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Destroying PCB:

A costly assault on the improbable

Second of two articles
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In its chemical state, PCB — polychlorinated biphenyl — is described by the federal Food and Drug Administration as "snow white, purely crystalline, deadly toxic."

In its manufactured state, when PCB is mixed with mineral oil for industrial use, it appears as a white, oily substance with an odd, pungent odor that's hard to describe.

But in either state, PCB is nearly indestructible.

And despite a 1979 production ban, PCBs remain in wide use. They can be found in microwave ovens, fluorescent lights, transformers, capacitors, television sets, refrigerators — in other words, in almost every electrical appliance.

For 52 years, PCB has provided nearly "foolproof" fire protection from electrical blazes and explosions, say officials at Monsanto Co. which invented the chemical in 1929.

When the compound was first marketed it was touted as "the wonder chemical of the decade" because it was virtually fireproof and, as a coolant oil, could transmit electricity and heat without igniting.

It was also stable, reliable and had a long chemical life expectancy.

Perhaps too long.

Despite years of study, scientists could not figure out how to destroy PCB. It was virtually immune to chemical and environmental breakdown.

Faced with a growing PCB storage problem, the U.S. Environmental Protection Agency finally gave its approval two months ago to the only known method for destroying PCB — incineration at 2,200 degrees Fahrenheit inside sealed, concrete kilns.

But some EPA officials — like John Dickinson, chief of the hazardous waste section in Atlanta, Ga. — believe that PCB incineration has not been studied enough to have been given "the green light."

Today, there are millions of pounds of PCB being stored in 55-gallon drums in secluded landfills across the country. But there are only two incineration sites — one in Texas and the other in Arkansas.

At both facilities, there is a year's waiting list that is growing by the day as hundreds of utility firms, foundries, steel mills and scores of banks, high-rise apartments and universities try to rid themselves of PCB.

Without a doubt, the toxin trauma has been a costly and time-consuming experience for U.S. industry. And the expense incurred from PCB disposal "is bound to be passed on to the consumer," said John H. Craddock of Monsanto Co. in St. Louis, Mo., which was the sole producer of PCB in the U.S.

"No one in this company is going to deny that PCB is toxic," Craddock told The Sun. "What we're saying is that it's not *deadly toxic*. That's ridiculous.

"It requires a certain amount of care in handling it. Just like gasoline does, which is also toxic. Most Americans don't come into direct contact with PCB, anyway. And most Americans probably have more toxic substances right at home, under their kitchen sinks."

The viewpoint of Monsanto is probably best summed up in a 25-page report it released on the

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uses, health and environmental effects and disposal of PCB.

"PCBs," the preface states, "are a classic case history of a true risk/benefit dilemma."

PCBs do pose a dilemma because no other chemical offers as many safeguards and benefits when it comes to electrical fire prevention. In fact, nothing usable as a cooling oil has been found to be as fire resistant as PCB.

As Craddock maintains, PCB "has saved thousands of lives by preventing fires in high-rise buildings, hospitals, schools, underground utility tunnels, underground transportation facilities like subways, trains, river tunnels and parking garages.

"How do we quantitatively measure risk — the risk of human health hazard and the risk of environmental damage — and compare them with benefits? This risk/benefit problem is not unique to PCBs," Craddock says.

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Unfortunately, the risk/benefit problem goes further than PCB. In a rather macabre way, it now extends to *dioctyl phthalate* or DOP, which is one of two synthetic chemicals being used to replace PCB as required by law.

Recent animal tests on DOP have concluded that — guess what? — DOP causes cancer in female rats.

"Where does it end? I don't really know," said James W. Gunter, who is in charge of PCB regulation for the U.S. Environmental Protection Agency (EPA) in Washington, D.C.

Peter Ackley of the EPA's chemical control division, however, admits that his agency has issued some arbitrary "toxic levels" when it comes to PCBs. For instance, anything with more than 50 parts-per-million (ppm) of the chemical represents a health hazard and must be placed in steel barrels and housed in a designated PCB landfill. Any substance with more than 500 ppm of PCB must be incinerated.

But many PCB-filled appliances, like fluorescent light ballasts, contain less than 50 ppm of PCB. Yet, because PCB "bioaccumulates" in the environment — which means it continually builds up and does not break down — thousands of fluorescent light fixtures thrown into thousands of city dumps pose a very real health risk.

"We decided to make 50 ppms our cutoff in terms of what we believe is an immediate health threat," Ackley said.

Although Ackley agreed that 10,000 fluorescent light fixtures containing PCBs in a 5 ppm concentration each yields 50,000 ppm of the chemical — which is way over the EPA's health hazard level — "we were forced to draw the line somewhere," he said.

Doesn't that mean that despite government regulations, PCBs will continue to bioaccumulate, if only at a slower rate?

"I don't think you can say that," Ackley said. "The substance does bioaccumulate and to that we can only say that the greater levels of PCB are of more concern to us at this point. We do not feel it's necessary to issue special requirements for anything containing under 50 ppm (of PCB) at this time."

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Polychlorinated biphenyls got their bad name from what is now referred to as "the famous Yusho incident," which occurred in Japan in 1968.

An industrial accident in the city of Yusho caused some PCB oil that had been used in a heat transfer unit to escape. The unit was being used to heat rice oil which the plant packaged.

"The PCBs went into the environment unnoticed and vast amounts of rice oil were contaminated," said Monsanto's Dan Bishop, director of environmental and science communications. "These amounts were very vast; they were in the 2,000 to 3,000 parts-per-million range."

Some 1,200 Japanese who ate the contaminated rice oil "developed a number of unpleasant and unhealthy reactions," according to a March 1980 regional report by the U.S. Food and Drug Administration. Most of the Japanese became nauseous, developed a painful acne called chloracne and complained of skin rashes and respiratory problems.

Today, however, scientists are questioning whether PCB was the real — and only — culprit in the Yusho incident.

There is evidence now that a second toxic chemical, called *di-benzo-furan*, was present with the PCB and had been produced as an "undesired side-product in the Japanese manufacturing process," said Ralph Komai, a scientist with the national Electric Power Research Institute in Palo Alto.

"In the manufacture of PCB, the Japanese produced high levels of di-benzo-furan and it could be that we're chasing the wrong animal in going after PCB," Komai said.

Unlike the Japanese process, Monsanto's production of PCB never yielded bi-benoz-furan.

The toxicity level of di-benzo-furan is estimated to be 500 times that of PCB, an EPA test found. And, some EPA officials like Dr. Frank Whitmore, believe that the bi-benzo-furan was the real toxin in the Yusho incident.

But in 1968, the rice oil in Japan was not that closely examined and PCB was singled out "as the villain," Komai said.

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In 1972, due in part to the Yusho incident, an animal test was begun at the U.S. Center for Disease Control in Atlanta, Ga. by Dr. Renata Kimbrough on the effects of PCBs.

Her test results, released in 1975, found that PCBs were "suspected of causing cancer" in the livers of female rats.

Several independent tests later, Kimbrough's results remain unverified and unreplicated. No one — including researchers at the National Cancer Institute — could come up with the same results.

In the follow-up tests by the National Cancer Institute, the EPA and Monsanto Co., some of the rats exposed to PCB did suffer liver damage but none of them, female or male, contracted cancer of any kind, results show.

In fact, studies now show that the toxicity level of PCBs — that is, the amount at which they are lethal to humans — is the same as another "slightly toxic" chemical, common table salt. Tests show that three cupsful of either chemical would kill most 160-pound adults if taken orally.

The concern about PCB stems from on-going animal studies which show that when rats are fed large doses of the chemical over a two-year period they develop a variety of health problems, including liver damage, miscarriage, birth defects, digestive ailments, throat and respiratory irritations.

Taken to a human level, some scientists fear that cumulative PCB exposure could cause those problems and more, including impotence, severe headaches, a darkening of the skin, jaundice, and chloracne.

Seven epidemiology studies — conducted over a 30 to 40 year period to trace the outbreak of disease among a specific population of people — have failed to detect any long-term health effects from PCB exposure. Even when populations with large numbers of utility workers were studied, the results remained unchanged, leaving scientists to question what real side-effects PCB poses.

"There have never been any documented incidents of anyone developing chronic ailments because of PCB," said Monsanto's Craddock. "It is true that some workers who spent years literally up to their elbows in the stuff reported having some liver problems. But those problems were reversible and when the PCB exposure was removed, so was the problem. There has never been a reported case of cancer from PCB, either."

CAUTION
CONTAINS
PCBs
(Polychlorinated Biphenyls)

A toxic environmental contaminant requiring special handling and disposal in accordance with U.S. Environmental Protection Agency Regulations 40 CFR 761 For Disposal Information contact the nearest U.S. E.P.A. Office

In case of accident or spill, call toll free the U.S. Coast Guard National Response Center 800-424-8802

Also Contact _____

Tel. No. _____

This is the marking format the Environmental Protection Agency requires on all PCB containers.

Those arguments are academic now, as far as industry officials are concerned.

For them the bottom line is that PCB must be replaced and kept in highly secure storage areas until it can be destroyed.

And that *bottom line is expensive.*

The cost of properly packaging PCB contaminants into 55-gallon barrels and transporting the drums to a designated landfill is high. In fact, PCB disposal has become so costly and complicated that some EPA officials fear massive amounts of illegal, "midnight dumping" are resulting.

One such illegal dump was recently found near San Bernardino County in the remote desert town of Llano where 27 barrels of PCB were illegally abandoned. No one knows where the PCB came from or how long the barrels had been there. By the time the illegal dump was found, the chemical had seeped more than 20 feet into the ground.

"Getting rid of the PCB has become the most major problem of all because no one really wants to pay to get rid of it," Dr. Paul Williams of the state's Hazardous Materials Management Division in Berkeley said.

"Any company using PCB has to find a landfill authorized by the EPA to take it. There's only on such landfill in California and that's the Casmalia disposal site in Santa Barbara County," Williams said.

The Casmalia site charges $150 for every ton of PCB it accepts. Tacked onto that cost is the reserved storage space fee which ranges from $2,500 to $1,000 a year, depending on the amount of square feet required to house the barrels of PCB.

"The PCB problem — if it's a problem which I don't think it is — will be around a long, long time," Monsanto's Craddock said. "And it's going to end up costing the consumers billions and billions of dollars to replace perfectly good equipment just because PCB has come to be seen as some sort of public menace. It's ridiculous."