Over 440 million pounds of these highly toxic chemicals have contaminated our rivers, lakes, oceans and landfills. Scientists are deeply concerned about their long-term impact and continued use

PCBs: The Poison That Won't Go Away

By John Culhane

In December 1977, technicians at Country Pride Foods in El Dorado, Ark., discovered highly toxic chemicals called polychlorinated biphenyls (PCBs) in a routine sampling of feed ingredients for the company's chickens. Country Pride contacted H. J. Baker & Bro., Inc., its New York-based supplier, which shipped samples of its fish-meal product to a testing lab.

Investigators finally traced the problem to a fish-meal warehouse in Ponce, Puerto Rico, leased and run by National Packing Co., a unit of Ralston Purina Co. During a fire the previous April, the feed had been contaminated by PCBs, which had leaked out when electrical transformers were damaged. National Packing had dried out the fish meal that was soaked by firefighters, reprocessed it and shipped it to the mainland.

PCBs have caused cancer in laboratory animals, and Ralston Purina decided to recall all the contaminated fish meal. About 400,000 chickens that had eaten the meal had to be destroyed—and millions of eggs they had laid were withheld from the market.

Boon to Bane. The chicken kill is only one of a growing number of incidents involving PCBs. In recent years, scientists have become increasingly worried about PCBs still in use and the rising level of PCBs in the environment. Their main concerns: PCBs, which don't degrade, flow

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into waterways, accumulate in fish, and so enter the food we eat. Some 290 million pounds of the poison have been disposed of in dumps.* And more than 750 million pounds of PCBs are still in service in electrical equipment, presenting a constant danger of leaking.

PCBs—liquid, resinous or crystalline substances prepared by the reaction of chlorine with biphenyl—were first sold in large quantities in 1929. Highly stable, they are fire resistant. Industry used them instead of mineral oil, which caught fire, in capacitors and electrical and railroad transformers. If for no other reason than the way they cut down on fires, PCBs were considered a boon to mankind.

In transformers and capacitors, at least, PCBs were enclosed in tight metal containers. But in a half-century of "open" uses, these man-made compounds became an ever-increasing component of industrial wastes. They were used in mining machinery and hydraulic die-casting and heat-transfer systems. They served as plasticizers in paints, adhesives and caulking compounds. A ton a year, for example, entered Scotland's Clyde River.

The first major sign of trouble appeared in 1968. Over a thousand Japanese were afflicted with a disease known as Yusho, or oil disease, after eating rice oil heavily contaminated with PCBs. The victims developed acne, swollen limbs and liver problems. Japan traced the poisoning principally to PCBs and in 1972 banned their manufacture.

Meanwhile, from 1946 to 1976, the General Electric Co. had been discharging PCBs into the Hudson River with waste water from its capacitor plants at Hudson Falls and Fort Edward, N.Y. In August 1975, Ogden R. Reid, then commissioner of the New York Department of Environmental Conservation (DEC), learned of alarming PCB readings in Hudson River fish—as high as 350 p.p.m. in the flesh of rock bass. This was 70 times the "safe" level for food fish then established by the Food and Drug Administration (FDA).

Reid closed the upper Hudson to all fishing (and the lower Hudson to commercial fishing of striped bass), and appointed an administrative hearing officer to fix responsibility and exact penalties. In a negotiated settlement in 1976 under Reid's successor, Peter A. A. Berle, GE paid $4 million toward PCB research and river cleanup; the DEC agreed to pay $3 million, acknowledging negligence as a public watchdog.

Subsequent research turned up more bad news. "While PCBs are present in virtually every river in the nation," said the DEC, "studies show that the Hudson ranks first in the degree of contamination of its water, bottom sediments and aquatic life." Unprecedented PCB deposits—

*The Environmental Protection Agency (EPA) demands that materials with very high concentrations of PCBs—50 parts per million (p.p.m.) or more—must be destroyed by incineration. But two years after this regulation was promulgated, not a single incinerator for general use has been approved, because of citizen opposition or technical problems.

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as much as 100 tons—lie in Hudson River "hot spots." Even with the fishing limitations in effect, consumers were advised to eat no more than half a pound of river fish in any one week.

In November 1975, the Environmental Defense Fund and the Natural Resources Defense Council had petitioned the FDA to insist on a PCB level of only one p.p.m. in fish. The FDA rejected this, explaining that "enforcement could significantly disrupt the food supply."

Finally, on April 1, 1977, the FDA proposed the reduction of the allowable level of PCBs in fish to two p.p.m. The regulations requiring lower PCB levels for such items as poultry, eggs and baby foods became effective in August 1979. But they have yet to be enforced for fish, the main source of PCBs in the food chain, because of objections filed with the FDA.

Fearful Specter. The EPA reported in 1978: "PCBs appear to have caused malignant and benign tumors in rats and mice." In one experiment, conducted by Dr. Renate Kimbrough at the Center for Disease Control in Atlanta, rats fed 100 p.p.m. of PCBs in their diet for 21 months developed "a high incidence of carcinomas" (26 out of 184 rats) and neoplastic nodules (144 out of 184 rats) in the liver. Only one of 173 control animals developed a tumor.

At the University of Wisconsin, James Allen conducted a series of experiments with rhesus monkeys. Females fed PCBs at 5 and 2.5 p.p.m. in their diet for six months, before being mated with untreated males, demonstrated severe reproductive dysfunctions. Of the eight monkeys fed 5 p.p.m., five aborted; two didn't conceive at all; only one gave birth. Of the eight fed the lower dosage, five gave birth to extremely small infants, and three aborted. The six baby monkeys were permitted to nurse their mothers for a period of four months. During this period three of the babies died.

"There's no question that PCBs are a carcinogenic agent," said Allen. "And without doubt, high levels are transmitted through mother's milk."

So far there is no conclusive evidence that PCBs cause cancer in human beings, but preliminary findings are disquieting. Medical scientists have been studying the Japanese who ate PCB-contaminated rice oil. "A preliminary tabulation of the deaths among Yusho victims through 1975 shows an excess in the rate of cancer, particularly of the stomach and liver," the EPA reported in May 1978.

In another preliminary survey, 92 workers at a New Jersey petrochemical facility, who were considered likely to have been exposed to PCBs between 1949 and 1957, were studied. They showed, said the EPA, "a significant excess of malignant melanoma and pancreatic cancer." In still another study, the death certificates of 50 employees who actually made PCBs "revealed seven cases of lung cancer," said the EPA, "com-

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pared with an expected 2.5 cases."

The Japanese and American workers were exposed to other toxic substances besides PCBs, and the study of cancer deaths of PCB workers was not corrected for age or smoking habits. Nevertheless, the effect of PCBs on laboratory animals was enough to stir the federal government into action.

On January 1, 1979, the government prohibited further manufacturing or importing of PCBs. (Monsanto Co., the last remaining U.S. manufacturer of PCBs, had ceased making them in mid-1977.) Last May, the EPA, FDA and Department of Agriculture proposed that, starting next year, electrical equipment containing PCBs be removed from the nation's 26,000 food-processing, animal-feed and agricultural chemical plants.

Contaminated World. Despite the recent total U.S. ban on manufacture, the PCB problem will persist for years. "PCBs don't break down in the environment," says William Gunter, leader of EPA's PCB-regulations team. "The concentration of PCBs in the body will increase as PCBs in the diet are stored in fatty tissue." And most other countries, such as the U.S.S.R., that manufacture PCBs still haven't passed laws restricting their use.

The EPA estimates that 440 million pounds of PCBs remain in U.S. rivers, lakes, oceans, dumps. PCBs have been reported from Escambia Bay, Fla., and Chesapeake Bay to San Francisco Bay and Puget Sound. Wherever old transformers have been dumped, they may leak PCBs. "PCBs tend to collect in waterways and bioaccumulate in fish," explains PCB expert John P. DeKany. "Fish-eating mammals are particularly at risk."

Effects are already evident. Ranch minks in Wisconsin, fed coho salmon from Lake Michigan with 10-15 p.p.m. PCBs, stopped reproducing or their kits died. Sweden's Sören Jensen, the first scientist to detect PCBs in the environment, thinks the decline of the Baltic Sea seal is due to a diet of PCB-contaminated fish. In 1977, polar bears, at the very top of the arctic food chain, showed PCB levels of up to 8 p.p.m. in their fatty tissue. "This was the first indication," says Barnard College geologist John E. Sanders, chairman of New York State's PCB Settlement Advisory Committee, "that PCBs are spread throughout the biosphere."

Human beings absorb PCBs through the lungs, the gastrointestinal tract and even the skin. After absorption, PCBs circulate through the blood and accumulate in fatty tissues and in organs. The EPA now estimates that 91 percent of Americans carry a measurable quantity of PCBs in their fatty tissues.

Expensive Clean-Up. What can be done to minimize the danger? Scientists believe that the environment simply must be cleansed of huge concentrations of PCBs. A technology has been developed that could clean up hot spots where river sediments are especially contaminat-

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ed. Hydraulic dredges would vacuum the PCB-laden sediments which could be piped or barged to special land disposal sites. (PCB experts like DeKany stress that the American public must be educated to recognize the necessity for properly controlled landfills and incinerators. The alternative: continued illegal dumping.)

New York State has already developed a $40-million pilot removal program for the Hudson River. But it has run short of funds. In November 1978, Peter Berle asked the EPA for permission to use previously allocated Clean Water Act funds to clean up PCBs.

The EPA turned the request down flat. But Berle's successor, Robert F. Flacke, took the matter to Congress. Last October, both Senate and House voted to allow the state to use $20 million of its Clean Water funds not only to build sewage-treatment plants but also to dredge PCB hot spots. And GE, in a precedent-setting move, agreed to clean up PCBs and other wastes dumped in seven New York State landfills.

It is also necessary to determine quickly how serious a health hazard PCBs pose. A conclusive link between PCBs and cancer and birth defects in humans has not been established; but, while research into the question proceeds, PCBs are building up in mother's milk and the fatty tissue of human beings all over the world.

It is going to be expensive, but we must stop that buildup. We must break up the hot spots of PCBs in our waterways, and keep PCBs low in the food we eat and the water we drink. Fortunately, Goodyear Tire & Rubber Co. and Sunohio have developed chemical processes for removing PCBs in certain fluids and in electrical equipment.

Congress has been debating establishment of a "superfund" of more than $1 billion—industry- and government-provided—to clean up various types of oil and chemical spills, leaks and contaminated dump sites. Leaving such poisons as PCBs in dumps and in the biosphere is like having a time bomb in the house—primed and ticking.

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Duty, Free

ANOTHER HOSPITAL VOLUNTEER and I stood in the hospital lobby one cold, nasty day watching one of our veteran colleagues being buffeted by wind and drenched by rain as she made the long walk in from the parking lot. As she entered the lobby, soaked from umbrella to boots, I called out to her, "Now, there's a dedicated volunteer!"

"You're not kidding," she responded. "If I were being paid for this, I'd call in sick!"

—Contributed by Barbara C. Brookshire

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