Bruce Gordon

The Pine River: Contamination

Chemicals, these are tomorrow's solutions. At least that is what all chemical companies have been saying since the emergence of the industry. Chemicals are created to make for a better and more fulfilling life, however, at what cost? Many of today's chemicals are extremely dangerous not only to the planet but to the people themselves. Velsicol Chemical Corporation allows one to see some of the hazards chemicals pose. More specifically, this essay will focus on the Pine River in Saint Louis, Michigan, which was hit very hard by the repercussions of the chemical industry and is a major source of concern to this day. The Pine River is so important to the understanding of chemical contamination because water is a great vessel for the contaminates that Velsicol created. Looking at the chemicals, the effects of contamination, and finally what is being done about it, one can see the real mess that Velsicol made.

The Contaminants. Polybrominated biphenyls, more commonly known as PBB's, are the main source for the contamination of the area today. DDT, which is another well known chemical, was also produced by Velsicol. The chemicals themselves are very harmful to the environment, especially when used or produced in the wrong way. The DDT that Velsicol created is not linked to any of the pollution of the area surrounding St. Louis and the Pine River, however, DDT has been banned by the EPA.[1] This substance was banned, after its use as a cheap and effective way of killing insects such as mosquitos. DDT was found entering the food chain

[1] EPA. "EPA Proposes Cleanup Plan For Soil and Ground Water."

and greatly affected the animals that had ingested the chemical.[2] Rachel Carson was one of the first whistleblowers of the affects that the chemicals that companies such as Velsicol. This hurt the images of the companies so bad that Velsicol lead a lawsuit against Carson to silence the book *Silent Spring* the lawsuit never came to fruition but it did place pressure upon the author.[3] PBB, on the other hand was created as a fire retardant. PBB is about the same as Polychlorinated biphenyl, however, it is produced in a solid state not a liquid as PCB does. This makes PBBs seemingly harmless and easier to contain, or so this is the thoughts of Velsicol management; however, this was not the case because during the cooling process, particles of PBB were lost.[4] The particles lost in production and went unaccounted for. For years the company used the same process, unknowingly dumping these particles into the land and the river.

Both DDT and PBBs are highly dangerous chemicals. The reason for this is the way in which they act in an ecosystem. Once in the environment they are hard to remove, especially from water bodies. This is because water microorganisms consume the chemicals and begin a chain reaction cycle. The microorganisms only consume a little of the chemical, but this small amount can still affect the photosynthesis process in the algae. Now the chemical being in the algae gets eaten in large amounts by bigger animals, and all the small amounts of chemical waste

---

[2] Rosenberg, Tina. "What the World Needs Now Is DDT." *New York Times*, April 11, 2004.

[3] Boyd, David. "The Constitutional Right to a Healthy Environment." Environment (August 2012).

[4] Hesse, John L., and Richard A. Powers. "Polybrominated Biphenyl (PBB) Contamination of the Pine River, Gratiot, and Midland Counties, Michigan." *Environmental Health Perspectives* 23 (April 1978): 19-25.

in the algae multiplies by how much algae the bigger animal eats. This cycle keeps repeating itself, multiplying more and more rapidly.[5]

The Contamination. The major problem besides contamination is finding out where it starts and how to fix it. When looking at a water system such as the Pine River, no amount of money nor man power could completely rid all the water, sediment, animals, and surrounding contaminated land of the pollution. It is here and it is here to stay. Before the plant was shut down an Environmental Protection Agency study was conducted to see how much PBB was getting into the river system. The number they found was astonishing: 167 grams per day.[6] Being the kind of contaminate that PBB is, it stays within the food chain and does not break down; rather, it simply dilutes. The contaminated area is not yet under the kind of control that will allow for the area to naturally dilute itself. The Pine River is very vast because it not only covers a large area of land, but it also connects to the Chippewa and Titawasee River systems and eventually ends up in the Great Lake water system. These scenic rivers, attract homeowners, who want to settle upon their banks.

As seen in an aerial photo provided by the DNR, there are numerous people living in close proximity to the river.[7] Many of the houses on the banks of the river are rural homes, which raises concern about the well water that many of these homes rely on as their source for drinking water. In an article by *States News Service,* the EPA stated that the wells in St. Louis,

---

[5] Rosenburg, Tina. "What the World Needs Now Is DDT." *New York Times*, April 11, 2004.

[6] Hesse, John L., and Richard A. Powers . "Polybrominated Biphenyl (PBB) Contamination of the Pine River

[7] Department of Natural Resources. "Aerial Image Collection." The State of Michigan.

Michigan are unsafe for drinking and need to be replaced.[8] While being costly, this will bring clean water to those living in St. Louis, but will the average homestead in the rural areas be given a new well or do these residents have to provide one for themselves? This question has not been answered, but what is known is that the well water in the area is not safe for human consumption.

Another source of concern that again affects humans more directly is the animals being exposed to PBBs. As with most rivers in Michigan, used for recreation, the Pine River is no exception. The main problem is that the most popular recreational use of rivers is fishing, and in the Pine River, the fish are not able to be eaten because of the contamination.[9] And the fish eating advisory has been in effect since the plant closed in 1978. To put perspective on the amount of contamination that is in the fish, a study from 1974 (which was published just after the fish advisory had been put into place) showed the following, the EPA has set up:

> legal tolerances for PBB's in cattle but not for fish the legal level is 0.3 mg/kg that means that 0.3 milligrams of PBB diluted into 1 kilogram of fat is dangerous to human consumption, compared to beef fish in the Pine River had 30 mg/kg which is 300 times as much.[10]

Even with the plant closure and steps taken to clean up the contamination by workers funded by Velsicol, the spread of the chemicals throughout the fish population has not stopped. As the EPA and Michigan Department of Environmental Quality study shows based off of samples of fish

---

[8] "Replacement of St. Louis, Mich., Well Field To Be Reviewed By EPA Panel." *States News Service* (May 18, 2010).

[9] Department of Community Health. "Michigan Fish Advisory: A Family Guide to Eating Fish." The State of Michigan.

[10] Hansen, D. J., et al. Chronic toxicity, uptake, and retention of a polychorinated biphenyl (Aroclor 1254) in two estuarine fishes. Bull. Environ. Contam. Toxicol. 6: 113 (1971).

populations in the Pine River from 1989 to 1994 the levels of pesticides in the fish had doubled.[11]

In 2010 the EPA looked back upon the implementation of the clean up from 1983 and determined it to have been done in the wrong way, and that contamination of the river had not yet been stopped.[12] On a personal note, before I started research, I never thought to check the fishing advisories. This begs the question of how many people have done the same in this area and eaten contaminated fish? Through this water source, the toxins have reached spread over an area that it is unable to be contained. Deadly levels of contaminants have been found 3.3 miles upstream and downstream, all the way to where the Pine River connects with the Chippewa River. The main reason that the contamination does not go further downstream, however, is the Alma Dam, which does not allow fish through, a major vessel for the PBB's to pass.[13]

Yet even with this dam blocking the fish from the river, there is yet another contaminated animal to look out for: The waterfowl. This is an animal that is even harder than fish to track because of their migratory patterns, as well as their ability to fly where they please where as fish are stuck in the water. There are three types of birds that were recorded for the EPA study: Mallards, Wood ducks, and Teal. As for the Mallards and Wood ducks they are not yet in the danger level for human consumption, being under 0.3 mg/kg. But the Teal, at 1.8 mg/kg, are

---

[11] EPA. "EPA Proposes Cleanup Plan For Soil and Ground Water."

[12] "Replacement of St. Louis, Mich., Well Field To Be Reviewed By EPA Panel."

[13] Committee on Water Quality Criteria. Water Quality Criteria, 1972. Environmental Protection Agency, Washington, D. C., 1972.

well past the limit. Researchers credit this to the size of the birds, the Teal being the smallest.[14] The most alarming part of the studies listed, however, is that they were conducted over 30 years ago the fish are still monitored regularly, but the waterfowl are not for the shear difficulty of it. With most numbers of PBB's rising in animals it makes one wonder what the levels of PBB in the waterfowl of the area today and if the hunters are aware of this. The contamination is everywhere and is seemingly not stopping, but there is hope. St. Louis is a Superfund site. As a result, it gets the EPA's attention and care to try and help this area recover from its destructive past.

The Cleanup. Starting four years after the plant closed the EPA recognized the need for containment of the affected area and forced Velsicol to build a slurry wall to contain the contaminated soil from the water and reduce the pollution.[15] With the wall in place the contaminants were seen to be almost invisible for over ten years, as it took until 1996 to begin more cleanup efforts. At this time from (1996 to 2006), a total of $100 million was put into cleanup efforts just for the Pine River. However, in an EPA report, one can find that the slurry wall built in 1982 began to fail:

> In Fall 2001, contaminant leaks in the site's original slurry wall were identified, indicating a partial failure of the site's original remedy. A DNAPL (dense nonaqueous phase liquid) consisting of 28 percent DDT and two NAPLs have been found seeping into the Pine River. As an interim management measure, EPA has installed collection trenches around the site (Operable Unit 1) to collect the liquid.[16]

---

[14] Hesse, John L., and Richard A. Powers Polybrominated Biphenyl (PBB) Contamination of the Pine River

[15] US EPA. "Velsicol Chemical Corp. (Michigan) Superfund Site."

[16] US EPA "Velsicol Chemical Corp. (Michigan) Superfund Site."

Even after this has happened and the leakage was thought to be stopped, yet again in 2006 the EPA listed the same incident again. The containment of chemicals is an everlasting struggle and as seen with many cleanup efforts, it is a money pit. The containment projects are expensive and will not last forever. Each time they break down and begin to leak, the cycle of chemicals get released back into the ecosystem and the whole cycle of pollution restarts. The EPA, however, has come up with more options for clean up.

In February of 2012, four options for cleanup were discussed. These options and their cost included:

1.) No action cost $0

2.) Containment cost $325 million

3.) Containment, plus in-place treatment and removal of dense liquid contamination, and the treatment or removal of soil in highly contaminated areas cost $373 million (most recommended by both the EPA and MDEQ)

4.) Containment, in-place treatment and removal of dense liquid contamination, in-place treatment of contaminated areas, in-place treatment of soil and ground water cost $416 million

5.) extensive excavation and increased ground-water treatment but no vertical containment barrier and drain system around the property cost $481 million.[17]

---

[17] EPA "EPA Proposes Cleanup Plan For Soil and Ground Water."

All of these options cost millions of dollars and there is no guarantee that any one will eradicate the problem. In fact, at best the EPA states that these will reduce the amount of pollution exposure in the long term. No option, once implemented, will completely remove contaminants, especially within the river system. Furthermore, many of these options create a risk to the workers who would carry out the task.

The conclusion. Sadly, there is no soulution in sight for the ongoing problems in St. Louis, Michigan, especially for the river system. A once beautiful river teaming with aquatic life is now a segway for pollutants and contaminants. Superfund classification was put in place to help this area get back to normalcy, but by all reports, any reader can see that this area has been left with a lifelong scar. The fish are not edible, the retainers of the pollutants keep leaking, and all we can do is try to slow down the effects that Velsicol made some 30 years ago. The fight is ongoing. However, thanks to the EPA, people can become informed about what is going on in this area and try to do what they can to help. Furthermore, corporations can look back at the mistakes made by Velsicol and see how to create a more eco-friendly industry without having to go back years from now and spend millions of dollars on containment. Foresight is the key to a cleaner tomorrow.

Bibliography

1.) Boyd, David. "The Constitutional Right to a Healthy Environment." *Environment* (August 2012).

2.) Committee on Water Quality Criteria. Water Quality Criteria, 1972. Environmental Protection Agency, Washington, D. C., 1972.

3.) Department of Community Health. "Michigan Fish Advisory: A Family Guide to Eating Fish." The State of Michigan.

4.) Department of Natural Resources. "Aerial Image Collection." The State of Michigan.

5.) EPA. "EPA Proposes Cleanup Plan For Soil and Ground Water."

6.) Hansen, D. J., et al. Chronic toxicity, uptake, and retention of a polychorinated biphenyl (Aroclor 1254) in two estuarine fishes. Bull. Environ. Contam. Toxicol. 6: 113 (1971).

7.) Hesse, John L., and Richard A. Powers. "Polybrominated Biphenyl (PBB) Contamination of the Pine River, Gratiot, and Midland Counties, Michigan." *Environmental Health Perspectives* 23 (April 1978): 19-25.

8.) "Replacement of St. Louis, Mich., Well Field To Be Reviewed By EPA Panel." *States News Service* (May 18, 2010).

9.) Rosenberg, Tina. "What the World Needs Now Is DDT." *New York Times*, April 11, 2004.

10.) US EPA. "Velsicol Chemical Corp. (Michigan) Superfund Site."