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city final

PCB— deadly and pervasive

sunday special

First of two parts
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Fifty-two years ago it was hailed as "the wonder chemical" of the decade and was credited with protecting many a home, school, hospital and business from electrical fires.

Today, however, the compound has become one of the most notorious toxins in the country. Scientists have debated that distinction. Some maintain it causes cancer while others say it's no more dangerous than table salt.

The chemical is PCB, an acronym for 209 compounds known as polychlorinated biphenyls, which were invented to be used as electrical cooling oils.

Today PCB can be found in everything from microwave ovens to television sets, fluorescent light fixtures, electrical transformers and capacitors, refrigerators and air conditioners. Before 1979, PCB was also used in carbonless copy paper, printing ink, varnishes, paints, a number of pigments and dyes, textiles, sealants, fire retardants, natural gas pipeline compressors and plasticizers, which are softeners used in adhesives and adhesive tapes.

Although new studies have cast doubt on the widespread belief that PCB causes cancer in humans, there is reason to be concerned about the chemical because it "bioaccumulates" in nature.

That means that PCB, which is a close chemical cousin to DDT, does not metabolize and cannot be broken down by plants or animals. Rather, it moves up the food chain and accumulates along the way. The danger is that PCB could end up on your dinner plate in a high concentration in fish, meat, eggs or poultry.

And once you've ingested PCB, it remains unmetabolized in your body and lodges itself in your fatty tissues. The toxin has a half-life of 20 years. In other words, in 20 years' time about half the PCBs you ingest today will still be in your body, along with what you ingested yesterday and so on.

Scientists and researchers are concerned because no one knows exactly what PCB does once it enters the body. Nor is anyone certain how much of the toxin the body can safely absorb over time.

Not surprising, almost all Ameri-

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PCB —

a 'wonder chemical' that got out of hand . . .

(Continued from A-1)

cans have traces of PCB in their bodies, according to a U.S. surgeon general's report on hazardous waste issued in September 1980. The chemical was cited as one of a number of toxic compounds so pervasive in the environment that there's no way to escape it.

The chemical *does* seem to be everywhere. In 1979 t was found in the breastmilk of a Lafayette, Colo., arm woman. That same year it was also found in a herd of Kansas cattle, in Maine lobsters and along 200 miles of roadway in North Carolina.

In 1980, a DePaul University scientist who examined the dust in his Chicago apartment found sizable amounts of PCB. And recent government soil samplings found PCB in the snows of Antarctica.

For more than a decade, PCB has been discovered in all kinds of foodstuffs across the country. It has contaminated milk in West Virginia, meatmeal in Illinois, fishmeal in North Carolina and Puerto Rico, fish in the Hudson River and the Great Lakes and poultry feed packaged by Ralston Purina, according to a March 1980 report by the U.S. Food and Drug Administration.

"And those incidents are the ones that are *known*," cautioned Carol Tucker Foreman of the FDA. "It's very likely that there are a number of localized incidents of (PCB) contamination each year that we never know about."

But Monsanto Co. of St. Louis, Mo., which invented the chemical in 1929, has issued scores of press releases and sent their top directors on dozens of speaking tours to denounce what it calls "the PCB hysteria."

Says Dr. John H. Craddock, manager of Monsanto's Product and Environmental Safety Division, "The hazards of PCBs to humans have been greatly exaggerated. PCBs *are not* human cancer-causing agents and they *are not* deadly toxins. PCBs are considered only mildly toxic on an acute basis when ingested by humans — about on the same order as common table salt.

"The public has been unfairly alarmed about PCB and that's because officials in the government completely overreacted and chose PCB as some kind of toxic scapegoat," Craddock told The Sun.

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What is PCB used for and why is so much of it around — an estimated 750 million pounds?

Since 1929 it has been used as a cooling oil in nearly all things electrical because when it comes to preventing fires, few substances beat PCB.

Even though PCB use was banned in 1979 when Congress approved the Toxic Substances Control Act, the law allows a five-year phase-out "grace period." That means that PCB-filled appliances and equipment will be in use around the country until 1984.

The chemical's properties are so extraordinary that it took many years to find a replacement for it. For that reason, officials with the U.S. Environmental Protection Agency say, it was not outlawed until 1979, even though its toxic dangers were known in the late '60s.

PCB was a laboratory breakthrough because it had so many desirable qualities. The compound is insoluble in water, resistant to biological and chemical destruction and tolerates extremely low temperatures without changing its chemical form or state. It could insulate and cool hot electrical coils while neither conducting current nor igniting and it satisified every government safety code when it came to electrical fire prevention.

Then in 1975 a two-year test study on female rats linked the chemical to liver cancer. Hundreds of articles were written, all labeling the chemical a cancer-causing agent, and fears about PCB spread rapidly.

Later research has indicated PCB may not cause cancer in humans and does not necesarily cause cancer in rats, either.

After that latest batch of studies many industry officials — particularly the Monsanto Co., the sole producer of PCB in the U.S. — breathed a sign of relief.

And as for bioaccumulation, a recent study on fish in the Great Lakes showed that the accumulation of toxic chemicals like PCB and DDT is not passed to the animals' offspring. Monsanto uses that study to show that the environment "can be cleaned up if we stop dumping chemicals into it," said Craddock.

Unfortunately, no one knows what happens to *people* who are either exposed directly to PCB or who eat fish and other foodstuffs containing PCB. And, unless one submits to extensive and complex blood tests, there's no way to determine how much PCB each of us has in our bodies or how much PCB we may be eating at breakfast, lunch and dinner or drinking in our water.

For those reasons, human bioaccumulation of PCB is quite frightening. It is so feared, in fact, that last year a single incident of PCB contamination resulted in the destruction of 325,000 chickens, 4 million eggs, 41,000 pounds of meat and bonemeal, 12,000 cases of frozen strawberry cakes, 184,000 pounds of concentrates and finished feed and 3,375 hogs.

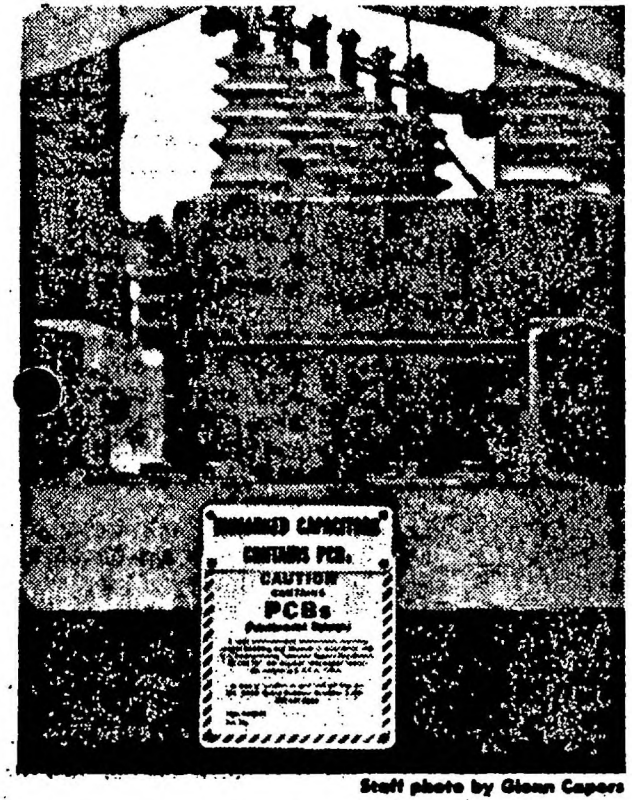
It began when an undetected leaky transformer dripped about 200 gallons of PCB-insulating fluid into feed at the Pierce Packing Co., an animal feed distributor in Billings, Mont.

Working its way up the food chain, the PCB contaminant spread into 19 states and two foreign countries, Japan and Canada, before it was detected. Some 1,400 firms may have received the contaminated meatmeal or feed made from it, the U.S. Food and Drug Administration reported.

It is impossible to say how many persons and livestock ate some PCB-contaminated food prior to detection or whether the government was able to track down every PCB-tainted morsel.

But it is possible to say that every person alive today has varying amounts of the chemical in their bodies. Random studies "have revealed PCBs in

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Staff photo by Glenn Capers

Sign warns that PCBs are used in these Southern California Edison Co. capacitors in Rialto.

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human fat tissue and blood plasma in amounts greater than 2 ppm (parts-per-million) and 29 ppb (parts-per-billion), respectively," according to a four-volume report issued last year by the Electric Power Research Institute in Palo Alto.

The EPA has ruled that any electrical cooling oil or lubricant with more than 50 ppm of PCB represents a health hazard. And any material containing more than 500 ppm of PCB must be destroyed by incineration.

To put all those figures in perspective, most electrical transformers and capacitors use PCB concentrations at 500,000 ppm or higher.

In the past 30 years, more than 750 million pounds of PCB were produced. And nearly all are believed to have been discharged into the environment — and the food chain, the FDA states.

Today, approximately 84,000 utility PCB transformers are still in service, containing 180 million pounds of PCB mixtures. About twice as many pounds of PCB are used in capacitors as in transformers and 95 percent of all capacitors contain PCB, the study by the Electric Power Research Institute found.

Under the 1979 Toxic Substances Control Act, utility companies cannot be forced to replace PCB-filled equipment before the natural lifespan of the machinery. In other words, PCB equipment does not have to be replaced until it fails. Ironically, such failures often start with PCB leaking, dripping and/or exploding into the environment.

In addition, since less than 1 percent of PCB equipment fails in the first 40 years of use, many companies and industries may still be using the chemical in the year 2019 — which is 40 years from the date PCB was outlawed by Congress.

"It's a very stable, immobile, persistent chemical. It's very tenacious and virtually nothing will break it down," said a spokesman for the FDA which set "tolerance levels" for PCBs in 1973, four years before the Environmental Protection Agency acted on the problem.

Because PCBs were used in printing ink and food processing equipment, the FDA also set tolerance levels for paper food packaging materials and banned the use of PCB in industries that handled food, feed and food processing.

However, the primary usage of PCB — as cooling oil in electrical transformers and capacitors — was not banned outright "mainly because there were no suitable replacement chemicals," said Dr. Paul Williams of the state Health Department's Hazardouus Materials Management Division in Berkeley.

Monsanto "wanted to stop production of PCB in 1975 but the EPA asked us not to because there was nothing to use in its place," Craddock told The Sun.

"The EPA thought that taking PCB off the market without a suitable replacement chemical would have a catastrophic effect on the nation's utility industry and would cause wide-spread power outages," Craddock said.

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What progress has been made toward finding a replacement for PCB?

According to nearly all government and industry officials contacted by The Sun, it has been less than satisfactory.

Since 1977 the nation's utilities have been working to come up with an adequate substitute for PCB.

In those years, chemists have come up with two such replacements: silicones, which are made by several manufacturers, but not Monsanto, and a chemical called *dioctyl phthalate*, or DOP, which is being used as a PCB substitute in electrical capacitors.

Some replacement is going on now, even though the EPA ruled that equipment does not have to contain non-PCB fluids until it malfunctions.

"Although the law says they can use them (PCB-filled equipment) for the normal life span of the equipment, public pressure is forcing the utilities to take them out sooner," said Craddock.

One utility that has really felt the pressure is Pacific Gas and Electric Co. in Northern California, where "an immediate replacement program is costing us between $30 million and $50 million," said one company spokesman.

But will those customers be appeased if, as Monsanto's Craddock predicts, "their electric bills double? I don't think so. I think consumers will take a second look at PCB when that happens and it's bound to happen."

Even though PCB is on its way out, the toxin trauma that the nation's electrical industry has gone through is far from over.

In fact, many utility officials fear that it may only have begun.

Their fears are based on test results recently released by the National Cancer Institute. The results show that one of the non-PCB replacement compounds, DOP, has been found to cause cancer in female rats.

Next: The effects of PCB and the problems of destroying it.

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