminated sites, and as these sites continue to pose risks to nearby communities, the disparities in health and well-being among these populations are worsened. One such site, Tar Creek, has been contaminated for decades. This brings up an important question: how has the delayed remediation of the Tar Creek superfund site exacerbated environmental injustice in Ottawa County, Oklahoma?

A case study performed on the Tar Creek superfund site, located in Ottawa County, Oklahoma, revealed that historical and sociohistorical factors contributed to delays. Investigating this site also allowed for a detailed examination of the roles of various stakeholders involved and the agency that they held. Evidence for this case study was collected from EPA publications,

local news sources in Oklahoma, and academic papers. Pellow's environmental justice framework was used to support the analysis by exploring the four dimensions of the framework for the Tar Creek site. In order to explore the four dimensions of Pellow's framework, a timeline was constructed to analyze the events that took place in Ottawa County.

Tar Creek Case Study Analysis

It has been 41 years since the Tar Creek superfund site was added to the NPL, and remediation activities are still ongoing. The delayed remediation of the Site has aggravated the environmental injustice within the nearby communities manifesting in adverse health effects, economic repercussions, and environmental degradation. The history of the Quapaw Tribe, as with many indigenous tribes, is one of persistent injustice at the hands of the U.S. government. Beginning with the dispossession of the tribe's land, this injustice has translated into environmental injustice through the contamination of the land that they were forced onto. This complex issue involves numerous stakeholders driven by diverse motives, contributing to a conflict where certain levels of the U.S. government have been implicated in perpetuating injustice through a lack of decisive action. A closer examination of the third dimension reveals that this conflict is rooted in class inequalities and discrimination. Ultimately, the local community, despite facing formidable challenges, managed to assert its agency and challenge powerful institutions, marking a significant turning point in addressing the long-standing environmental and social issues associated with the Tar Creek superfund site.

Timeline of Events

1. (1970) Last record of significant production.
2. (1979) Site comes into the focus of the EPA and the State of Oklahoma when water began flowing to the surface.
3. (1980) Governor of Oklahoma establishes the Tar Creek task force. This task force is composed of 23 state and federal agencies as well as interest groups.
4. (1983) Site is added to the NPL.
5. (1984) OU1 record of decision is signed.
6. (1986) Construction activities are finished on OU1.
7. (1994) Indian Health Service tests blood of children, high levels of lead.
8. (1994) EPA begins sampling at high access areas and finds high levels of heavy metals.
9. (1995) EPA expands its testing to include all residences on the site.
10. (1995) EPA performs excavation of contaminated soil.
11. (1997) OU2 record of decision is signed.
12. (1997) The Local Environmental Action Demanded (LEAD) Agency is founded.
13. (1998) The first Tar Creek Conference is held by the LEAD Agency.
14. (2008) OU4 record of decision is signed.
15. (2009) OU4 residential buyout for the communities of Picher, Cardin, and Hockerville, Oklahoma.
16. (2012) Quapaw Tribe signs a cooperative agreement with the EPA to lead the cleanup efforts at the Catholic 40 site.

Historical Analysis

The first dimension of Pellow's framework involves analyzing the history behind environmental justice to understand the conditions under which the injustice has occurred. The last recorded record of significant production in the mines of Ottawa County, Oklahoma occurred in 1970. A decade later, polluted water began flowing to the surface from the abandoned underground mines. This discharge flowed into Tar Creek and a majority of the downstream aquatic life was killed. The bed of the creek was also stained red due to ferric hydroxide deposition, as seen in Figure 1. Due to these obvious environmental concerns, the Governor of Oklahoma created the Tar Creek Task Force in 1980, and the site was added to the NPL in 1983. In 1983, an article was published by a local news source, The Oklahoman, that accused the EPA of "dragging its heels" in reference to the remediation process of Tar Creek (Meyer, 1983). Internal memos from the EPA shed some light on this, revealing that the EPA was taking extra precautions due to the effect that the Tar Creek site could have on other mining sites across the country.

Figure 1. Image of Tar Creek (Miami News-Record, 2019)

Once it was added to the NPL, the Site was then divided into operational units (OUs), with OU1 addressing the surface water and the groundwater (US EPA, 2024). A record of decision (ROD) for OU1 was signed in 1984. A ROD contains information about the remediation technology to be used for a site, including the justification for why the technology was chosen. In 1984, The Oklahoman reported that the first phase of the clean-up of Tar Creek had been delayed (Biskupic, 1984). This delay was reportedly caused because "the state failed to follow federal bidding rules." Construction activities, including use of diking and diversion structures to reduce the inflow of surface water to three mine shafts at the site and reduce the outflow of acid mine water from the subsurface to Tar Creek, were completed in two years (US EPA, 2019).

After the discovery of high lead levels in children in 1994, remediation activities progressed with the excavation of contaminated soil. The OU2 ROD, dealing with the contaminated soil, was signed in 1997. Eleven years later, the ROD for OU4 was signed, addressing undeveloped rural and urban areas of the site where mining wastes are located. This involved voluntary relocations of 628 residences, 74 businesses and 125 renters from impacted areas.

Role of Stakeholders

The timeline of events also provides insight into the role that stakeholders have had throughout this crisis and shows when each stakeholder entered the conflict. From 1833 to 1970, the main stakeholders were the local tribes and community members, the U.S. government, the State of Oklahoma, and private mining companies. All four of these stakeholders had an interest in profiting from the mining activities. Once the mines had run dry, however, the private mining

companies largely left the picture as stakeholders. When evidence of extensive environmental contamination began to surface in 1979, many additional stakeholders arose. The arrival of the EPA and the Oklahoma Department of Environmental Quality (ODEQ), as well as surrounding communities and local governments, signifies a shift from primarily economic concerns to addressing the environmental and public health issues caused by extensive contamination.

Social Inequality

In 1994, the Indian Health Service reported that 34% of 192 American Indian children living in the area of the Tar Creek superfund site had elevated blood lead levels (Vincent & Shriver, 2009). Exposure to lead as a child causes damage to their brain and nervous system, slows growth and development, causes learning and behavior problems, and can lead to hearing and speech problems (CDC, 2022). This is a blatant form of social inequality that has had devastating effects on the Ottawa County community. Rebecca Jim, a Tar Creek activist, told an interviewer, “When children are lead poisoned, you change the potential of a community” (Baer, 2024). Residents used mine wastes containing lead as recreational venues without knowledge of the harms of exposure. Chat piles, seen in Figure 2, were used as slopes for sledding and as liners for ball fields (Shriver et al., 2008).

Figure 2. Image of chat piles in Picher, Oklahoma (Riedel, 2008)

The mining activities conducted in Ottawa County produced more than $222 million in zinc and $88 million in lead from 1908 through 1930 (Everett, 2010). Unfortunately, this wealth was not distributed equitably, and the local community did not experience prosperity. The local men worked in abysmal and hazardous conditions, experiencing collapses, explosions, accidents, stale and dusty air, polluted water, and diseases, all while being paid low wages. Today, Ottawa County has higher unemployment rates, higher child poverty rates, and more disabled residents than state averages (Shriver et al., 2008).

Agency of Stakeholders

In an environmental justice conflict, stakeholders hold a certain level of agency to shape the outcome of the conflict. Through organization and resistance, these stakeholders can hold a significant amount of influence over the political process. In 1997, the Local Environmental Action Demanded (LEAD) was founded by Rebecca Jim and Earl Hatley to address the contamination in the region (Baer, 2024). LEAD is a nonprofit organization that seeks to educate the community about the environmental concerns that Ottawa County faces. They organized the first Tar Creek Conference in 1998, bringing together various stakeholders to discuss the Tar Creek superfund site. Rebecca Jim also mentored a local high school student group called the Cherokee Volunteer Society (Vincent & Shriver, 2009). They put on numerous events like the Tar Creek Fishing Tournament and Toxic Tours, shown in Figure 3. The fishing tournament was an ironic event, meant to highlight that there were no living fish in the polluted creek.

Figure 3. Image of students on a Tar Creek Toxic Tour (Bigby et al., 2023)

In 2012, the Quapaw Tribe signed an agreement with the EPA to allow them to lead the cleanup efforts at the Catholic 40 site (US EPA, 2015c). The Catholic 40 site is a 40-acre parcel owned by the Quapaw Tribe. Many members of the Tribe attended boarding school and church at the site from the 1890s to the 1920s. The site was later leased for mining and was covered with contaminated mine tailings.

Given the historic and cultural significance of the site, the Tribe proposed an unprecedented agreement that would allow them to lead the remediation of the site. EPA Regional Reuse Coordinator Casey Luckett Snyder said about the project, “The cleanup of the Catholic 40 site provided a chance for stakeholders to create a springboard for the future. The Tar Creek cleanup is a long-term project. Each party has a vested interest in moving the cleanup of properties forward as effectively and efficiently as possible. EPA signing cooperative agreements with the Tribe and the state was how we made it happen. We saw the cleanup of the

Catholic 40 site as a first step, considering it might lead to future joint projects" (US EPA, 2015c).

The Quapaw Tribe Environmental Office, established in 1997, developed the technical capacities to appropriately address the contamination of the site. They created air and water programs, acquired equipment, built a lab, and hired scientists, an environmental director, and other staff. 108,000 tons of mining waste were removed from the site for off-site disposal. Workers were able to preserve historic structures and artifacts during the cleanup (US EPA, 2015c).

Discussion

The delayed remediation of the Tar Creek superfund site has led to an environmental justice crisis within the nearby communities. This crisis has led to illnesses, economic costs, and complete contamination of Ottawa County, Oklahoma. Delays in the remediation of Tar Creek occurred for a number of reasons including, but not limited to, contamination complexity, regulatory compliance, and resource constraints. As reported by local news outlets, Oklahoma had issues complying with the regulatory standards set forth by the EPA, and the EPA was not moving with urgency due to bureaucratic obstacles. It is a harsh reality that these roadblocks exist when so many peoples' health is on the line.

This case study was supported by Pellow's environmental justice framework, which allowed for the examination of four dimensions of environmental justice. First, a historical analysis was performed which revealed the practices of discrimination that took place for decades preceding the contamination of the site. This analysis also revealed the significant amount of time that passed between contamination and remediation activities, which are still

taking place today. Second, an analysis of the stakeholders involved in the conflict revealed many unique motives and roles. Third, environmental injustices at Tar Creek are largely rooted in class inequalities and discrimination. Finally, the citizens of Ottawa County were able to use their agency to make real and lasting changes to address the deep environmental injustices associated with the Tar Creek superfund site. While Pellow's framework provided a helpful structure for this case study, a rigid framework may not be a perfect solution for analyzing every instance of environmental justice. Not every case of environmental justice follows the same recipe, and some may have relevant factors that fall outside of the scope of these four dimensions.

This case study did have a few limitations. One limitation is that I did not have access to the site or some of the research resources that are located in Oklahoma and not available online. This site also has a complex history, and due to time limitations, there were certain facets of the site's history that I did not have the time to delve into completely. This case study could be improved with interviews of those who have had a first-hand experience of the injustice taking place in Ottawa County. This research has enabled me to advance my understanding of how environmental injustices can drastically impact the lives of communities. As an engineer, I will be designing structures that will impact communities every day, and it will be vital that I understand the extent to which I am interacting with the environment as I design.

Conclusion

Mining for resources is a necessary and economically beneficial practice, but it must be done responsibly. There should have been more oversight during and after the mining activities in Ottawa County, and if there had been, an entire generation of children could have experienced

an upbringing free from lead poisoning. In the aftermath of this environmental travesty, the government that is charged with protecting the health of its citizens was slow to take action and appeared to be protecting its own interests before the interests of the people of Ottawa County. Because mining wastes are an inevitable byproduct of mining, fees could be imposed upon mining companies to pay for the cleanup when mining activities are completed. Moving forward, the lessons learned from the Tar Creek superfund site should serve as a catalyst for proactive environmental policies, swift identification, and timely remediation of potential hazards.

The Tar Creek superfund site is a stark reminder of the far-reaching consequences that can result from delayed identification and remediation of environmental hazards. The environmental justice crisis that unfolded in the surrounding communities of Ottawa County, Oklahoma, had a profound impact on public health, economic well-being, and the overall environment. In the future, an in-person site visit and interviews with the local community could greatly improve the depth of first-hand information. A comparison study could also be conducted using similar superfund sites.

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