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The Ubiquitous Contaminants

Hunting a Chemical in the Haystack

Last of three parts

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If you wanted to pick the best place for a toxic chemical to get into the environment and cause widespread health problems, where would you put it?

How about in marine paints on the outside of boats so it washes into the water? Or in highway stripe so it washes into the soil? Or in 800 million fluorescent light fixtures, billions of sheets of paper and countless appliances so that it would be almost impossible to retrieve it?

That is what has been allowed to happen during the past five decades with a group of flame-retardant chemicals called PCBs, polychlorinated biphenyls. They came into wide use as an insulator in electrical equipment and as a preservative in numerous other items. Now they have been shown to cause cancer and reproductive failure in test animals and skin lesions in people.

Nine years ago, the first serious illnesses were reported in humans from PCB poisoning—February 1968, in Yusho, Japan. Five years ago, Japan banned the chemical and an American interagency task force concluded that PCBs are highly persistent, could be found in all parts of the environment and could have serious adverse effects on human health.

And during the past four years, the Environmental Defense Fund and the Natural Resources Defense Council, two leading American environmental groups, petitioned and sued the federal government, demanding strict regulations to limit domestic use of the chemical and its exposures in the population.

Yet the federal government still has not set minimum allowable limits that many scientists consider safe for all segments of society in the consumption of PCB-contaminated fish, the chemical's chief pathway to people. Further, there are no regulations to prevent the hundreds of millions of pounds of the toxic chemical now in use from getting into the environment and causing more harm.

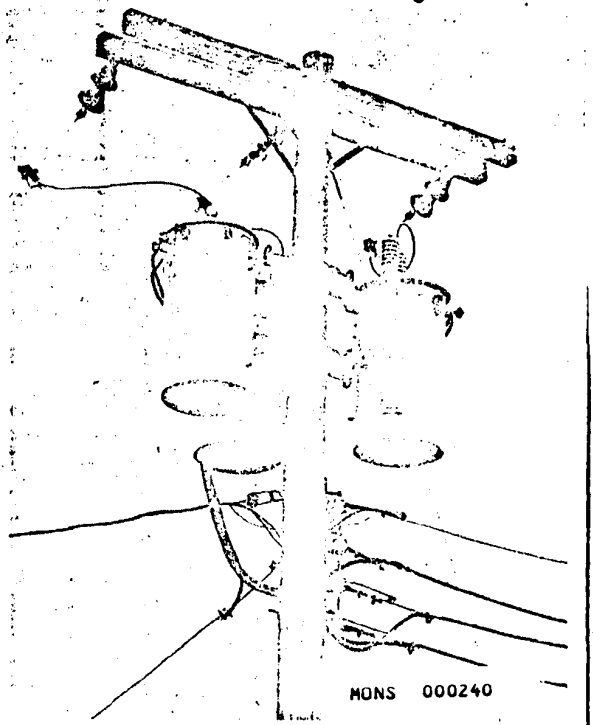
In February, the federal government banned discharges of PCBs into the environment as of Feb. 2, 1978. Monsanto Chemical Co., the nation's sole supplier of PCBs, has announced it will cease making the chemical by Oct. 31 of this year.

But since the Yusho incident, Monsanto has produced more than 400 million pounds of PCBs, and thousands of pounds have been discharged into the environment by industries, homeowners, businesses and a multitude of other sources. The Food and Drug Administration is proposing to lower by 80 per cent its limits on the consumption of contaminated fish, but even then, it concedes, the doses will not be safe enough for children and women of child-bearing ages to eat more than four meals of such fish per month.

The Environmental Protection Agency 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 the regulations by July 1, but it wasn't ready. The proposals pointedly exempt a large proportion of the PCBs from regulation, because the agency doesn't know how to collect the substance. The agency's Office of Toxic Substances is still grappling with the problem, and rules are expected within two months.

"The EPA's proposed regulations are atrocious—an outrageous response to the problem," charged Joseph Highland, biochemist for 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. If that material gets out there, there will be a national catastrophe."

Highland's group first sued the EPA in 1973 because it had not limited discharges of toxic chemicals, as provided in the Water Pollution Control Act of 1972. The EPA then 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 outgoing EPA administrator, signed the discharge ban on Jan. 18 of this year—more than four years after the discharge standards were mandated by Congress.



These transformers contain PCBs

Newsday Photo by Bob Lackey

Federal officials questioned do not dispute the substance of Highland's comments about the dangers of PCBs. But they refused to take the blame for the delays or for the regulations. "We have a very perplexing problem here," said George Wirth, a chemical engineer whose unit in EPA 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."

PCBs are similar in structure to the insecticide DDT and to other organic solvents and pest-killers. But PCBs are much more stable—resistant to acids, bases and biological breakdown. Because of this PCBs have been used in a myriad of everyday products—as insulators, heat-conductors, anticorrosive agents and plasticizers. Among the products are refrigerators, television sets, transformers, capacitors, sealing agents, inks, copy paper, electric motors, microwave ovens, paints and varnishes. Not all of these items contain PCBs—in fact, many do not. But it is difficult or impossible for the non-expert to tell if the chemical is present. Usually, the substance is not listed as an ingredient and almost never as PCBs. Monsanto's marketing name is Aroclor, but it has also been sold in this country under the names of Chlorextol, Dykanol, Inerteen, Noflamol, Pyranol and Therminol.

About 1.4 billion pounds of PCBs have been produced in this country, and only 55 million pounds, or 4 per cent, have been degraded in the environment or destroyed by special high temperature incineration. Another 160 million pounds, or 11 per cent, have been released to the environment and are in the air, water and soil. An equal amount has been exported.

That leaves a little more than a billion pounds. Of that, about 300 million are in varying degrees of control in landfills and about 750 million are in use.

The EPA's proposed marking and disposal regulations are aimed at two-thirds of the 750 million pounds in use. Those PCBs are distributed in 8.1 million large transformers and high-voltage capacitors used by utilities and major industries, and they are fairly well monitored and inventoried by their owners. The EPA plans to draw up strict rules for the orderly collection and disposal of the items, first in approved chemical landfills, and, after July 1, 1979, by incineration.

That leaves about 250 million pounds of PCBs, dispersed in 895 million capacitors, or "bombs," in

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the nation's highway lights, in air-conditioning motors in numerous commercial buildings, in individual small appliances and in fluorescent light fixtures. Each item contains an average of 3.5 pounds of PCBs, although some have only a few ounces of the chemical.

Not only is the EPA unsure what to do about this material, but the agency acknowledges that most of it may eventually wind up in the environment, as appliances are discarded and leak, paints erode, and fish—and people—consume the residue. The agency also believes some of the material now in landfills eventually may find its way into the soil and water. All told, the EPA says, 540 million pounds of the chemical could wind up free in the environment. That is more than a third of the entire domestic production since it began 48 years ago. And it is 2½ times the amount now free in the environment.

"Although banning the production of PCBs will help the problem of toxic contamination, it will not solve it," says Nolan A. Currey, an expert consultant on hazardous chemicals for the EPA. "The cases of sealed units [appliances, etc.] now in use can be ruptured, and will discharge PCBs . . . Control of the disposal of electrical units now in use will also be difficult. And the job of intercepting and destroying toxics after discharge into the environment will be more difficult, if not impossible."

The agency's proposed regulations, in fact, exempt the owners of the 800 million fluorescent light fixtures and 50 million small appliances from marking and disposal. "This means that the article can be placed into the normal trash collection system used by the occupants," the regulations say. The article would then be taken to a dump or incinerated with other refuse.

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.

But how successful could that be? "How successful is the paper-recycling program in this country?" said Thomas Kopp, a chemical engineer with the office of toxic substances. "How successful were the attempts to cut the use of gasoline? Not too successful."

Some officials balk at a full program to inform people of the risks of PCBs so they will not discard items containing the chemical. "The problem is that, we don't want to scare people," said David Wagner of the EPA's toxic-substances office.

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. That does not count collection and advertising costs. The EPA says it has "reservations" about the practicality of collecting those items. It is asking for suggestions.

The proposed regulations also would not control the disposal of PCBs in "widely used commercial products," if the concentrations of the chemical are below 500 parts per million. These products are too numerous for the agency to define: the carbonless copy paper sitting in file cabinet inventories, the half-cans of marine paint on people's shelves, the caulking compounds on windows. These traces total 8 million pounds of PCBs, in addition to the 750 million currently in use and accountable.

Since municipal sewage and sludge usually has PCBs in concentrations below 500 parts per million, that, too, will go unregulated under the new guidelines. Recent surveys have disclosed the toxic chemical in a number of the nation's sewage effluents—in Illinois, Michigan, Wisconsin, Ohio, California, New York and Florida, among others. Beyond that, discharges from plants that produce recycled paper often contain PCBs in concentrations below 500 parts per million, so they, too, will be exempt from regulation. The chemical winds up in such discharges because of its presence in the original stock.

The incineration of PCBs also poses problems. The material can be destroyed only by burning at 2,200 to 2,900 degrees Fahrenheit. If anything goes wrong with the process, the chemical will merely be spewed into the air with the combustion gases. Most municipal incinerators burn at only 1,500 to 1,800 degrees Fahrenheit. Thus, any PCB-laden material being incinerated now is winding up in the environment intact. To construct special, high-temperature incinerators would cost a large amount of money, he said. "Basically, you would have to build blast furnaces," said Kopp of the EPA.

The Environmental Defense Fund's Highland suggested a national mobilization program similar to the one during World War II. "If people realized the significance of the problem, a small effort by a lot of people would solve it. The government should enact regulations requiring the return of these materials."

Restrictions on the consumption of PCB-contaminated food were first set by the FDA in 1973. In that year, the amount of PCBs in the average American diet reached its highest level ever. The chemical showed up in baby cereal, a variety of processed foods and numerous other items.

The FDA's limits were five parts per million in fish and lower for most other foods. Within two years, the amount of PCBs in the average American diet dropped by half, although 40 per cent of the meat, fish and poultry still contained traces.

The only food in which PCB content had not dropped was fish, which continued to spawn in rivers and lakes where the chemical was being discharged. In 1975, the Environmental Defense Fund again urged the FDA to lower the standards. After the Environmental Defense Fund threatened suit on numerous occasions following months of inaction, the FDA this past April proposed lowering the maximum PCB level for edible fish to two parts per million. Long Island would be a principal area targeted by the government. Both bluefish and striped bass in Long Island waters exceed those limits, according to recent tests by the State Department of Environmental Conservation.

Many East End residents and fishermen are opposed to the new limits, expected to be enacted this year, because of the loss of revenue they would cause—$1.5 million annually, according to state estimates. The national loss estimated by the FDA would be $49 million a year.

The Environmental Defense Fund opposes the new standards from the other side. It wants the allowable PCB limit to be zero—or, if that is not possible because of detection problems, one part per million.

"Sports fishermen should be advised of the risks involved in eating those fish and of feeding it to their families," Highland said. "The zero-tolerance could cost [the fishing industry] a lot of money but the health problems without it will cost even more."

Beyond these problems is the issue of how to purify the soils and river sediments already contaminated. Even if the sediments contain PCB levels above 500 parts per million, the EPA's rules would exempt them from regulation unless the material is removed from the waterway. The same is true with contaminated soil. The city of Bloomington, Ind., for example, faces a cost of $25 million for replacing sewer lines and cleaning up the local river after Westinghouse Corp. discharged tons of PCB-contaminated effluent into a landfill and into the municipal treatment plant. Residents also want restoration because they unknowingly planted their gardens with PCB-contaminated soil conditioner from the treatment plant. Now they can't eat their vegetables or drink milk from their cows. Nor can they fish in 40 miles of the local river.

In New York State, the Hudson River has accumulated sediment levels of PCBs that measure up to 6,000 parts per million—3,000 times the proposed limits for edible fish—from discharges by General Electric Co.'s plants near Albany. Officials estimate it will cost up to $30 million to clean up the waterway.

Numerous substitutes for PCBs have been developed since 1971, none of them with the fireproof qualities of PCBs, but all of them less toxic. To prevent fires, Underwriters Laboratories will require special protection of items containing the new materials, a lab official said. Since Japan has banned the use of PCBs, indications are that there has been no increase in fires traceable to the substitutes, EPA's Kopp said.

The question of why it has taken so long for the United States to get to the point that Japan arrived at four years ago continues to be 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 state conservation department. "But we didn't know about the health problems . . . Only the scientists knew about the health problems after Yusho. These things take time. Agencies don't work as closely as they should. The point is, we're doing something about it now."

The FDA's proposed limit of two parts per million in fish will affect only those sold in interstate commerce. State officials are opposed to a similar ban for fish caught and sold within the state. They plan to issue only a caution and let people decide for themselves.

"Everything has some contamination in it," said Anthony Taormina, in charge of preserving coastal resources for the state environmental unit. "Of course we should reduce the risks. But to expect no risks from eating fish is to expect no risk from flying in an airplane. It is part of our technological society. Whether good or bad, this is the price we have to pay."

With PCBs, however, the price is continually rising. First, scattered chickens were destroyed. Then, commercial fishing was stopped in Lake Michigan. Then, Lake Ontario was closed. Then the Hudson River. Kopp said the new FDA limits will destroy the fresh-water fishing industry in most parts of the country.

"Wherever you look, you are going to find it," he said. "And if you find it, what are you going to tell people? We have no answer. It's there. It shouldn't be. It isn't good.

"We have seen only the tip of the iceberg."

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