PCB Perils Just Coming to Light

By Stuart Diamond
Newsday Service

New York, N.Y. — In the snows of Antarctica, in fish eaten daily by millions, in the milk of nursing mothers, the toxic pollutant PCB is showing up in increasing concentrations.

First marketed in 1929, the chemical's harmful properties did not become widely known until the mid-1960s, after millions of pounds were in use in such everyday products as paint and refrigerators.

Now, research indicates that large doses of the clear, oily fluid cause skin lesions in humans and produce cancer, genetic damage and death in test animals.

The US Environmental Protection Agency this year banned PCB production, effective in 1979. The Food and Drug Administration has proposed a strict limit on PCB levels in fish, the chemical's principal pathway to humans.

All this may be too late. PCBs (polychlorinated biphenyls) have invaded living creatures throughout the world. They have been found in the air, in soil and in river sediments.

More than 90% of all Americans have it in their tissues, according to EPA studies. And 5% of the population has PCB levels that exceed the proposed guidelines for contaminated fish.

"It is an ubiquitous contaminant, as bad as DDT ever was," says Joseph Highland, a biochemist for the Environmental Defense Fund. The Washington based organization began prodding the federal government four years ago to control the material.

Commercial and recreation fishermen await a decision on new maximum allowable PCB levels for Lake Michigan fish; story on Page 1, Discover.

Elizabeth Campbell, the FDA chemist who wrote new standards to limit consumption of the material sharply, agrees. "PCBs may be the chemical scare of the '70s," she said.

Although virtually all experts agree that PCBs pose a significant environmental threat, the issue is complicated by the fact that few adverse health effects have been noted in mans.

The only major instance of human sick from PCBs occurred nine years ago in J after an accidental contamination of ri with the chemical. That contamination affe 1,200 people, caused a number of serious nesses and, some believe, deaths. The PCI es, however, were in concentrations up to 1 times the levels found in contaminated fish

Japan banned PCBs in 1973.

Occupational exposures in the last five ades have produced chemical concentrati PCBs in humans dozens of times higher th the contaminated fish. Still, few adverse eff have been noted.

"What does this mean? It doesn't neces mean that PCBs have no long term effe said Frank Cordle, a PCB expert for the E "We know nothing about the long term eff We haven't seen any because we hav looked."

Many scientists believe it is just a matte

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PCBs

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time until human ailments are documented. This year, PCBs were found for the first time in embryonic fluid surrounding developing human fetuses, in concentrations several times above the allowable safe limits.

"Whenever you look you are going to find it," said Thomas Kopp of the EPA's office of toxic substances.

The results of animal testing are alarming.

For a year and a half, 16 female monkeys were fed food contaminated with PCB in concentrations similar to those found in fish caught off Long Island and elsewhere.

When the monkeys mated, seven miscarried. Two did not conceive at all. Uterine growths were recorded. The monkeys developed facial sores and swollen eyelids and lost their hair. All offspring were undersized and contained detectable levels of PCB.

Evidence Cited

The infants then were breast fed. They developed the same symptoms as their mothers. Within four months, half died.

The EPA is sufficiently convinced by such evidence to state that it has been demonstrated conclusively that PCBs are toxic to humans, fish and wildlife.

"Our methodology (with human studies) is very crude," said Dr. Blair Smith, researcher for the National Institute of Occupational Safety and Health, who has examined workers for PCB concentrations. "But the animal studies give very great cause for concern."

Last year the EPA began testing the breast milk of Americans. PCB was found in the milk of 78 of the first 80 women tested. The levels averaged about half the lowest concentrations found in the monkeys, and about an eighth of the highest concentrations.

"PCBs are practically in the hands of every American."

—EPA official

That study, by Dr. J.R. Allen, pathologist at the University of Wisconsin, is a principal reason why the federal government is preparing to lower drastically the allowable limits of PCBs in fish.

The new standard, expected to be enacted this year, is two parts of PCBs per million. The current standard is five parts per million.

Even the proposed limit is not meant for daily consumption, said Ms. Campbell of the FDA. "We figure that four fish meals per month at those levels should be the maximum, especially for women and children," she said.

The caution for children is based on the fact that children are smaller than adults, and PCB doses they receive from a contaminated fish are much larger per pound of body weight.

"An average child nursing at mother's breast for a year could ingest what adults ingest in a decade," says Highland of the Environmental Defense Fund.

Bass Contaminated

On the East Coast striped bass, popular for both eating and sport fishing, are widely contaminated. Several other species are affected.

Recent studies show that the Chesapeake Bay area, the largest bass spawning ground, has yielded striper eggs with unsafe PCB concentrations.

In Lake Michigan, a large proportion of the salmon and trout, the basis for a developing sports fishing industry in Michigan and Wisconsin, are found to contain PCBs in excess of the present standard.

Should the new limit for fish be enforced, both commercial and sport fishing for these species would be decimated in the Great Lakes and off Long Island. The present standard has scotched aspirations for commercial Lake Michigan fishing already.

Polychlorinated biphenyls, first manufactured in 1881, belong to a class of chemicals called chlorinated hydrocarbons, which include most common pesticides and solvents.

Some chlorinated hydrocarbons such as DDT, Mirex, dieldrin, aldrin and trichlorethylene, have been banned after causing cancer in test animals. Another, vinyl chloride, is known to cause cancer in humans.

In 1929, Monsanto Chemical Co. of St. Louis began producing PCBs commercially for use as an insulator in transformers, capacitors and similar equipment. Within a few years, PCBs became the fluid of choice in the electrical industry.

Many Other Uses

Numerous other uses were found. The chemicals were able to absorb and hold large amounts of heat, so they were used in heating coils to heat products in factories where open flames would be a hazard.

PCBs extend the life of caulking compounds around windows in skyscrapers. Since PCBs would not react with ink, they prevented smears on carbonless copy paper. In the electric motors of refrigerators, air conditioners, typewriters, power saws, clothes washers and dryers, dishwashers and furnace blowers, PCBs became common.

About 1.4 billion pounds of PCBs have been produced in this country. Four percent has been destroyed, 11% is in the environment and 19% is under varying degrees of control in landfills.

The rest is in billions of items not yet discarded.

Thousands of pounds have been discharged into the water each year by industries. In addition, discarded appliances have leaked PCBs into groundwater. Incinerators burning PCB laden paper have spewed the chemical into the air. Recycled, some of the paper has wound up as cereal boxes, where the chemical can get into the food.

"PCB's were not identified as a contaminant until the mid-1960s, when the technology was developed enough to measure it in the environment," said Smith of the Occupational Safety and Health Institute.

In 1966, Swedish scientists found PCBs in fish, bird feathers and human hair.

Two years later, the accidental factory leak of PCBs into cooking oil sickened 1,200 consumers in Yusho, Japan. They suffered from swollen joints, severe skin lesions and other disorders.

2 Stillbirths

Of the 13 contaminated women who became pregnant, there were two stillbirths and 12 of the 13 babies were smaller than national standards, according to scientific papers.

Up to Sept. 13, 1973, 22 deaths had occurred among the 1,200 victims. Of those, nine were from cancer, "suggesting a possible excess mortality (from cancer)," according to one paper.

In 1969, PCBs leaked from a factory near Pensacola, Fla., contaminating marine organisms in Escambia Bay. Less than one part per billion in the water killed half of the exposed shrimp within 15 days.

In 1973, the FDA set five parts per million as the safe limit permitted in edible fish.

The sickening concentrations that were consumed at Yusho in the accidental contamination were 2,000 parts per million, but that was a one time exposure, not a continuing one.

Still in Production

In 1971, Monsanto voluntarily stopped producing PCBs for "open" applications such as paints, but since the Yusho incident, Monsanto has produced more than 400 million pounds of PCBs. Thousands of pounds have been discharged into the environment by industries, homeowners, businesses and others.

manding strict regulations. But the government still has not set minimum limits that many scientists consider safe for all segments of society in the consumption of PCB contaminated fish.

Further, there are no regulations to prevent hundreds of millions of pounds of the PCBs now in use from getting into the environment to cause more harm.

Preparing Regulations

In February, the federal government banned discharges of PCBs into the environment as of Feb. 2, 1978. Monsanto, the nation's sole supplier of PCBs, has announced that it will cease making the chemical Oct. 31.

The EPA is preparing regulations for the safe disposal of the more than three-quarters of a billion pounds of PCBs still in use. It was supposed to enact regulations by July 1, but it wasn't ready. Now rules are expected within two months.

The proposals pointedly exempt a large portion of PCBs from regulation because the agency doesn't know how to collect the substance.

"The EPA's proposed regulations are atrocious — an outrageous response to the problem," charges Highland of the Environmental Defense Fund. "Hundreds of millions of pounds of this stuff will wind up in the environment because the government is unwilling to regulate it."

"Perplexing Problem"

After Highland's group sued in 1973, EPA tried to propose limits for nine chemicals but was overwhelmed by industry attorneys in 1974.

After further court suits, Russell Train, in one of his final actions as EPA administrator, signed the discharge ban Jan. 18 — more than four years after standards were mandated by Congress.

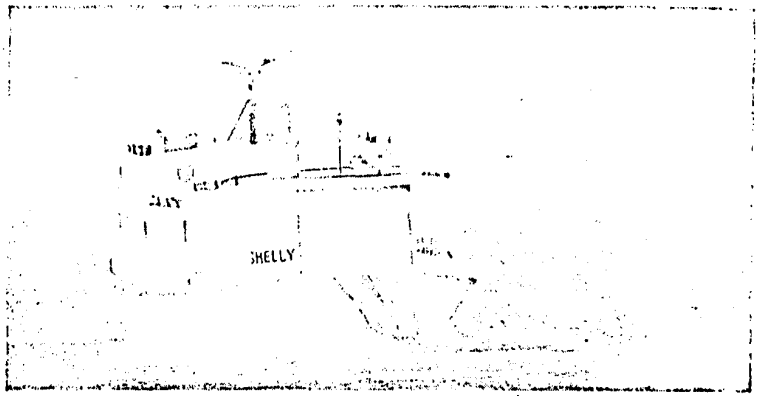
Federal officials do not dispute Highland's comments about the dangers of PCBs. But they refuse to take the blame for delays.

"We have a very perplexing problem here," said George Wirth, a chemical engineer whose unit wrote the disposal regulations. "PCBs are practically in the hands of every American. It is the fault of the society as a whole that we did not take better care of what we have produced and done with this chemical since Day One."

It is difficult or impossible for the nonexpert to tell whether the chemical is present in a given product. Usually its presence is not labeled, and almost never as PCBs. Monsanto's marketing name is Arochlor, but PCB has also been sold as Chlorextol, Dykanol, Inerteen, Noflamol, Pyramol and Therminol.

Disposal Planned

The EPA's proposed regulations are aimed at locating and disposing of two-thirds of the 750 million pounds believed still



—Journal Photo

PCB levels in fish are reducing commercial fishing in Lake Michigan.

in use in 8.1 million large transformers and high voltage capacitors used by utilities and major industries.

These are fairly well monitored and inventoried by their owners. The EPA plans strict rules for the collection and disposal of the items, first in approved landfills, and, after July 1, 1979, by incineration.

That leaves about 250 millions pounds of PCBs dispersed in *895 million highway lights, in air conditioning motors, small* appliances, fluorescent lights and many other products.

The EPA acknowledges that most of this may eventually wind up in the environment as appliances are discarded and

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—Environmentalist

leak, paints erode and fish — and people — consume the residue.

All told, EPA says, 540 million pounds of the chemical would wind up in the environment, more than a third of the entire domestic production of 46 years.

Education Suggested

The EPA suggests an educational program to encourage repair shops and commercial buildings to turn in their PCB laden equipment when the equipment is no longer useful over the next 20 to 30 years.

How successful could that be? "How successful is the paper recycling program in this country?" says Kopp of the EPA. "How successful were the attempts to cut the use of gasoline? Not too successful."

Another suggestion by the agency is to pay people a "bounty" to turn in their PCB laden items. A $2 bounty on each item, however, would mean a government outlay of $1.8 billion, not counting collection and advertising costs.

Municipal sewage usually has PCBs in concentrations below 500 parts per million. That, too will go unregulated under the new guidelines. Recent surveys have disclosed that the toxic chemical is in a number of the nation's sewage effluents, including some in Wisconsin.

Incineration a Problem

Discharges from plants that recycle paper often contain PCBs in concentrations below 500 parts per million. They, too, will be exempt.

Incineration of PCBs poses problems. The material can be destroyed only by burning at 2,200 to 2,900 degrees fahrenheit.

Most municipal incinerators burn at only 1,500 to 1,800 degrees. Any PCB laden material being incinerated now is entering the environment intact.

Beyond these problems is the question of how to purify contaminated soils and river sediments.

Numerous substitutes for PCBs have been developed since 1971, none of them with the fireproof qualities of PCBs but all less toxic.

There are indications that since Japan has banned the use of PCBs, there has been no increase in fires traceable to the substitutes, Kopp said.

The question of why it has taken so long for the US to get to the point that Japan arrived at four years ago is a touchy subject with many officials.

"Sure, we can be faulted for not acting two or three years earlier," said John Spagnoli, head of PCB monitoring and research for the New York state conservation department.

"But we didn't know about the health problems. Only the scientists knew about the health problems .... The point is, we're doing something about it now."