PCBs and WARREN COUNTY

"Water, water everywhere and N'ere a drop to drink"
—Samuel Taylor Coleridge

by Ken Geiser and Gerry Waneck

Water is a precious resource on the surface of this planet. It is required by all life forms—the average human consumption is two quarts per day—and it represents most of the mass of living organisms. It covers most of the earth's crust but it cannot escape the earth's atmosphere—it can only move from place to place. Thus the water cycle is a closed system.

Throughout the industrial world today, vast bodies of water are being contaminated by synthetic toxic chemicals. Whole lakes and rivers have been declared too dangerous for human exposure. As these pollutants seep into creeks and groundwater, water acts as a vehicle that carries these toxins from our physical environment into our biological environment.

This article wishes to call attention to the serious consequences of chemical contamination of the earth's water resources. It focuses on one of the most hazardous of contaminants: PCBs, a close relative of dioxin. Some of the scientific background needed to understand the chemistry and biology of these compounds is provided. It shows how industrial negligence and government ineffectiveness are responsible for the crisis. As more and more communities are faced with this threat, people often find that they themselves must take action if they are to overcome it.

In the fall of 1982, a large protest occurred in Warren County, North Carolina, against an effort by the state to dump over 6000 truckloads of PCBs-laden soil into what officials called "a secure landfill." Protestors came from miles around as blacks and whites, young and old, united in a courageous attempt to block roads to the landfill with their bodies. Over 500 arrests were made as the protest drew national attention. Why are PCBs so frightening that people were willing to risk arrest while using their bodies to stop the dumptrucks?

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Demonstrators at the front of the march face the trucks attempting to bring PCBs to the Warren County landfill, October 1982.

Chemistry and Biology of PCBs

PCBs is an abbreviation for "polychlorinated biphenyls," members of the family of halogenated aromatic hydrocarbons. This family also contains DDT and TCDD (Dioxin), some of the most toxic substances known to life.[1] (Their chemical structures are illustrated in Figure 1.) All of these compounds are synthetic: they do not occur naturally and must be made by

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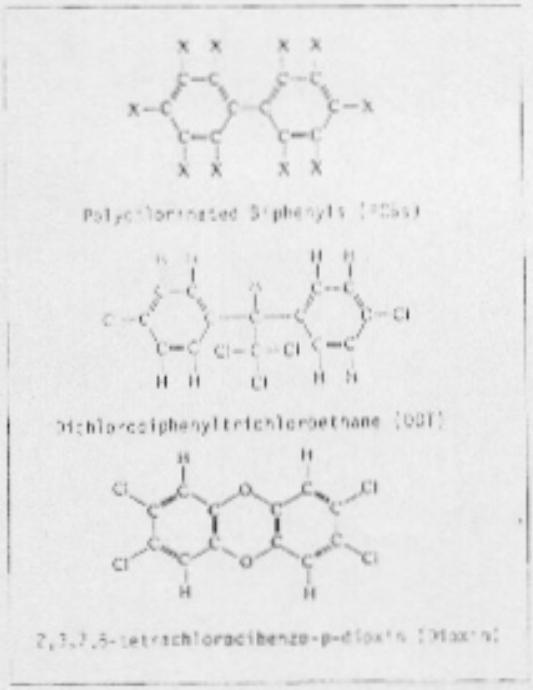

Figure 1. *Structural similarity between PCBs, DDT and Dioxin. All are members of the family of Chlorinated Aromatic Hydrocarbons. Most commercial PCBs are actually a mixture of 50 or 60 individual structures where the X may be either H (hydrogen) or Cl (chlorine). There are 210 possible structures, but data are scant on which structures are the most toxic.*

reacting chlorine or other halogens with certain petroleum derivatives. Commercial PCBs are inevitably contaminated with dioxin because of their common manufacturing process.

The very properties of PCBs that make them so hazardous to life are the properties that make them so attractive to industry: they are virtually indestructible. PCBs are chemically inert, heat resistant, nonflammable, and electrically nonconducting. They are most commonly used in transformers and capacitors, but have also been used in pesticides, heat exchanger fluids, paints, copying paper, adhesives, sealants, and plastics.[2]

Much of the PCBs have already escaped into the general environment although "hot spots" have been identified. PCBs have been found in lakes, bays and rivers across the country. The list includes the Great Lakes (see Dioxin and Dow in box on the next page), Escambia Bay, Florida; the Waukegan River in Illinois; the Ohio River; the Housatonic River in Connecticut; the Chesapeake Bay; San Francisco Bay; Puget Sound, Washington, and in New York's Hudson River. Most of these waters have been polluted by discharge of industrial wastes, either directly or indirectly through municipal sewer systems.[3]

The problem encountered in all attempts at disposal is how to detoxify the PCBs contaminated soil and river sludge. Thus far, high temperature incineration is the only EPA-approved method. However, scientists debating how to dispose of PCBs from the Hudson River found that burning the contaminated sludge at temperatures as high as 1000°C merely drove PCBs out of the residues into the gas stream exiting from the furnace. Treatment in an after burner at 1800°C was necessary to completely destroy the PCBs. The main problem with incineration at such extremely high temperatures is that it consumes a tremendous amount of fuel—approximately one gallon of oil for every cubic foot of river bottom treated.[4] It is ironic that incomplete incineration is also one way in which PCBs can be converted to dioxins.[5]

Of the PCBs that have made their way into the environment, a large amount have entered the food chain and the EPA estimates that 90% of the world's population have measurable levels of PCBs in their bodies. Although PCBs and their relatives are poorly soluble in water, they are carried by water and accumulate in the oils and fats of plants and animals where they cannot be excreted. As Joseph Highland of the Environmental Defense Fund has stated, "The levels of contamination and the number of people affected continue to increase every year. Human breast milk is so heavily contaminated that currently the average nursing infant exceeds by ten times the maximum daily intake level for PCBs set up by the Food and Drug Administration. Fish, birds and livestock in many parts of the U.S. are literally sodden with PCBs."[6] Animal studies have shown these chemicals to be carcinogenic, toxic to the liver and to interfere with reproduction. Studies of their effects on humans have been limited to accidental or occupational exposure. One such incident is described below.

In 1968, some 1200 Japanese developed severe rashes, accompanied by discharge from the eyes, dark brown pigmentation of the skin and nails, headaches and physical weakness. Scientists painstakingly traced the problem to a specific batch of rice oil that was used for cooking by all the affected families. The oil was found to be heavily contaminated with heat exchanger fluid that had leaked into the oil during processing.

PCBs, long known to produce rashes and other skin symptoms in industrial workers, was found to be the major contaminant of the fluid. When this was discovered, the doctors treating these patients focused primarily on these skin symptoms, while tending to ignore the more general complaints. As time passed, however, the skin rashes disappeared while the general symptoms persisted and grew worse. In the years since the incident, these patients have shown disturbances in the liver, blood, nerves, immune responses and reproductive function. There is also some indication that the cancer rate may be unusually high among these people, although even now it is still not long enough after the accident to be certain.

The "Yusho" patients (Yusho is Japanese for "oil disease") along with victims from a chemical plant explosion in Seveso, Italy, constitute the largest group of people known to be suffering from exposure to PCBs or

dioxin. Their specific symptoms are probably a result of the close chemical resemblance of these chlorinated aromatic hydrocarbons to certain growth or sex hormones and to certain mutagens. Liver enzymes are also thought to play a role in the induction of cancer as they attempt to metabolize these chemicals.[4] The effects on the majority of the population who chronically receive much lower exposures over a lifetime can only be extrapolated from the available data on acute exposures.

The Role of Government and Industry

Many of the problems caused by toxic wastes are due to a combination of negligence by industry and failure of governmental agencies to take proper action. In many cases the desire for a favorable business climate and increased profits subordinate their responsibility to society. We are just beginning to see the hidden costs of our technological society and have yet to understand how we will pay the price. According to Dr. Mary-Jane Schneider, in her book *Persistent Poisons:*

> Even if no further pollution were to occur, enough PCBs are already dispersed throughout the environment to cause concern for the indefinite future. The cumulative production of PCBs in North America through 1970 (after which production fell off) has been estimated at 500,000 tons, and world wide production was about twice that. In North America, an estimated 300,000 tons have been disposed of into dumps and landfills and may or may not be leaking into air and waters. About 50,000 tons have been released into the atmosphere and were probably carried back to earth by rain and snow. And about 50,000 tons were released into fresh and coastal waters.[5]

With clean and inexpensive detoxification technologies still years off, what actions can be taken to reduce the PCBs threat to our environment? One step has already been taken—that of "source reduction."

The effort to reduce the source actually began some time ago. Although little concern was raised over the chemical between 1929 (when Monsanto first began production) and 1968, the news of the "Yusho" poisoning incident in Japan brought the issue squarely to public attention. The reaction here in the U.S. was so significant that in 1972 Monsanto voluntarily restricted sales of PCBs to closed electrical and hydraulic systems. In 1976 the U.S. Congress took an even bolder step with the passage of the Toxic Substances Control Act by specifically banning the manufacture or continued use of PCBs except in sealed systems. Monsanto ceased production of all PCBs in 1977 which left only the problem of regulating continued use and disposal.

In regulating use and disposal of PCBs manufactured prior to 1977, the government has been less than aggressive. In 1979 the EPA published regulations limiting the use of PCBs to intact, non-leaking capacitors, electromagnets and transformers. The Environmental Defense Fund petitioned the U.S. Court of Appeals to review these regulations as less than adequate and in 1981 the court ruled the regulations invalid and granted an 18 month interim period to promulgate new regulations. The new regulations proposed by EPA in 1982 are limited to providing for indefinite use of current transformers containing PCBs and a ten year phase out of PCB containing capacitors.

The U.S. Food and Drug Administration first established standards for PCBs in food in 1973. Those regulations permitting 2.5 parts per million in milk and dairy products were later reduced to even lower levels in 1979. Similarly, the National Institute of Occupational Safety and Health has recently reviewed Occupational Safety and Health Administration standards for worker exposure and recommended tighter standards, but OSHA under the current administration has failed to act.

Regulations outlawing PCBs have now left us with large amounts of PCBs-laden substances facing disposal. The government has been procrastinating here as well. Almost two years elapsed between the time EPA promulgated disposal regulations and the first incineration facilities were licensed. Presently there are only two licensed incinerators on land and the incinerator ship Vulcanus is occasionally provided temporary permits to burn PCBs at sea. There are nine landfills permitted to accept solid PCBs wastes (less than 500 ppm) and several Mobil chemical treatment plants are permitted to detoxify PCBs-contaminated oil. With such limited facilities the problem of backlog and storage of PCBs, particularly in discarded transformers, remains serious.

Thus, although PCBs production has actually stopped, the struggle to regulate the use and disposal has moved more slowly. One of the primary impediments to more aggressive government action has been the pressure of current industrial users for whom tighter regulations on use would increase costs. The current federal administration's reluctance to advance regulations will mean that any increased efforts to reduce the source of PCBs contamination must come from interests outside the government. Neither government nor industry is likely to move forward on further source reduction or clean-up of existing water and soil contamination without public pressure. That message has clearly been read in neighborhoods and communities across the country and the result has been a groundswell of local citizen action.

Community Action: The Source of Real Solutions

In many communities across the country, citizens have come together into local voluntary organizations to struggle against the threat of PCBs. These grassroots organizations have become the wellspring for generating the political muscle necessary to confront government officials and irresponsible industries.

Citizens have organized to press for state enforcement of existing laws and regulations. Citizen groups

have also pushed ahead in researching, advocating and demanding many new and innovative approaches to toxic chemical contamination. In clean-up efforts, citizen groups have pressured state agencies for studies of contaminants, removal of above-ground containers and remedial action to contain chemicals discharged into the ground. In the area of health, citizens groups have conducted their own door-to-door health surveys, pressed for professional epidemiological studies of potentially affected populations and advocated long term health screening programs for monitoring exposure victims. Recently citizen groups have initiated campaigns aimed at the industrial sources of the chemicals themselves.

Broad-based coalitions have formed in several states advocating source reduction, "right to know" and "right to inspect." *Source Reduction* as discussed in the case of PCBs above, generally involves a whole series of technological changes in industrial production ranging from simple chemical substitution to complex treatment and detoxification processes whereby the amount of hazardous material produced as waste is reduced. *Right to know* provides workers in plants and community residents living near plants the right to gain the name of and information about toxic chemicals used in the plant. *Right to inspect* provides workers and community residents the right to tour industrial facilities and review current health and safety features.

While much of this citizen action is recent, it is off to a strong start, offering hope of a comprehensive approach to the massive and widespread problem of chemical contamination in water and soil. The character of the citizen action is yet emerging, but so far it appears to be based in working class communities where the hazards are most prevalent and to draw upon the direct action tactics developed over years of community organizing experience. The protest in Warren County, North Carolina is a good example.

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Demonstrators at the march to stop the dump trucks from reaching the landfill, Warren County, NC, October 1982.

PCBs contamination in the state of North Carolina was caused by the deliberate criminal dumping of PCBs fluid from the Ward Transfer Company of Raleigh by the Robert J. Burns trucking operation of Jamestown, New York. Court records show that, faced with an economic loss brought about by the EPA's ban on resale in 1979, Burns and Ward chose to illegally dump the PCBs. Burns and Ward are now serving sentences for their crimes,[1] but there are only a handful who have been brought to justice for similar actions.

Meanwhile, thirty-thousand gallons of the PCBs fluid remained on 270 miles of roadway in fourteen North Carolina counties for four years before the EPA and the state began the clean up. Because of the technical difficulty and prohibitive expense of permanent detoxification, the state decided to build a landfill in which to store the contaminated soil indefinitely.

As soon as the state announced that Warren County was being chosen as a potential site for the landfill, Warren County Citizens Concerned About PCBs was formed under the leadership of Ken Ferruccio, one of the residents of the town of Afton (in Warren County).

Warren County is the poorest county in the state with per capita income of around $5,000 in 1980. Its population is 65% black. According to Ken Ferruccio, "The trend is very clear. They would rather experiment with poor black people, poor white people, than to experiment with the middle and upper classes . . . The regulations are such that allow landfills to be placed in environmentally unsafe, but politically powerless areas."

Landfills were discussed at a citizens meeting in Moore County in February 1982, attended by Ken and his wife Deborah. Moore County is one of several that is being considered by the Chemical Wastes Management Co. for siting of landfills. Speaking at this meeting were Mr. William Sanjour, branch chief of the EPA's Hazardous Wastes Management Division, and Ms. Lois Gibbs, organizer of the Love Canal residents. According to Deborah Ferucctio, "Mr. Sanjour supervised studies on the damages caused by hazardous wastes, on industries which generate hazardous wastes, and on the technology to handle these wastes. Nearly $20 million were spent in these studies. The results, which were quite conclusive, were that *landfills inevitably leak*; and that safe landfill technology is only a concept, not a reality."[1] In New Jersey, construction of landfills with the same basic design have been outlawed because of leaching problems.

There are economic factors involved in the political decision of where to site landfills. Landfills have federal common law liability regulations that absolve landfill operators from all liability after five years. The producer passes the responsibility for damages from hazardous wastes onto the landfill operator. Landfill operators usually operate at the edge of bankruptcy, so when a landfill leaks, the company goes bankrupt and the taxpayers are left with the burden.

In the case of Warren County, it became clear that the state of North Carolina had other economic and industrial considerations in mind when Afton was sited. According to Ken Ferruccio, "The Afton site is only three miles from a new regional industrial waste water treatment plant connected by pipeline to Soul City, potentially one of the industrial parks in North Carolina. The Afton site would begin the completion of an industrial package consisting of Soul City (production), the treatment plant (waste processing), and landfills (waste storage).

"As the plot unfolded, the scenario became even more depressing. Documents revealed that the overriding consideration for the state's desire to acquire the Afton site was the need for a legal chemical waste dump in North Carolina. This would mean that Afton would have to eventually store not only the PCBs, and not only waste eventually generated during production at Soul City, but also waste imported from various parts of the region as well."[11]

The site at Afton was not even scientifically the most suitable. The water table of Afton, N.C. (site of the landfill) is only 5-10 feet below the surface, and the residents of the community derive all of their drinking water from local wells. Only the most optimistic could believe that the heavy concentration of PCBs in the Afton landfill will not eventually leach into the groundwater. Unless a more permanent solution is found, it will only be a matter of time before the PCBs end up in these people's wells.

The October 1982 protest by the Warren County Citizens Group represented the first time people have gone to jail trying to stop a toxic wastes landfill. Actions like these have been characteristic of the civil rights and anti-nuclear movements. Both analogies have merit. The issue at Warren County *is* a question of civil rights; and the danger of the toxic wastes threat *is* related to the nuclear threat. In the case of the toxic wastes, however, "meltdowns" have already occured all over the country.

The PCBs protest failed to prevent the landfill from being completed, but it succeeded in a number of ways. The governor, James Hunt, had initially refused to meet with the group but was then forced to make concessions to their community. These were that no more landfills would be built in Warren County and that well water and body levels would be monitored. The Concerned Citizens group is still actively pressuring the state to remove or detoxify the landfill as soon as possible.

The Warren County protest illustrates some of the real opportunities of citizen action. The common threat of the waste dump in Afton united the community in a concerted action of defense. Black and white residents met together, worked together and were arrested together. In fact, the presence of national civil rights figures and members of the national Black Congressional Caucus served to link the protest to larger civil rights and "poor people's" movements. Participants in the community organization educated themselves about the technical issues, learned about PCBs and health hazards and developed an in-depth analysis of the policy and financial questions which led to the selection of Afton as the dump site. United and educated, the citizens of Warren County have developed a true sense of community and a heightened sense of community efficacy.

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Police arrest demonstrator at PCBs march, Warren County, October 1982.

REFERENCES

1. A great controversy surrounds the attempt to define just how toxic these chemicals are. Variables such as acute v. chronic effects, synergism with other environmental factors, the root of administration, and the species tested all contribute to problems in quantitating a "hazardous exposure." However, the U.S. Center for Disease Control (CDC) in Atlanta considers 50 parts per trillion of Dioxin, and 1 part per million of PCBs hazardous, based on chronic effects in non-human primates; DDT falls somewhere in between.

2. Mary Jane Schneider, *Persistent Poisons: Chemical Pollutants in the Environment*, New York: The New York Academy of Sciences, 1979, p. 13. (This book was published by the Academy for the general public on the basis of the proceedings of an Academy conference in 1978, entitled "Health Effects of Halogenated Aromatic Hydrocarbons." The full proceedings of the conference have been published as Volume 320 of the *Annals of the New York Academy of Science*.)

3. *Ibid*, p.15.

4. *Ibid*, p. 59.

5. Ward Worthy, "Both Incidence, Control of Dioxin Are Highly Complex," *Chemical and Engineering News*, Volume 61, Number 23, June 6, 1983, pp.55-56. (This whole volume of C&EN is devoted to the topic of Dioxin. Although most of the articles are apologetic for industry, many of the facts are indisputable regardless of how they're interpreted.)

6. Joseph H. Highland, "PCBs: An Environmental Catastrophe," published by the Environmental Defense Fund, 1979.

7. Schneider, pp.5-6.

8. U.S. Environmental Protection Agency, Office of Water Regulation and Standards, *Ambient Water Quality Criteria for Polychlorinated Biphenyls*, Publication No. 440/5-80-068, Washington, D.C., October 1980.

9. Schneider, p. 15.

10. Kimberly French, "A Community Unites Against Toxic Waste," *Whole Life Times*, January/February 1983, p.25.

11. Deborah Ferruccio, "Experts Testify Against Hazardous Waste Landfill: Letter to the Editor," *The Franklin Times* (North Carolina), February 16, 1982, pp 4-5.

12. Ken Ferruccio and Dollie Burwell, "Angry Warren County Rejects Landfill: PCB Direct Action Stuns Local, State Authorities," *Mountain Life and Work*, volume 59, Number 5, May 1983, pp 26-27.