The Kalamazoo River and PCBs

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"Don't dump on us!" exclaimed government officials and citizens of Kalamazoo, protesting the PCB dumping last year. In March 2008 concerned residents Lee Kirk, former city attorney, and Sarah Hill, Western Michigan University Professor of Anthropology and Environmental Studies, expressed their outrage and continued frustration with the Kalamazoo River cleanup.

After learning about the unregulated landfill where the EPA planned to dispose of the PCBs, Kirk and Hill were joined by an army of government officials. These officials included Senators Tom George and Patty Birkholz, Public Services Director Bruce Merchant, City Manager Ken Collard, Mayor Hannah McKinney, City Commissioner Don Cooney, House Representative Fred Upton, Governor Jennifer Granholm, Senator Carl Levin, Senator Debbie Stabenow, and State Senator Jack Hoogendyk. All played key roles in bringing attention to the issue.

According to Kirk, the experience was "like riding the wave of overwhelming public force" which brought about political controversy about environmental and economic policies. Due to widespread citizen unrest, local and state government officials who normally side with industry were forced to re-examine their politic values.

City Commissioners played a large part in this dispute for two main reasons. First, as elected officials, their job was to represent the voice of the people, and in order to be re-elected they had to lend support to the citizens that would vote them into office. Second, as members of the community, the dumping would potentially affect the health of the representatives, their families, and their friends.

Mayor Hannah McKinney was the elected city official with the largest influence, and she drew upon the energy of the public outrage to be very active in the controversy**.** She wrote many letters to EPA officials, and in one to Richard Karl, the regional director of EPA, McKinney strongly opposed the methods that the EPA had used to negotiate the private agreement with the two polluting paper companies. She was angered most by the EPA's tactic of excluding city commissioners from the negotiations by calling the matter "time critical." After all, the talks took two years, while the contaminated material had been sitting in the river for over 30 years.

Although she recognized that much of the discussion needed to be held in private, the fact that "EPA subverted the Community Involvement Plan and foreclosed other opportunities for public comment and involvement" really angered her (McKinney to Karl 1). She emphasized that the city "[disapproves of] being left out of the decision making process, it objects to imposing the burden of this cleanup on its low-income, minority citizens, and it

objects to the PCB-contaminated sediments being placed in the unlicensed disposal area up gradient from a municipal well field" (McKinney to Karl 1).

In hopes of gaining federal support, McKinney also wrote letters to the EPA. She sent Senator Carl Levin an urgent letter outlining the plan and the problems associated with it. She emphasized her shock in the EPA's unsettling decision to dispose of the PCBs above the public drinking water. She was also concerned with environmental justice for residents living closest to the landfill who were of low income or minority status (McKinney to Levin 1-2). In addition to writing letters, McKinney also acted as a liaison to Representative Upton, making sure that he was supportive of the movement—an essential step toward success.

Two other city officials also played an essential role in preventing the dumping of the contaminated sediments in the Allied Landfill. City Commissioner Bobby Hopewell, who would later become the city's mayor in 2008, was so enraged by the situation that he threatened to physically put himself in the way of the tracks carrying the contaminated sediment to the Allied Paper dump site. In addition to Hopewell, Don Cooney, another city commissioner as well as a Professor of Social Work at Western Michigan University, motivated and encouraged the public to protest the dumping and force the EPA to move the PCBs to a landfill capable of safely holding them. At a protest, he attested to the strength of the movement proclaiming, "There is no power like the power of the people, because the power of the people won't quit" (Five hundred 1).

Elected state officials reacted to citizen activism by using status and political power to press the EPA for answers to questions, hoping to force results. Open to hearing the concerns of the people, Senator Debbie Stabenow's representatives were present at a panel discussion on April 24 at the Kalamazoo Environmental Council's annual legislative breakfast. McKinney ascertained Governor Granholm's commitment to cease dumping of toxic wastes into open water in her letter to Stephen Chester of the Michigan Department of Environmental Quality (MDEQ). Additionally, Gov. Granholm met with Kalamazoo City Commissioners about the controversy. Gov. Granholm vetoed the Department of Natural Resources budget, Senate Bill 278, which had been strongly supported by State Senators Tom George and Patty Birkholz.[1] It had aimed to remove 3 dams on the Kalamazoo River, but Gov. Granholm insisted that the PCBs must be cleaned up before the dams could be removed.

Senator Carl Levin was more involved in the movement, as he wrote letters to the regional administer of the EPA, Mary Gade, expressing his concern about the disposal plan. His letters indicated his anger towards the EPA's decision, which would jeopardize the health of many citizens. He pushed for specific answers to questions about the disposal plan about containment of the PCBs, monitoring, and the "temporary" status of the Allied Paper site. His disappointment and disapproval of the plan and the way it was carried out was evident in his statement after EPA announced that they would scrap the plan. He said, "I hope the EPA has learned a lesson and will involve the community and local leaders in its future deliberations about matters so seriously impacting local communities and neighborhoods."[2] By connecting big-name politicians to the local problems of Kalamazoo, the EPA was awakened to the fact that a new plan must be devised.

[1] http://www.tomgeorge.net/
[2] http://www.senate.gov/~levin/newsroom/release.cfm?id=273082

City Manager Ken Collard, Public Services Director Bruce Merchant, and city attorney Lee Kirk also played primary roles in researching, studying and discussing PCBs and the Allied Paper Site at Kalamazoo City Commission meetings at City Hall. According to Lee Kirk "most things reached the City Hall and that's how I got involved." However, Kirk noted that other Kalamazoo citizens like Sarah Hill "were the people that really organized and educated the general public on the issue." For example, Hill had organized a community forum many days before the City Commission took action.

Senator Upton's powerful position in the federal government allowed him to play an integral role in the Kalamazoo River PCB dumping controversy. Although tending to side with industry on issues of the environment,[3] this time Sen. Upton was forced to listen to the cries of the public and take environmental action. After receiving over 150 letters, emails, and phone calls from outraged citizens, he was obliged to respond.[4] According to Mark Ratnet, one of Upton's Legislative Assistants, "Fred is a federal official and EPA is a federal agency, so it is their job to listen to Fred." In addition, Upton annually donates money allowing the EPA to operate. Because of his direct link to EPA, Upton's letters had more power and weight than the pleas of local officials.

"Forty-eight hours after the second letter was sent, [the] EPA cancelled the dumping, which could be coincidence… but I think not," said Ratner, implying that Upton's influence was key. Upton mailed two strong letters to Ms. Mary Gade, Region V administrator of the EPA, requesting a one month moratorium to allow more time for public discourse. He adamantly opposed the way in which the city had been closed off from negotiations and showed concern for the effect that the PCBs would have on drinking water.

The pressure of public officials led the EPA to acknowledge that it had not adequately talked to the people of Kalamazoo, and had mishandled the negotiations. Furthermore, public officials gave credibility to the worries and demands of the citizens. Without their presence, the EPA almost surely would have implemented its plan, endangering the health of thousands of Kalamazoo residents. The crucial role of public officials ensured that EPA protected not only the environment, but local citizens as well.

When the EPA proposed to dump two tons of polychlorinated biphenyl's (PCBs) dredged from the Kalamazoo River at the abandoned Allied Paper Mill site in the Edison and Homecrest neighborhoods area, residents in the area reacted with immediate concern and considerable force. As one resident of the Homecrest neighborhood, Philip Gestwicki, described the reaction, "This was a classic example of Democracy at work" (Killian.)

News of the dumping spread quickly. Tammy Barnard, head of the Edison Neighborhood Association, informed researchers in a personal interview that she heard about the meeting in Plainwell from a contact in the Westnedge Hill Neighborhood Association. That day Tammy went to the meeting where the EPA first announced their plans. Tammy immediately called the city of Kalamazoo to relay the news to public officials. She attended a

[3] On Friday, March 7, 2008 Kalamazoo College students protested with Greenpeace organizer, Justin Trezza, at Fred Upton's office regarding Upton's rejection of HR 5351 (Renewable Energy and Conservation Act) despite constituent pressure. For more history or information contact Justin Trezza at justin.trezza@wdc.greenpeace.org.
[4] http://blog.mlive.com/pcb_problems/about.html

second meeting held the next day and appeared on a local news station where she stated that the residents of her neighborhood were "going to fight this." Neighborhood groups and city leaders banded together to write hundreds of letters and e-mails, as well as make personal phone calls to state and federal officials in protest of the EPA's decision to dump flooding Representative Upton's office telephone lines (Killian).

Noah Manger, a Kalamazoo College student who conducted research about the PCB issue within the Homecrest neighborhood said that residents in Homecrest organized almost immediately after hearing the news, as neighbors met in garages and living rooms to discuss how they were going to fight the EPA. Two of the first organized groups to form in response were Kalamazoo Environmental Justice Coalition (KEJC) and Responsible Environmental Strategy and Planning for Effective Confrontation against Toxics (RESPECT), led by resident Amber Colgrove. Collective action was so widespread that MySpace web pages were opened where teens and young adults could comment about the issues and organize for protests. Protests were the main form of resistance used by citizens. Many citizens were angered and shocked at the news of the EPA's proposed plan. Furthermore, many of the residents were confused by the information and under the impression that the Allied Paper Mill site had already been cleaned up and existing PCBs had been removed. According to Tammy Barnard, about 30 percent of the residents in the Edison Neighborhood wanted the Allied Paper Mill site completely cleared of PCBs. The remaining 70 percent did not want to face the inconveniences of site cleanup and thus wanted the existing PCBs capped and left at the site. Despite differences in opinion and the incurring confusion, all citizens were united in their stance that no more PCBs should be placed at the site.

The largest protest was held at the gates of the Allied Paper Mill site and garnered more than 500 residents. Residents of all ages—ranging in age from children to the elderly—were supported by a community to university students, professors, and city officials. One resident, Mary Brand, whose backyard bordered the proposed dumping site, summed up the citizens' sentiments, stating "The EPA thinks this land is a commodity, but we think it's a community" (Killian). According to Tammy Barnard, Kalamazoo residents personally funded all aspects of the campaign against the EPA. Citizens allegedly paid out of pocket for all of the technical equipment used at protests, all of the t-shirts and buttons with slogans such as "Don't Dump on Me" printed on them, as well as all of the costs of postage and printing of flyers.

Eventually, the hard work of the citizens paid off. The EPA renounced its plan to dump the PCBs at the Allied Paper Mill site. At a meeting held in April of 2007 at the Edison Neighborhood Association headquarters, 150 citizens gathered to learn about the revised disposal plan that intended to take the PCBs to Zeeland county and Detroit, Michigan. At the meeting EPA officials promised better cooperation with the public in the future, although not dispelling the notion that the EPA could potentially return to dump on the site in 2008. The branch chief of the EPA's Region 5 Superfund Division admitted to the crowd, "I can't say today that there will be no dumping (of PCBs) at the Allied site in 2008, but more information will be sought from the public. This is where you come in." Don de Blasio, the EPA's Region 5 community-involvement coordinator, commented as well. "We thought people knew there had been PCBs stored at the (Allied) site for years. We were excited about coming here," he said (Killian). Mayor McKinney thanked both the EPA officials and the residents, urging residents to

continue the "democratic process" and stressing the importance of cleaning up the entire Kalamazoo River.

To keep the momentum of the movement going, residents formed the Kalamazoo River Cleanup Coalition (KRCC). The coalition monitors the EPA as it conducts further research on future dumping possibilities. Furthermore, neighborhood associations have taken a lead role in the KRCC, and many citizens attend coalition meetings as active participants.

The citizens of Kalamazoo displayed remarkable solidarity in fighting the EPA's proposed plans; however, there were obstacles that had to be overcome. Noah Manger reported that language barriers with Hispanic residents resulted in difficulties educating the citizens quickly and sufficiently. To combat these difficulties, groups such as REPECT and the KEJC used citizen resources, such as Kalamazoo College student Marlene Ramos, a fluent Spanish-speaker, to translate flyers and written materials for meetings and discussions. Other Kalamazoo College students spread information by going door to door in each neighborhood and talking with residents.

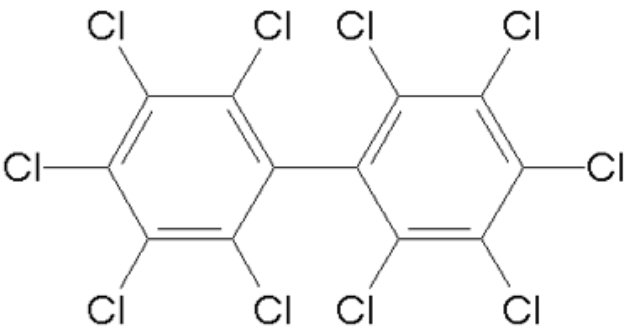
Noah Manger also commented on the lack of racial diversity amongst the community activists, which he felt led to under-representation of the affected minorities. In contrast, Tammy Barnard felt that racial groups were represented fairly, with more disparity between the ages of people who were involved. According to Barnard, elderly citizens were not fully represented at the meetings and protests. Barnard and Manger offered fundamentally different perspectives in Kalamazoo neighborhood organization. However, Barnard is the director of a neighborhood association that represents one of the most racially diverse areas in Kalamazoo, while Manger's research largely involved interviewing white, middle-to-upper-class citizens of the Homecrest Neighborhood. These factors may have affected their overall perceptions of representation.

Despite differences, it is evident that grassroots, community organization had a positive effect on residents. Michelle Zorich, a resident of the Homecrest neighborhood who has a home patio overlooking the Allied Paper Mill site, remarked, "I went to every single meeting there was and I met people I didn't even know lived on my street. It's brought the community closer together". Philip Gestwicki, another resident of the Homecrest neighborhood, echoed Zorich's sentiments, claiming he now feels much more involved in his community and attends City Commissioner meetings regularly. "We know they [the EPA] still want to come back here in 2008," he said, "so we have to be ready. This is not a won war, it's a won battle."
(Killian, C. *How Grassroots Action Turned Tide in PCB Fight*,
http://blog.mlive.com/pcb_problems)

Industrial Uses for PCBs:

Polychlorinated biphenyls (PCBs) have had many uses over the years, primarily as insulating fluid and coolant in electrical equipment and machinery (Iyengar). In Kalamazoo they were used to alter the consistency of inks, most notably the ink that was suspended in carbonless copy paper.

There are many variations of the PCB molecule, all characterized by two hexagonal rings of carbon with chlorine molecules around the outside (Dueweke).

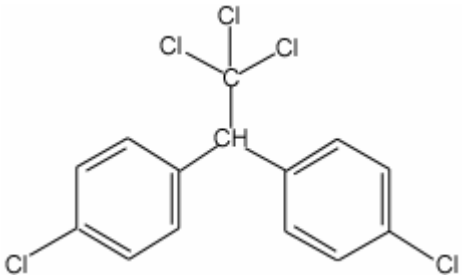


Polychlorinated biphenyl (PCB) Molecule
(http://www.uic.edu/sph/glakes/pcb/images/pcb_structure.gif)

Different variations of PCBs have different numbers of chlorines attached around the outside. The variation used in the carbonless reproducing paper is very highly chlorinated in order to provide the desired consistency for the ink (Bartz). Unbeknownst to scientists of the time, the higher the level of chlorination, the more toxic and persistent the molecule becomes (www.epa.gov/OGWDW/dwh/t-soc/pcbs.html).

PCBs in Water Systems:

In 1976, the Monsanto Company, a multinational, agricultural, biotechnology corporation, announced that it would voluntarily cease production of PCBs in light of surmounting evidence that they posed a serious health threat. "PCBs have been used in manufacturing processes since 1930, but their presence as toxic substances in the environment was not detected until 1966 because they were confused with DDT, with which they have a similar chemical structure" (Phase-Out is Set of PCBs Chemical, New York Times 1/26/1976).



Dichloro-Diphenyl-Trichloroethane (DDT) Molecule
(http://www.worldofmolecules.com/pesticides/DDT.png)

In 1979 the Environmental Protection Agency (EPA) announced in a press release that in addition to banning the production of PCBs in 1977, they planned to strengthen regulations on use and disposal methods concerning PCBs (www.epa.gov/history/topics/pcbs/01.htm).

The Allied Paper Company used the Bryant Mill Pond to dispose of the waste produced from recycling carbonless copy paper from 1957 to 1971. Carbonless copy paper contains tiny beads of ink that are released into the paper when under the pressure of a pen; PCBs were mixed with the ink to obtain the desired consistency. The carbonless copy paper was 3.4% PCBs

by weight. Geographically the contamination of the Kalamazoo River begins where the Bryant Mill Pond discharges into Portage Creek (www.epa.gov/superfund/sites/npl/nar1088.htm).

The Kalamazoo River is the fourth largest source of PCBs in Lake Michigan (Hampton). Areas polluted by PCBs have not become less toxic over the years due to the persistence and insolubility of the PCB molecule. Part of what made PCBs so useful was that they were incredibly stable and never broke down. As non-polar molecules, they are hydrophobic and have an oily consistency that keeps them from dispersing in water.

The rule for chemical solubility in polar molecules is described as "like dissolves like", meaning polar molecules dissolve polar molecules and non-polar molecules dissolve non-polar molecules. H_2O is a polar molecule, giving PCBs in the "oil in water" effect, where the PCBs are actually denser than the water. Therefore, when the Allied Paper mill dumped waste into the river, some pollutants would have dissolved in the water, while pollutants like PCBs sunk to the bottom and nestled in the sediment (Dueweke).

The waste dumped into the Bryant Mill Pond, which discharges into the Portage Creek, remain as concentrated PCBs in the sediments. Several mills are responsible for the high levels of PCBs in the Kalamazoo River, including the Plainwell Paper Mill, Fort Mill Paper Mill, Georgia Pacific Paper Mill, and the Allied Paper Mill. Because they dump pollutants directly into the Bryant Mill Pond, the Allied Paper Mill has been held responsible for a majority of the pollution (Bucholtz). Over the years, PCB-laden sediment has been carried by the current downstream until reaching the Plainwell dam. The PCBs' aversion to water causes them to remain in the sediment while the water washes over the dam (Dueweke).

The Department of Natural Resources now hopes to remove the Plainwell dam, a goal which has prominent support from local environmentalists eager to see the Kalamazoo River flow naturally without obstruction (Bucholtz). However, currently, if the dam were to collapse or be removed, polluted sediment would be able to continue its slow progression downstream, polluting more of the river and eventually reaching Lake Michigan. Therefore, PCBs must to be removed before any further action could be taken concerning the dam (Dueweke).

The Hydrogeology, Soil Science and Treatment Methods of PCBs

In the bottom of every body of water are sediments—loose particles of sand, clay, and silt among other substances—which are crucial to aquatic life. Many of these sediments come from either eroding soil or decomposing plants and animals. When PCBs are disposed of in the environment, they tend to divide and attach to organic components, leading to their prevalence in fine-grained, organically rich sediments. Due to their hydrophobic nature, PCBs become tightly bound to the organic fraction of the sediments. In the case of the Kalamazoo River, the PCBs are absorbed to the gray paper mill sludge which is found in stream banks and flood plains (Hampton).

Treatment is problematic because of sediments' limited accessibility and high water content, complexities in technology selection, threat of disruption of aquatic ecosystems, limited tools for evaluation of site recovery and unrealistic cleanup goals (Agarwal 1075). Consequently, the two main forms of treatment—*ex-situ* and *in-situ*—are somewhat significantly flawed making cleanup projects such as Kalamazoo's controversial.

Ex-situ treatment (dredging) is the physical removal of contaminated sediments from a body of water. Most often, dredging techniques are used in shallow waters, and must be conducted slowly and deliberately with such controls as silt screens and water surface covers in order to limit the re-suspension of sediments. When PCB-contaminated sediments are dredged from a river and placed in landfills, those PCBs usually stay absorbed without causing groundwater contamination.

The greater risk with landfills, however, is if the exposed sediments can be picked up by winds before a cover layer is applied. This poses human health risks, as after being carried through the air, PCBs may be deposited in people's homes and lungs (Hampton).

In-situ treatment can be divided into two categories: biological and chemical treatment (bioremediation). These methods involve the addition of microorganisms and/or chemicals to the sediments to initiate or enhance neutralization and degradation of the contaminants. Solidification, also known as stabilization treatment or "capping," involves the addition of chemicals or cements to capture contaminated sediments and convert them into less soluble, less mobile, and less toxic forms (U.S. EPA).

In-situ treatment is more advantageous in that it decreases the chance of further contamination from re-suspension, and reduces irretrievable loss of the contaminants into the environment. Moreover, it is less expensive than *ex-situ* treatment. However, *in-situ* treatment methods are depend on the availability of microorganisms and are naturally less efficient in traveling bodies of water such as rivers and streams.

Effects of PCBs on Plants and Animals:

Due to their stability, high lipid solubility, and slow rate of metabolization, degradation and elimination, PCBs tend to accumulate over time (bioaccumulation) and concentrate up the food chain (biomagnification) in the fat-rich tissues of animals. Animals are harmed by PCBs in a variety of ways, including liver, stomach and thyroid gland damage, anemia, chloroacne, damage to the immune system, changes in behavior, impaired reproduction, and birth defects.

Fish are particularly susceptible to PCBs due to their aquatic lifestyle, and PCBs can accumulate in fish directly from water, sediment, and prey. Studies have shown that more chlorinated the PCBs are, the more readily absorbed and retained they are by fish. Because sediment PCB concentration is often higher than water PCB concentration, bottom feeders tend to accumulate PCBs more quickly than fish that spend their time at the surface.

Birds are also highly susceptible to PCBs. Like fish, PCBs can be taken up via prey or from the water itself, and PCBs with high chlorination are accumulated more readily. Substantial amounts of PCBs can also be transferred to eggs, outright killing or severely hampering the development of the chick. In migrating birds, starvation during migration can cause redistribution of PCBs from fatty tissues to the brain, which can be fatal.

Plants can also take in PCBs, either by absorbing them directly from the soil, resulting in their and accumulation in the roots. Hypothetically, due to their greater mobility in soil, less-chlorinated PCBs are more readily absorbed by plants.

Furthermore, because PCBs are bio-accumulable, the effects that they have on human health are extensive and severe. PCBs have a carcinogenic effect upon animals, and a probable carcinogenic effect upon humans. Humans who have internalized a large amount of PCBs

either through consumption, inhalation, or through the skin experience sever irritation of the eyes, nose, lungs, and skin. Expectant mothers exposed to PCBs run the risk of negatively affecting the child which they are carrying. Effects in infants include decreased birth weight, size, and overall development.

PCB Sequestration:

The first method for neutralization of ill effects of PCBs is the removal of the contaminated sediments and mediums in which the toxin exists. The danger of spreading PCBs exists during the removal, transport, and storage processes. The substance has a high volatilization into air. Therefore when PCBs come in contact with significant wind, there is a chance that PCB particles may be carried away. During the excavation process, as contaminated soils are stirred, difficulties in the containment of toxic particles arise. Therefore, the excavation of soils must be done with great speed and caution in order to minimize the time PCBs are in contact with air. During transportation, the contaminated soil should be capped to prevent the escape of PCBs. The soil should then be stored in a sealed facility that is filtered through a toxin filtration system before being vented (Volatization of PCBs into the Air).

The second method of PCB isolation is the *in-situ* capping technique. This technique is the isolation of PCBs by placing a sessile, inert medium on top of the contaminated medium. This creates a buffer between the PCB particulates and the atmosphere that might disperse them. Most often this technique is used to cap contaminated river bottoms. Factors that must be ideal in order to use this technique include the following: river bottom composition, flow speed, sheer probability, depth, and type of river usage. For a river to be suitable for an *in situ* cap, it must be a slow moving, deep river with a stable bottom.

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History of Paper Mills

In 1867, the Kalamazoo Paper Company became the first paper mill to locate along the Kalamazoo River. Its ensuing success prompted numerous other entrepreneurs to follow, such as the Bryant Paper Company and King Paper Company in 1895 and 1901, respectively. As Kalamazoo's paper mills flourished, others began to pop up across the county. By 1902 there were mills in Plainwell, Otsego, Three Rivers, Watervliet, Vicksburg, and White Pigeon (Forist).

Paper mills in the area thrived for a variety of factors. First, a steady stream of immigrants settled in the area allowed the labor pool to grow along with the industry. Also, Kalamazoo offered a convenient location, for as the railroad system advanced, mills gained easy outlet to large markets such as Chicago.

The existence of the Kalamazoo River proved to be one of the biggest factors contributing to industrial growth (Forist). Before the use of fossil fuels to power industrial processes, many paper mills used hydro-power to operate paper-manufacturing machines. Paper-making from the nineteenth century onwards used a Fourdrinier machine to make paper, which relied on processes easily powered by water from an adjacent river. Processes included pressing, rolling, etc. (Gordon 57).

Furthermore, positioning a factory next to the river had another industrial advantage. The processes used to produce paper also produced toxic byproducts. Before regulations on the dumping of industrial waste, paper mills would simply take toxic byproducts and dump them into a nearby river (Gordon 103).

The first half of the 20th century was a period of growth for the paper industry in the Kalamazoo area. As mills expanded, more workers were employed and wages steadily increased. The quantity and quality of paper products also increased. Moreover, growth allowed companies indirectly related to the paper industry, such as playing card manufacturers and chemical coating plants, to prosper as well (Forist).

In 1954, The W. E. Upjohn Institute issued a report titled *The Position of the Paper Industry in the Economy of Kalamazoo County Michigan*. This report stated that nearly "32% of the combined sales of all the manufacturing, distributive, and service industries and 24% of total

personal incomes in Kalamazoo County came directly or indirectly through the paper industry" (Forist).

By the early 20th century, the mills of Kalamazoo County dominated the state's paper production. The 1904 state census revealed that the five paper and wood pulp mills of Kalamazoo County represented one-sixth of the state's total revenue, and 25% of the entire industry's capital value. By World War I, the Kalamazoo area had become the largest paper-producing region in the nation, and the industry employed nearly half of the city's workforce (The History of Kalamazoo).

During the 1970s and 1980s the paper industry in Kalamazoo began to falter. Because a large percentage of the local economy depended on the paper mills, even small setbacks in the industry were harmful. Although a variety of economic factors played into the industry's decline, a growing environmental movement in the 1970s had created a new public mindset. Furthermore, new environmental laws had unfavorable effects on the mills.

Aside from putting thousands of Michiganders out of work, the fall of the paper industry and mills also drove local governments to spend millions of dollars on the demolition of old buildings and finding new uses for the land (Forist).

The Kalamazoo Paper Company and the Allied Paper Company were two of the largest paper mill companies in the Kalamazoo area. Founded in 1867, the Kalamazoo Paper Company was bought by Georgia-Pacific in 1967. Despite its long history, it was shut down in December of 2000, leaving 285 employees jobless. Georgia-Pacific blamed the closing on a weak market, and the small size and old age of the mill made it less efficient than the newer mills being built (G-P's Kalamazoo Mill).

Founded in 1922, the Allied Paper Company was created through in the merging of the King and Monarch Mills in Kalamazoo and the Bardeen Mill in Otsego. The Bardeen Mill was sold by 1939, and later, in 1956 the Allied Paper added the Bryant Mill in Kalamazoo (A Brief History).

In 1967, the Allied Paper Company was bought by the Smith-Corona-Marchant (SCM) Corporation and became its paper-making division. By 1969, Allied Paper employed about 1,300 workers locally and a total of 2,880 workers nationally. In the early 1970's, the Allied Paper mill also joined with the city's sewer system, an arrangement that greatly reduced pollution entering Portage Creek (A Brief History).

King Mill and the Monarch Mill closed in 1970 and 1980, respectively. In the early 1980s Allied Paper was sold again from SCM to Hanson PLC. However, by the middle of the decade the Bryant Mill was losing money. A main reason for the losses was that book papers, the mill's main product, were not an expensive good. The Bryant Mill found itself unable able to compete with newer, larger, and more efficient mills (A Brief History). In 1988, Hanson PLC sold the Bryant Mill to an Illinois businessman who later founded Performance Papers.

In most states, pollution laws regulate that the land owner for any given piece of land at any given time is responsible for its maintenance. When a company sells its property to another company, they do away with their accountability for its pollution. However, in Michigan laws regulate that even when a land owner sells polluted land to another company, the former owner is still responsible for cleaning up polluted areas. Therefore, although Hanson PLC sold

Bryant Mill to Performance Papers, the responsibility of pollution cleanup remained with Hanson PLC (A Brief History). (Bucholtz).

Mill closings in Kalamazoo have continued to occur throughout the industry for the past few decades. Although the US uses nearly 50% more paper today than it did in 1980, there has still been a reduction of over 60,000 jobs in the industry since 1995 and over half were lost specifically from paper mills. Overcapacity, corporate consolidations, and globalization—as well as the emergence of newer, larger, and more efficient mills—have caused the closings of older mills and reduced the industry's demand (Kates).

PCBs and other toxic byproducts of the paper-making process have been very damaging to the environment. PCBs, a group of 209 chemicals, have been used primarily as industrial coolants, insulators, and lubricants. "Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper" (Leighton-Katers).

PCBs were introduced to Portage Creek and the Kalamazoo River through disposal of PCB-contaminated paper residuals by the paper industry. Four disposal areas were situated on the riverbanks, containing millions of cubic yards of PCB-contaminated waste. It is estimated that the river sediments contain over 350,000 pounds of PCBs. The four parties liable for contamination are Allied Paper, Inc./HM Holdings, Inc., Georgia-Pacific Corporation, Simpson Plainwell Paper Company, and the James River Paper Corporation (EPA).

Currently, regulatory laws have been put into place, and mills have begun to pursue more appropriate methods of disposal. Furthermore, PCB-coated carbon copy paper is no longer in use or sold in the US. However, PCBs are occasionally still used in closed systems such as capacitors and transformers in electric utilities.

Furthermore, some countries have yet to ban PCBs. As industries moving between foreign borders with the goal of attaining cheap labor, environmental regulations are loose at best, and most often nonexistent.

Moreover, information about paper-making processes is restricted, and as paper companies themselves rarely mention the harmful byproducts of the manufacturing process. For example, in Wisconsin, the nation's largest paper-producing state, paper mills have agreed to a voluntary reduction of many well-known toxic substances. These substances include chlorine, chloroform, formaldehyde, hydrogen sulfide, methanol, phosphorus and xylene (WPC). However, other chemicals used replacements to PCBs may be just as harmful. Such PCB-replacements include, "DIPN (diisopropyl naphtalenes), formaldehyde isocyanates, hydrocarbon-based solvents, polycyclic aromatic hydrocarbons, polyoxypropylene diamine, epoxy resins, aliphatic isocyanates, Bisphenol A, diethylene triamine, and others" (Aerias).

The paper industry remains at odds with environmentalists worldwide. Areas such as the Fox River in Wisconsin and our very own Kalamazoo River contain harmful PCBs that continue to pose serious health risks to bordering ecosystems and communities. Furthermore, Toxic byproducts of current paper making processes are have been blamed for increased levels of asthma, rashes and cancer in humans (Aerias).

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PCB Service Learning – Funding

The state of Michigan has a deeply flawed system of funding the state agencies responsible for cleaning up polluted sites. The decline in automobile manufacturing in the state has led to severe under-funding of such cleanups. This problem can only be improved only if the state legislature dedicates significantly more funding to the Department of Environmental Quality (DEQ).

However, there are few ways to make this happen without raising state taxes, and democratic Governor Granholm and the Republican state senate have firmly pledged not to raise taxes. As a result, the very Michigan citizens who have succeeded in pressuring their lawmakers not to raise taxes have ensured that only a tiny fraction of the most toxic sites in the state are properly maintained, cleaned up, or redeveloped.

Across the United States, private companies are accountable for cleaning up the polluted properties they own. In 1995, the state legislature amended environmental laws, allowing new companies to forgo site cleanup as long as they had not caused the pollution (Nixon – Law). The goal of changing such legislation was to add incentive for companies to purchase land and open business without the cost of proper waste disposal.

Tax incentives for redevelopment of "core communities" such as Kalamazoo, Grand Rapids, Battle Creek, Benton Harbor, Muskegon, Holland and Grand Haven, include *brownfields*. A *brownfield* site is "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (EPA). Should an area re-develop, legislation provides that developers may

escape outstanding taxes. This incentive is intended to provide smaller communities with the ability to re-develop abandoned buildings and businesses.

The problem with such legislation is that when companies are held liable to clean polluted sites, chemical disposal is left in the hands of the state and its taxpayers. Furthermore, the cost of waste removal and disposal is high, due to the care with which asbestos and other hazardous materials found in buildings' structures must be handled. Demolition of the Allied Paper mill site alone would cost approximately $1 million, while asbestos removal would amount to another $500,000. Other contamination sites, including underground gasoline leaks, drastically increase the State's need for more funding. The total cost of Michigan's 7,100 contaminated sites amounts to $80 million more than is currently available to the state currently (Nixon – State Can't Keep Up).

In order to curb clean up costs, Michigan residents voted on the Environmental Protection and Clean Michigan Initiative bonds in 1988 and 1998. Money set aside accumulated to approximately $760 million in bond funds, but unfortunately, the money was never destined for the complete eradication of toxins from contaminated sites. It was never a feasible option. After government programs "reduced the threat" to what they deemed "a manageable level," toxic dump sites were given lesser priority on a long list of "more urgent" state problems. However, problems continue to accumulate, and according to Frank Ballo, assistant supervisor of Kalamazoo's DEQ clean up program, "most sites will never be fully cleaned up" (Nixon – Only Most Toxic Sites).

Undoubtedly, funding provided to the Michigan Department of Environmental Quality (MDEQ) does not sufficiently support environmental clean-up procedures. The MDEQ is funded through the general state budget, as well as profits from recyclables. But as funds from the state dwindle, the MDEQ has also come to rely upon money from legal decisions, as settlement from legal cases can also be a source of revenue.

There are four ways that the MDEQ can obtain revenue through settlements. The first is through "funds assessed for violations (including bond forfeitures) of environmental laws" (Department of Environmental Quality Policies and Procedures). The second source of revenue is through courtroom legal cases. The third source of money for the MDEQ is "collected from settlement cases and credited against the responsible party payments deduct in the appropriations bill," (Department of Environmental Quality Policies and Procedures) or through "contested cases in which a legally binding consent agreement is reached among the parties" (Department of Environmental Quality Polices and Procedures). The final source of funding for the MDEQ comes through public recycling. According to data collected by the *Kalamazoo Gazette* on the MDEQ 2006 rates of return, "If each and every man, woman, and child in the state failed to claim an additional 132 deposits, the MDEQ could close its $80 million gap in cleanup funding" (Nixon-Update).

The Michigan Department of Natural Resources (MDNS), which owns most dams surrounding Kalamazoo, obtains funding through a different set of sources different from the MDEQ. The MDNS receives funds from the general state budget, grant money and hunting and fishing licensing fees. Not unlike the MDEQ, however, the department also suffers from dwindling funds and a large deficit.

In respect to other states, Michigan has one of the worst ratings when it comes to revenue allocated to environmental cleanups. The Michigan state budget is $9,223 million, with a total of 0.4 percent of state revenue going to the MDEQ. This year, the MDEQ will receive a total of $34 million —$62 million less than in 2000. From this $34 million, nine percent will come from the general fund and 54 percent will come from state-restricted funds, while 38 percent will come from federal funds (South East Michigan). According to the MDEQ, these funds are simply "not enough" to thoroughly clean up Superfund sites. In fact, only $15.5 million of the MDEQ's budget will go cleaning up sites (Cleanup Funding).

Recent shortfalls in funding are nothing new. Reporters document that the "overall General Fund support for the department has been cut 68 percent since 2002" (Nixon-Update). Due to the under-funding of environmental clean up projects, Michigan has been given one of the worst rankings for funding environmental projects nationwide. Alex Nixon, reporter for the *Kalamazoo Gazette*, wrote, "On a spending-per-capita basis, the state ranks 47th out of the 48 contiguous states" (Nixon-Michigan Lags).

There are some projected changes to the budget, as Governor Granholm's 2009 budget proposes that $368.5 million be appropriated to the MDEQ. Of the MDEQ's allotted budget, 40 percent of funds would be allocated to grants to locals for cleanup and pollution prevention efforts, while 18 percent would be dedicated to environmental cleanup and response activities, as shown in figure 1.

However, in 2007 the DEQ received $446.7 million in funding and in 2008 it received $369.2 million (Granholm, B15 – B16). The money that the MDEQ receives every year is suffering an enormous reduction—even more than figures suggest when inflation is taken into account. With the adjustment for inflation, the money that the MDEQ receives from city permits and fees is also declining. Currently, the Michigan state government spends approximately two percent of $9.2 billion generated from taxpayers' dollars on funding for cleanup projects undertaken by the MDEQ and the MDNR. Jeff Spoelstra of the Kalamazoo River Watershed Coalition believes that in order for government agencies to receive more funding, the state government will have to increase the money allotted to them from the general fund (Spoelstra).

Contaminated sites along the river span from Battle Creek and to Lake Michigan. In neglecting to provide money to clean up sites and fix dilapidated dams, it is possible that Lake Michigan will become even more contaminated with PCBs. Lake Michigan is already the most contaminated of all the Great Lakes. Of the 21.1 million cubic yards of polluted sediment planned for removal from the Great Lakes, 19.1 million cubic yards will come from Lake Michigan (United States PCB Emissions Inventory). If PCBs from the Kalamazoo River enter Lake Michigan, contamination would potentially affect people the whole western shoreline of Lake Michigan, as well as the eastern shoreline of Illinois and Wisconsin (Jones).

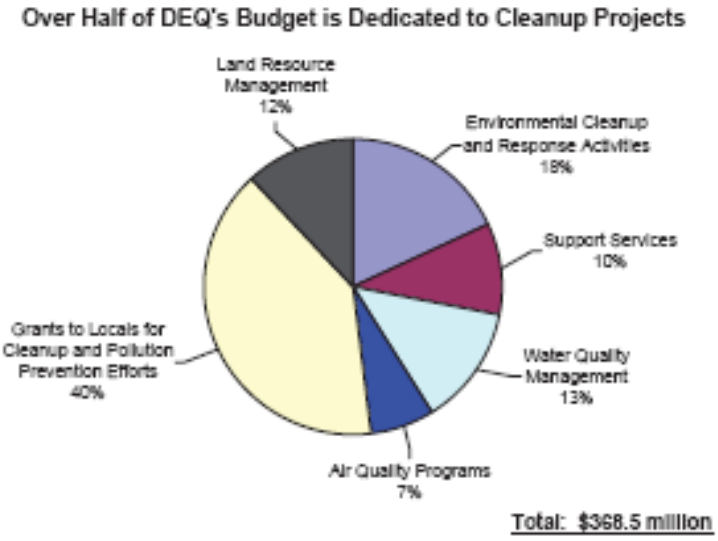

Fig 1. This chart represents the allocation of money for DEQ in Governor Granholm's proposed budget for 2009. (Granholm B-15)

The recent Clean Michigan Initiative Bond is now almost depleted, as money has been promised away to individual Michigan environmental projects (Spoelstra). Most money for these projects was actually derived from *Potentially Responsible Parties* (PRPs). A PRP is a company, individual or other party deemed responsible for the release of harmful substances to a given Superfund site, and liable to pay cleanup costs. When the public and environmental groups bring attention to a certain site, the MDEQ will undertakes a scientific evaluation of how polluted the site is, and contacts the PRP with their decision on whether or not a site is problematic.

The MDEQ is required to follow all relevant state laws, and as a state agency, the it is not required to follow in the footsteps of the EPA. At the federal level, laws can be more lenient, while state laws are often more inclusive and detailed because states have the ability to obtain a clearer and definitive opinion of their individual citizens or environmental concerns. Therefore, federalism may not be an issue for some environmental decisions. Conversely, since state and federal agencies are in agreement of proper environmental laws, the two groups tend to overlap and conflict on the issue of weighted financial responsibility and the toughness of hazardous waste clean-up.

In 1990, the MDEQ was responsible for leading the investigation on the Allied Paper Mill site. However, due to scrutiny by the EPA and a lack of public support, in 2006 the MDEQ requested that the EPA assume the chief position of overseeing the Superfund investigation. The MDEQ wanted to remain a contributing party, but factors such as larger financial and human resources made the EPA a more qualified candidate to spearhead the research into the necessary reports and analysis.

The large scale of the cleanup project has led to the collaboration of the MDEQ, the EPA and the PRPs. Ultimately, the clean-up of the Kalamazoo River will only be achieved with their cooperation. (Jones).

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National Environmental Policy: Superfund and Environmental Justice

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. It was formed in response to the Love Canal disaster, an incident in which 22,000 tons of toxic waste was dumped in the Love Canal neighborhood of Niagara Falls, N.Y. (Holmberg). CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party could be identified. The U.S. Environmental Protection Agency (EPA) designates Superfund sites that are eligible for cleanups based on a hazard-ranking system ("CERCLA Overview").

The Superfund law allows the federal government to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The law authorizes two kinds of response actions: short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response; and long-term response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening ("CERCLA Overview"). These actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

Despite its name, the 'Superfund' lacks the sufficient funds to clean up even a small number of the sites on the NPL. If a responsible party does not agree to do the cleanup, the EPA can issue an order to do certain work, or work with the Department of Justice to pursue the party through the federal court system. (CERCLA overview) In situations in where no other

responsible parties can pay for a toxic waste cleanup, the Superfund law provides funding by implementing a tax on petroleum and chemical industries ("CERCLA Overview"). The tax provides incentives for these industries to use fewer toxic substances. Over a period of five years, $1.6 billion was collected through taxes, and was put into a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites; money for cleanups also came from specific companies determined to have polluted the sites (Holmberg).

After the Superfund tax against businesses generating pollution expired in 1995, and the Republican Congress at the time refused to reinstate the Superfund taxes. Congress believed that if the taxes were reinstated, they would first have to be restructured. Most importantly, they were concerned with liability provisions (Lazzari). As a result of the lack of taxes, the $3.8 billion fund for cleanups was depleted by 2003.

Despite lack of funding for cleanups, President Bush remained opposed to imposing taxes on industries. He claimed that it was unfair to burden environmentally sound corporations with taxes, while also opposing burdening the American public with taxation. Since 2003, the EPA has struggled to acquire congressional financing for Superfund cleanups. As a result, the Superfund Law has left individual sites competing for the money available. Currently, many sites remain unclean and nearby residents live at odds with the risks of through soil, air, and groundwater pollution (Holmberg).

It is important to question how this has happened and why the Superfund law has become so drastically under-funded. The Republican Congress in 1995 had a great impact on the budget of the Superfund site, and despite repeated efforts President Clinton was unable to reinstate the taxes imposed on industry by the Superfund Law. President Bush has also had a large impact as he has dropped the issue from his agenda altogether, even attempting to reduce the effectiveness of the Superfund law by appointing people who share his anti-environmental views to leadership positions. An example of this is Susan Bodine, who was appointed to her position as the top-ranking Superfund official, due to the campaign contributions of industry groups. Industry groups contributed much more money to the Republican Party than did environmental groups, so as a result the Republican Congress, and five years later, President Bush, cut taxes on corporations responsible for pollution of the environment (Sapien).

Bovine proceeded to cut the funding for the program she was in charge of. In 1999, she authorized a bill that would have decreased the Superfund budget by $300 million, but this failed. Undeterred, she also supported a $7 million decrease in the cleanup budget.

The Center for Public Integrity reported that since it ran out, Superfund has relied on an annual appropriation of $1.2 billion to $1.3 billion in tax dollars. Furthermore, the EPA has recovered increasing amounts of money from companies identified as responsible for polluted sites (Holmberg). In the case of the proposed PCB dumping in Kalamazoo, two paper-producing companies, Georgia-Pacific and Millennium Holdings LLC (parent company for the former Allied Paper and owner of the Allied site) have been held responsible for financing the $21 million to $25 million cleanup project (Killian 24 Apr. 2007).

Under two legal agreements, known as "administrative orders on consent," Millennium Holdings LLC and Georgia-Pacific Corp. were deemed responsible to perform a cleanup in the Plainwell Impoundment Area, a portion of the Kalamazoo River Superfund site ("Agreements").

Signed on February 21, 2007, the agreements are legally enforceable in court ("Agreements"). They are the result of a little over two years of mediated negotiations between the two companies and U.S. Environmental Protection Agency, Michigan Department of Environmental Quality (MDEQ) and the Natural Resource Trustees, which include the Michigan Department of Natural Resources, MDEQ, Michigan Department of Attorney General, National Oceanic and Atmospheric Administration, and the U.S. Fish and Wildlife Service (Jessup). This is important to note because it shows how complicated disposing of hazardous waste can be. There is no good place to store waste, only places in which it can do as little damage as possible or places where the citizens aren't able to organize against hazardous waste sites. This is where environmental justice has become large a factor.

Environmental justice is the principle by which: "no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (Environmental Justice Program). On February 11, 1994, President Clinton committed his administration to the principle of environmental justice by signing Executive Order 12989, titled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations". The Order directed federal agencies to identify and address "disproportionately high and adverse human health or environmental effects of their programs, policies and activities on minority populations and low-income populations" (Ridenour, 2).

Despite Clinton's work, about 11 million people in the US, including 3-4 million children, live within one mile of a federal Superfund site (Pollution Locator: Environmental Burdens). Evidence suggests that they are all victims of injustice, but attempting to separate victims of environmental injustice from victims of racism is an arduous process. In Kalamazoo, given the significant proportion of African American and Hispanic populations surrounding the Edison neighborhood site, it would seem that environmental injustice would be an appropriate charge. The correlation between low socioeconomic status, minority race, and environmental degradation is a theme throughout nearly all Superfund sites. Such communities generally have fewer resources and are less likely to be protected by NIMBY (not in my backyard) groups.

One way that environmentalists have begun to determine whether or not environmental injustice has occurred is through a system of scorecards. For environmental justice analyses, scorecards use a measure of the number of Superfund sites per square mile in an area populated by a minority (Pollution Locator: Environmental Burdens).

Although it began as a revolutionary policy, CERCLA and its 1986 amendment SARA have lost steam. The root problem behind the enforcement of CERCLA laws has been inadequate funding under the "polluter pays" principle. While environmentalists applaud this principle because it transfers the burden of environmental clean-up from victims to perpetrators, it is difficult to enforce because of the enormous political force large industries enjoy in the United States.

CERCLA no longer collects revenue in order to fund itself and allow for expansion of clean ups. Under Newt Gengrich's Contract for America, Congress decided not to renew a provision that allowed for the EPA to continue collecting revenue under Superfund. Thus the Superfund, as it exists today, is nothing like the original legislation that was intended to punish

the responsible companies by making them pay, not negotiating terms for a spot job clean up. Unless Congress re-creates a provision allowing the EPA to collect revenue from responsible parties, very little can be done to clean up waste sites.

A simple solution to this would be to reinstitute the original provision in the CERCLA act—a tax on the petroleum and chemical companies, in combination with harsh provision aimed at the responsible party. This provision should be a fine with the minimum cost being a quarter of the estimated cost of the clean up of the site. This would both allow for proper funding of the clean up and serve as a strong message to other polluting companies.

The law suffers from the traditional handicap of being a bold federal regulation that is carried out in individual states and unique communities. The public would surely benefit from the encouragement and support of the media. In the case of Love Canal, politicians felt compelled to respond "not because of the scientific evidence…but because the media has created such a strong sense of urgency amongst residents and the national public" (Layzer, 74). Increased state and community level participation is essential in decisions of how, when, and to what extent sites should be cleaned up.

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