Swim for the River

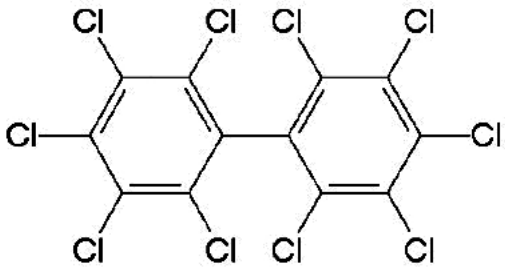
History of PCBs

The long battle over the most persistent pollutant
(Environmental Science and Social History)

Most people who live in towns along the upper Hudson River have heard about PCBs, or polychlorinated biphenyls. These ubiquitous industrial pollutants have been the focus of a thirty-year battle between the General Electric Company and assorted environmental groups, with state and federal agencies often in the role of reluctant policeman and prosecutor. Local citizens have been the target of a GE media campaign to persuade them that an attempt to clean up the Hudson would do more harm than good.

Yet few people know the history of PCBs – how they were discovered, their role in the development of energy technology, and the extraordinary lengths to which manufacturers avoided acknowledging that PCBs are a highly toxic, non-degradable pollutant.

The battle with GE on the Hudson River is part of a much larger story. PCBs were discovered in the late 1890's. Automobiles had just been invented and the process for refining crude oil into gasoline was being perfected. Waste by-products from the refining process were analyzed by scientists to determine possible uses. Among these was benzene, which became a ***key ingredient*** in PCBs. It was discovered that two benzene molecule rings could be heated, joined together, and chlorinated using chlorine gas. With variations in the process, 209 new molecular compounds could be created. These are referred to collectively as polychlorinated biphenyls and have shared characteristics. Condensed into a syrupy liquid, they possess a chemical stability that makes them highly resistant to fire, and thus an excellent insulator. This chemical stability also makes PCBs very difficult to break down.

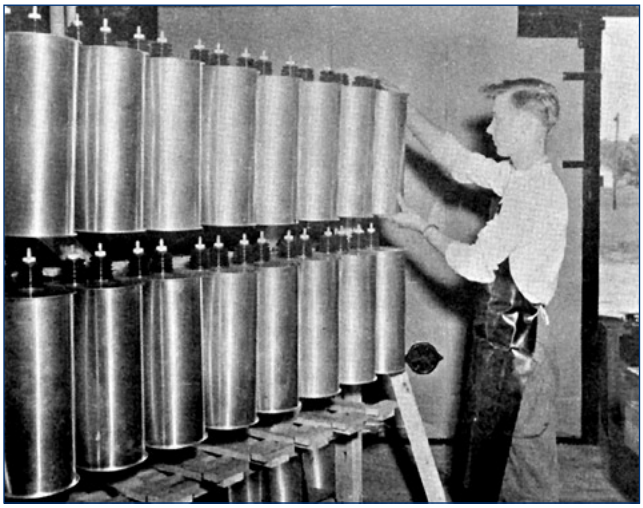


PCB molecule


PCBs do not dissolve in water

Monsanto, an innovative chemical company based in St. Louis, began producing PCBs commercially in the 1930's. Initially mixed into the plastic coating on electrical wire, they became an essential insulating fluid in capacitors and transformers. PCBs were also mixed into adhesives, inks, dyes, asphalt, paper, paints, rubber, heat-transfer fluids, hydraulic fluid, and lubricating oil. They were even mixed with sludge and sold to farmers as fertilizer.

Harmful side effects of PCBs were first recognized in 1937. *The Journal of Industrial Hygiene and Toxicology* published an article about a disfiguring skin condition called ***chloracne***. The condition was characterized by painful pustules and was observed in workers who had been exposed to the chemical. The article quoted General Electric official F. R. Kaimer describing the reactions of GE executives on discovering these effects: "We had 50 other men in very bad condition as far as the acne was concerned. The first reaction that several of our executives had was to throw it out – get it out of our plant. They didn't want anything like that for treating wire. That was easily said but not so easily done. We might just as well have thrown our business to the four winds and said, 'We'll close up,' because there was no substitute, and there is none today, in spite of all the efforts we have made through our own research laboratories to find one."



Transformers at GE's Fort Edward plant, 1948

Cloracne

Ten years later General Electric began manufacturing PCB-filled capacitors along the Hudson River at a factory in Fort Edward, New York. In 1952 it began production at a second factory, just downriver in Hudson Falls. Both factories pumped PCB-laden waste into the river. GE also donated ***contaminated fill*** that was used in the construction of homes and schools. Some executives were aware of the risk involved but found the evidence to be inconclusive. Electricity was the fastest-growing source of energy, and PCBs were the most effective electric insulator available.

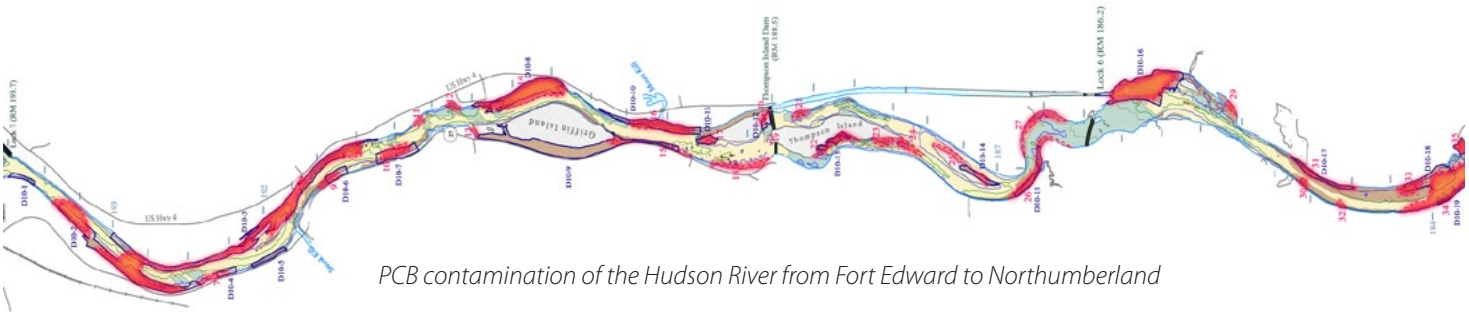
The big problem with PCBs, unlike many other pollutants, is that they do not break down or dissolve. Some have found their way into groundwater. Others sank into the sediment along the river bottom, to be occasionally churned back to the surface by boats, animals, weather, and erosion. Even more dispersed into the atmosphere.

Atmospheric PCBs travel long distances. When they encounter cold air they condense and fall to the ground. PCBs followed the prevailing global air currents, settling out of the atmosphere in northern climates. This became an international problem.

Peregrine falcon

In 1964, while examining specimens in Sweden for the toxic pesticide DDT, scientist ***Soren Jensen*** discovered what he believed to be a previously unknown molecular structure permeating the environment. At the same time scientists in ***Canada*** encountered the mysterious molecule in fish and fish-eating birds. In 1966 it was identified as PCBs.

In 1968 PCBs leaked into a batch of rice-bran oil in Japan. More than 1,800 people were exposed, many showing immediate symptoms, including chloracne, respiratory problems, and failing vision. This became known as the "***Yusho incident***."



PCB contamination of the Hudson River from Fort Edward to Northumberland

One year later, at the University of California at Berkeley, Dr. Robert Riseborough demonstrated the existence of widespread PCB contamination in the United States' food chain. He found PCBs in peregrine falcons that had eaten contaminated fish. An article citing Riseborough's work, entitled "A Menacing New Pollutant" appeared in the *San Francisco Chronicle* on February 24, 1969. The next day the manufacturer, Monsanto, denied that the chemicals found in falcons were PCBs, saying "it will take extensive research, on a worldwide basis, to confirm or deny the initial scientific conclusions."

Meanwhile Monsanto secretly drafted its "***Pollution Abatement Plan***." The plan was a masterpiece of rationalization, placing corporate profit above public safety while minimizing potential liability. Regarding PCBs, the plan states:

> The problem involves the entire United States, Canada, and sections of Europe, especially the United Kingdom and Sweden. Other areas of Europe, Asia, and Latin America will surely become involved. Evidence of contamination has been shown in some of the very remote parts of the world.

The plan outlined three choices:

> Option one, doing nothing, would cause Monsanto to face increased liability and potentially declining profits.
>
> Option two, ending the manufacture of PCBs, would result in the loss of all profits while maximizing liability, because "we would be admitting guilt by our actions."
>
> Option three, called the "responsible approach," would acknowledge aspects of the problem while continuing the manufacture of PCBs.

Monsanto chose the third option with the assumption that it would maintain profits and reduce liability in the event of any unfortunate outcomes.

Medical reports about PCBs in the 1970's documented increasing global contamination and brought government attention. Then in 1973 a dam at Fort Edward was dismantled. Built across the Hudson long before General Electric pumped PCBs into the river, it was now obsolete. No one realized that many tons of PCB-infused sediment were lodged behind the dam. When the dam was demolished the toxic sludge poured downriver, clogging navigation channels near Fort Edward and spreading PCBs along 200 miles of river, all the way to New York Harbor.

Dredges were used to clear the navigation channels. Workmen wore no protective gear while disposing of the dredged sediment. This eventually led to ***degenerative back and nervous system disorders***, now commonly associated with high exposure to PCBs. The PCB-infused sediment was put in a landfill in ***Moreau, New York***, where it leached into nearby wells, creating further health problems.

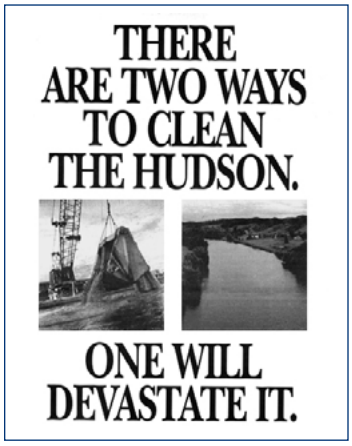
In 1976 the government ***declared PCBs a health risk*** and banned their production under the Toxic Substances Control Act. The same year, fish in the Hudson River were found to have dangerously high PCB counts. This led to a ban on commercial fishing. The ***Clean Water Act*** of 1977 made it illegal to flush PCBs and other harmful chemicals into public waterways. By then General Electric had already dumped more than 1.3 million pounds of PCBs into the Hudson River.

In 1980 Congress passed landmark legislation known popularly as the ***Superfund Law***. A key provision of that law allows the government to hold corporate polluters responsible for cleaning up their mess. General Electric could now be required to dredge and filter PCBs out of the Hudson River. Three years later the entire river below Fort Edward, stretching two hundred miles to the Atlantic Ocean, was designated a ***Superfund site***.

An ***Environmental Protection Agency Record of Decision*** ordered General Electric to cap sections of shoreline that contained dangerous levels of PCBs, but the EPA stated that no safe technology existed to remove the chemicals from the river sediment. Dredges normally used on rivers and harbors featuring clamshell-type buckets could stir up and resuspend PCBs in the river water without effectively removing them. Instead of dredging, GE covered small stretches of heavily contaminated river shore with a clay liner and a layer of soil, which was planted to minimize erosion.

Between 1991 and 1993, additional highly concentrated contamination was discovered seeping into the river from beneath the General Electric plant at Hudson Falls.

Meanwhile the EPA reassessed the possibility of dredging the Hudson, as new suction-dredging technology was designed and tested. In response General Electric launched a $120 million advertising campaign to convince the public that dredging was unnecessary and would damage the river. Why? If forced to clean up the Hudson, GE would have to acknowledge a degree of responsibility. This would make it liable for the cleanup of other contaminated sites around the country. At the same time, General Electric ***challenged the Superfund Law*** in court as unconstitutional. (The verdict is still pending.)



GE's ad campaign used images of old technology

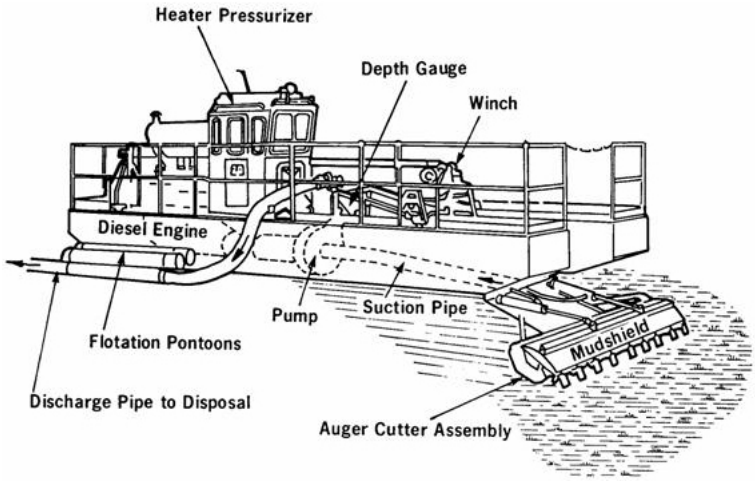
GE's television and newspaper ads misleadingly used pictures of old clamshell dredges and underscored the damage they could do. GE also funded studies that ***showed***, or were ***altered to show***, that PCBs were not a health risk. While concerned citizens and environmental groups demanded the removal of PCBs, others now opposed dredging, convinced by GE's disinformation campaign.

Negotiations between GE and the EPA continued. How much would be spent? How much would be dredged? Where and how would the waste be processed? Could the company be forced to dredge?

Lawsuits were filed against Monsanto, General Electric and Westinghouse (another major user of PCBs) alleging that the companies knew PCBs were a serious health risk years before the information was made public. This was confirmed by records and memos revealed in the course of litigation. One memo from a Westinghouse corporate lawyer advised the company to destroy all PCB-related records predating 1974, or risk self-incrimination in the event of a trial.

What came to light was not an orchestrated conspiracy so much as a series of individual decisions reinforced by a corporate culture of secrecy and deception in the service of

shareholder profits. All those who contributed to the legacy of willful ignorance, deception and denial concerning the dangers of PCBs may have seen themselves as simply "doing their job" – the right thing for business, the company, and their own careers. Once the juggernaut of deception was in motion, each individual risked taking responsibility for the decisions of a predecessor. Production continued, studies were conducted and repressed, and electric technology advanced, made ostensibly safe by the dangerous chemicals in transformers and capacitors: PCBs.



Suction dredge

The EPA issued a new Record of Decision for the Hudson River site in 2002. General Electric was ordered to decontaminate 2.65 million cubic yards of sediment from portions of the upper river, using suction dredges and a dewatering plant. This would filter out an estimated 150,000 pounds of PCBs. The cost to GE would be approximately $460 million. The company stalled, exceeding the estimated time for design and construction of the dewatering plant, which none of the surrounding towns welcomed. Eventually a site in Fort Edward was agreed on and dredging was scheduled for 2005. It was then rescheduled for 2007.

In January of 2006 a ***ten-year initiative*** by an organization of Christian shareholders at General Electric came to fruition. In 1996 it had begun pressuring the company to acknowledge its resistance to cleaning up its PCB pollution. Finally GE disclosed that it had pent the astounding amount of $799 million to delay cleanup of the Hudson and two other major contamination sites.

Civil, commercial, and government studies have now implicated PCBs in breast cancer, brain cancer, soft-tissue sarcomas, non-Hodgkin's lymphoma, and malignant melanomas. Even at low levels they can disrupt the body's immune and reproductive systems. They impede physical and mental development in children. PCBs are linked to spinal and joint degeneration as well as blood diseases and liver problems. Virtually all human beings on the planet are now carrying some amount of these man-made chemicals in their body.

More than 1.5 billion pounds of PCBs were manufactured in the United States between 1929 and 1977. Forty percent to 60 percent are still in use. Approximately one percent made their way into the ocean, and the rest are unaccounted for. As a result PCBs have circled the globe, affecting animals in every part of the food chain.

The high concentration of PCBs in the Hudson River is a small piece of the picture, but General Electric is still struggling to decontaminate it. Difficulties in obtaining parts for the construction of the Fort Edward dewatering facility may push dredging back further to 2008.