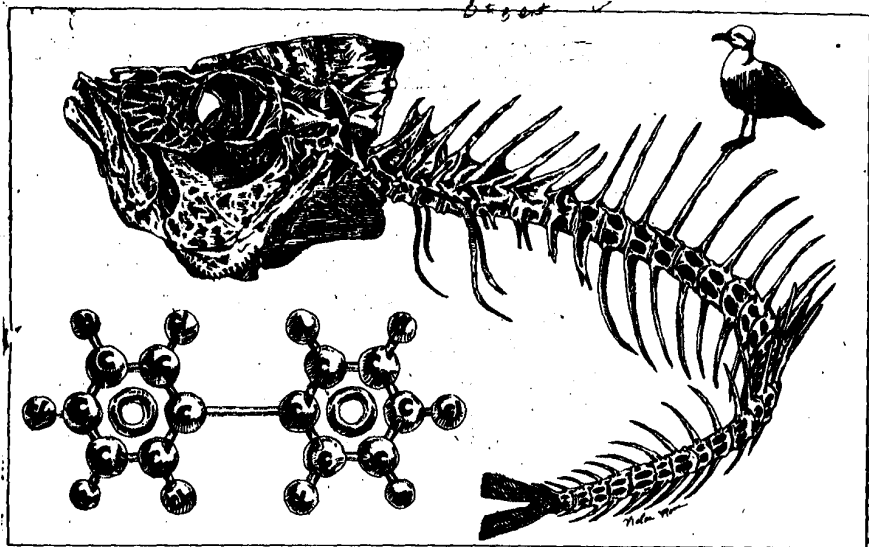




PCB: The tough, insidious chemical that's everywhere and refuses to go away

A highly stable, heat-resistant compound that once solved a lot of problems for industry, has crept into the environment, poisoning fish, wildlife — and maybe even man. Now the problem solver itself has become the problem

by TOM OPRE

Penguins at the South Pole and polar bears in the Arctic carry these insidious man-made agents of disease.

Wisconsin snowfall contains the dangerous molecules. So do fish swimming in the Great Lakes and many American river systems — in levels so high, in fact, that Michigan fishermen have been warned not to eat more than one Great Lakes fish meal a week.

These poisons are even found in minute amounts, according to the U.S. Environmental Protection Agency, in the fatty tissues of perhaps half the human population of this country.

Polychlorinated biphenyl (PCB), a chemical

used by industry worldwide in a variety of products because of its resistance to heat, deterioration and chemical change, is not easily dismissed — or, evidently, controlled. The same properties that made it so attractive to industry are now a large part of the concern over it, since its stability means it degrades very slowly in nature, and its solubility facilitates its absorption in the fatty tissues of fish, wildlife and man.

Used mostly in a liquid form, PCB is a chlorinated hydrocarbon compound. The higher the amount of chlorine, the more toxic and resistant to breakdown by natural enzymes a particular PCB compound becomes.

For the past four years scientists have known PCBs can cause skin lesions, abnormal swelling (edema), stillbirths and even cancer in laboratory animals. Humans exposed to high doses have exhibited reactions ranging from simple weakness and nausea to skin and liver disorders.

Despite this knowledge, PCBs, in one form or another, continue to permeate practically all parts of our lives today.

PCB was first manufactured by Germany in the 1890s. But since World War II, the compound has been available in just about every industrialized country in the world. Minnesota, this country's biggest producer (followed by General Electric and Westinghouse), has sold some 400,000 tons of PCBs since 1948.

Applications of the chemical form a long list. The power industry uses it as a heat-transference agent in high voltage capacitors and transformers, and the die casting industry as a mold-release agent. But the chemical is found in a wide array of products the average consumer comes in contact with as well. It is used in paints, inks, carbonless carbon paper, some plastic and rubber products, various sealants, some envelope glues, home electrical fixtures (like the two badies in the present light) washable wall coverings, treated board covers, copying machine toners, some toilet seats, flame-proof synthetics, and clutch and brake linings.

Quite literally, PCBs exist about everywhere the average American goes today. We come into contact with them directly through the products they are used in, and indirectly when those products and their manufacturing byproducts are discarded and enter our environment. Just how they

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For Michigan's fishermen, PCB contamination threatens a cherished way of life

by ROBERT OBTMANN/photographs by CRAIG PORTER

Bill Carlson, 65, the fourth generation of a fishing family in the island, sits at the wheel of the "Janice Sue," guiding the aqua, but functional, 41-foot vessel to the lake, 14 miles out of two-strewn Leelanau Harbor, into Lake Michigan.

As the 40-year-old March winds froth and spray at the plunging bow, Bill Carlson talks about PCBs—polychlorinated biphenyls—a chemical he has never seen and knows little about, but which threatens to destroy his way of life.

"It's a problem and I'm not worried about it. I don't think there's a fish out here that doesn't have the stuff in it. But I live off fish. Most of the fish sold in Detroit comes from here. So this will hit five-year-old kids and the fish catch. I'm not that worried about people not buying our fish because they're scared of PCBs. I'm worried that they'll stop us from fishing before that."

A boy appears aboard, rocking to the waves, holding the line as the "Janice Sue" nearly two miles of

water in Lake Michigan. The boat is about 100 feet long and 20 feet wide.

Carlson says, "I don't let it in [disturbance] all through the body and make the fish. The worst thing is a line of fish that's the most susceptible to contamination by the fat-sucking PCBs, and that's what Carlson says."

There are still some fish in the lake, but the PCBs are still there. They're not as big as some in the South, but they're still there. We're doing about 100 fish a day, but we're not sure if the fish are still there or not."

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Joe LeBlond runs a fishing operation on the Bay Mills Indian reservation. He's convinced that the fish is "poisoned" by the PCBs in the water. It's a big problem for the fish we catch.



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An imposing bear of a man, he sits at a table in his bar over a beer and speaks about PCBs with the intensity of one defending himself from fatal assault.

The DNR is pushing the PCB issue to get the fish to stop shipment of the fish we catch across state lines. (Most of the Indians catch is sold in Chicago.) The contamination is one of a problem here then it is in Lake Michigan or even in other parts of Lake Superior. But the DNR wants to blame the whole Great Lakes with the same standards. They want to create a sport fishing paradise, we don't see any movement to keep sport fishing because of PCBs."

Some Bay Mills Indians are at least primitive in their methods compared to Bill Carlson, for instance. They fish in small boats, with small nets, close to shore. Before PCBs, the biggest technological intrusion into their lands was the bottom trawl. But the fish, which may bring in \$50 per pound on a good day in the summer, is crucial not only to the Indian community's economy, but to its way of life.

"I don't see a lot of fish here," Carlson said. "I've seen on a good, healthy morning, with not being coming in and a cup of hot coffee in your hand. I can't see it."

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may be affecting us — if at all — is a question the federal government cannot answer.

Nathaniel Reed, U.S. assistant secretary of the Interior Department for Fish and Wildlife, told a Chicago conference last year: "I am deeply shocked by the pervasiveness of PCBs; they are literally everywhere. I am very troubled by the exceedingly high levels found in fish in all our drainage systems, and I do not mean just the Hudson and the entire Great Lakes system."

PCBs are now found in practically every living organism analyzed in the Atlantic Ocean, even those living at depths of 11,000 feet, according to a report by Dr. George Harvey of the Woods Hole Oceanographic Institution.

"Based on available data," Dr. Harvey concluded, "it seems safe to assume that PCBs are present in varying concentrations in every species of wildlife on earth."

A 1974 study from the International Agency for Research on Cancer, part of the World Health Organization, stated that PCBs have been found in human milk in concentrations up to 1.1 ppm in Japan. In some areas of California, the study said, human milk samples showed an average level "slightly above the maximum daily intake which would occur in adults eating 150 grams of fish weekly containing 16 ppm PCBs (an average for coho salmon in Lake Michigan)."

Yet no one seems quite sure exactly how — and in precisely what quantities — PCBs act within the human body to produce the poisoning effect.

U.S. Rep. Philip Ruppe, R-Mich., ranking member of the House Merchant Marine and Fisheries Committee, said recently he was appalled at the lack of government effort to determine just how toxic PCBs are to mankind.

"I am truly concerned about people who may be sitting on a bag of dynamite," he said. "We don't know what is tolerable or how we can get PCBs out of our systems."

Most of the PCB presence detected in fish, wildlife and man are measured in what would seem infinitesimally tiny quantities, ranging between 1 and 80 ppm (parts per million). It would take 1,000 ppm, for example, to equal one-tenth of one percent. But for assistant secretary Reed, "any level of PCBs are potentially harmful to humans."

PCBs can be absorbed by eating or drinking them in food products. They can even be absorbed by breathing. Discarded plastic products containing PCBs, for example, can release PCB molecules into the atmosphere when burned in dumps. PCBs have already been discovered in air samples in locations like Chicago and Florida.

The FDA has established temporary maximum limits for PCBs in various foods, animal feeds and food-packaging materials, which have helped reduce exposure to PCBs through commercially-offered products. The standards are 2.5 ppm for milk and dairy products, 5 ppm in fish, shellfish and poultry products, 2 ppm in infant foods, and 10 ppm in food packaging materials.

Just a few months ago, however, it was learned that the Michigan Department of Agriculture was quietly trying to locate perhaps as many as 100 dairy herds being fed tainted silage from silos that had been coated with a sealant containing high levels of PCBs. Sealant scrapings from inside the silos contained up to 10,000 ppm PCBs — one percent.

Milk from at least two of these dairy herds was pulled off the market for a time. Withdrawn from the contaminated silage, the cows soon exhibited PCB milk levels within FDA guidelines of 2.5 ppm.

But when Agriculture inspectors thought they had the problem completely solved, PCBs above the "safe" level showed up unexpectedly in a random sample of cheese.

Now it appears that a number of beef herds have been fed from PCB-contaminated silos for perhaps as

long as the past 15 or 20 years. Agriculture Department veterinarians seem to take little notice of that, however, pointing out that the FDA has not even set a PCB standard in red meat.

"We have no legal grounds for taking action even if we found high PCB levels," said chief state veterinarian John Quinn.

The only known instances of severe human PCB poisoning occurred in Japan (often a bellwether of environmental problems to come) back in 1968. A heat exchanger leaked PCB fluids into nearby rice fields, and Japanese families eating the highly contaminated rice — more than 600 persons — soon exhibited symptoms like skin lesions, hearing losses, edema, jaundice, blindness and abdominal pain. The weight of new born babies was lower than the national average and skin discoloration was evident. Cirrhosis of the liver also occurred in some victims, along with cancer-type cell changes in the livers of others.

Results in laboratory animals have been just as dramatic. Dr. James Allen and Deborah Barocci of the University of Wisconsin Medical School tested rhesus monkeys by adding PCB to their diets. Divided into two groups, one received 5 ppm doses while the other got only 2.5 ppm daily.

At the end of a two-month period, all the animals had lost hair and developed chloracne-like thickening of the skin. (Chloracne — skin lesions — was first detected in chlorine plant workers around 1910.) Four months later, still on the diets, the females were bred with monkeys not fed any PCB. Nearly all the females in the 5 ppm group aborted or had stillbirths. Slightly more than half the 2.5 ppm group gave birth to undersized offspring.

Milk farmers in the Great Lakes area who fed PCB-tainted silage to caged females discovered that reproduction ended. Lessening the dosage of contaminated fish allowed some births, but the offspring were almost all undersized.

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The Japanese call it "yusho." In English it's chloracne. This woman contracted the skin-ravaging disease by eating food prepared with rice oil heavily contaminated by a Japanese brand of PCB. Chloracne was just one of several ill effects suffered by more than 600 Japanese villagers who ate the contaminated food.

The proposed act provides for an immediate ban on all non-closed system uses of PCBs, and within two years of enactment, an across-the-board ban of all PCB usage, unless it is proven there is no risk. The measure would also require notification of EPA 90 days before manufacture of any new possibly toxic chemical. EPA would be empowered to halt manufacture of a chemical.

Action is pending at the state level as well. Following Michigan's lead (as they did in the struggle to control DDT several years ago), other Great Lakes states are now debating PCB elimination laws.

Many scientists have questioned why EPA doesn't just ban use of PCBs or at least institute some controls as it did in the case of DDT, without waiting for a federal act.

"EPA claims it doesn't have the legal authority to

ban industrial chemicals as it did DDT, an agricultural compound," Hesse explained.

Instead, the federal government has worked on a voluntary restriction program with various industries using PCBs, and with Monsanto, the biggest manufacturer of PCBs in the U.S. While Monsanto's production has dropped — under federal urging — from 70 million pounds annually in 1971 to roughly 40 million this year, PCB sales continue to provide a sizeable monetary reward for the company. PCB compounds normally sell at around 66 cents a pound, grossing about \$35 million for Monsanto this year.

Monsanto has voluntarily dropped some of the more highly chlorinated compounds. Companies requiring them, however, have simply turned to foreign sources. About 600,000 pounds are imported a year.

Estimates of breakdown times in the environment run as high as 100 years for some PCBs, but no one knows for sure.

"There's no question it will be a problem for years to come, even if all losses were stopped tomorrow," the DNR's Hesse said.

Deputy DNR director Tody said that although two years ago the DNR "surveyed and helped halt practically all the major open-air losses of industrial PCBs in this state, today the PCB level in Great Lakes fish has not dropped one iota. If anything, it has increased a little."

Modern sewage treatment can remove, at best, about 60 percent of the PCBs in industrial discharges, according to experts. PCB-containing items dumped in refuse areas cause contamination as the leaching process occurs. Normal refuse facilities burning these products simply allow the PCBs to enter the atmosphere undestroyed.

The only known way to absolutely destroy PCBs is in a furnace where the temperature exceeds 2,400 degrees Fahrenheit. It takes a special furnace, and very few exist in the U.S.

Following the lead of Ontario, Michigan's DNR officials are negotiating with Peabody Cement Company of Detroit to build a suitable incinerator here to destroy liquid PCBs. Canada's pilot project worked perfectly, developing temperatures up to 5,000 Fahrenheit.

"That doesn't solve the problem of contaminated solids," Hesse said. "The only present recourse is a landfill for them here in this state."

Most of the ill effects of PCBs detectable thus far in humans seems to be the result of industrial exposure. General Electric Company recently admitted that 50 or 60 of its employees at Hudson River plants manufacturing electrical equipment had become sick over the past 15 years, perhaps because of PCB exposure.

The sources of PCB exposure are diverse, however. A study of refuse area workers showed that about 80 percent had PCBs in their

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