Monsanto

Monsanto Company
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St. Louis, Missouri 63167
Phone: (314) 694-1000

June 7, 1985

Mr. Paul Blinkstad
400 Kourt Dr. No. C
Eugene, Oregon 97404

Dear Mr. Blinkstad:

Enclosed is the information you recently requested regarding polychlorinated biphenyls (PCBs). I hope it will provide the answers you are seeking.

Very truly yours,

John H. Craddock, Ph.D.
Environmental Policy Staff
Product and Environmental Safety Director

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Enclosures
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(314)694-8558

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MONSANTO POSITION STATEMENT FOR DISPOSAL
OF PCBs BY INCINERATION

Monsanto Company is a broad-based chemical manufacturing company. From 1935 until 1977, Monsanto Company was the major manufacturer of polychlorinated biphenyl (PCB) compounds in the U.S. and consequently has broad experience and expertise in handling and disposing of these chemicals.

The environmental and health effects and disposal of PCBs has been the subject of hundreds of technical and media articles. Recognized, technically trained, competent scientists and medical experts have published thousands of pages of documents discussing the health and environmental effects of these compounds and there is still disagreement among them as to the actual effects of PCBs on man and the environment. The scare labels of the media headlines of the early to mid-1970's of "deadly toxins" and "human carcinogens" are being rebutted and disproved by more thorough, detailed human epidemiology and animal studies.

In the report of the National Academy of Sciences Committee on the Assessment of Polychlorinated Biphenyls in the Environment (fall, 1979) the committee stated the following:

> "An analysis of PCB data compiled following criteria of FIFRA and TSCA proposed guidelines, leads to the conclusion that PCBs are persistent and are likely to accumulate. PCBs do not appear particularly toxic for short-term exposure, but results are subject to interpretation."

This paper, however, is directed not toward toxicity but rather the proper disposal of PCBs. Safe and acceptable technology for destruction of PCBs by high-temperature incineration has been known and practiced by the scientific and industrial world since PCBs were first discovered to be environmentally persistent in the early 1970's.

Many European hazardous waste disposal facilities include high-temperature incineration equipment to routinely handle both solid and liquid forms of chemical wastes, such as PCBs and other chlorinated wastes. These include sludges, contaminated earth and other debris. At least a dozen such facilities are currently in operation and have been functioning satisfactorily for several years. Many of these facilities are jointly owned and operated by both the government and private sector. All of these facilities are capable of destroying PCBs in an environmentally acceptable manner with no human health hazard.

In both the U.S. and Canada successful test burns of various high-temperature incinerators have been performed that have been carefully monitored by appropriate State and Federal regulatory agencies. This includes the Rollins Environmental Services facility at Deer Park, Texas, and ENSCO at

El Dorado, Arkansas. Both of these facilities meet the rigid specifications, including destruction efficiencies prescribed by Federal regulations under the Toxic Substances Control Act (40 CFR 761), and have been approved by the EPA for incineration of PCBs.

Based upon the results of these tests, EPA scientists and officials and other interested parties have concluded that the two U.S. incinerators are capable of destroying PCBs without harming human health or the environment.

The major obstacle to safe and ultimate disposal of PCBs is not safe technology, but public awareness and education so that suitable disposal sites can be located in industrial areas without unfounded public fear and opposition. Many citizens activists groups share this concern. Attached is information published by one of these informed groups, the Great Lakes Basin Commission, which speaks to the PCB problem generally and, specifically, to incineration and public fear of PCBs and their disposal options.

I urge you to carefully consider all of the facts in an unemotional arena in discussing PCB waste disposal options. Certainly, regulated, controlled disposal facilities using proven technology, such as high-temperature incineration, is preferable to long-term storage at many private industrial locations. The potential dangers of environmental contamination due to long-term storage and handling (e.g., repackaging leaking or damaged containers, decontamination of storage facilities and equipment, etc.) are significantly greater than once-and-for-all ultimate destruction of PCBs by safe and acceptable incineration.

81-019

Enclosure

great lakes
Communicator

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PCBs: You Can Store Them Up, But Can You Throw Them Out?

Hundreds of thousands of gallons of PCB-contaminated wastes are being stored in barrels throughout the Great Lakes region. There is no legal way to destroy or discard many of them.

Once used as insulating materials by industry and in consumer goods, these PCBs now sit in temporary facilities, built to government standards, for which industry has spent millions of dollars.

William Gunter, head of the U.S. Environmental Protection Agency's PCB regulations staff in Washington, says some 20 million pounds of PCB wastes are being stored nationwide, mostly by utilities. A report for the Electric Power Research Institute says that EPA's Region V, which includes six of the eight Great Lakes states, will have the greatest demand for utility PCB disposal capacity of all 10 EPA regions.

The technology exists to destroy the PCBs through incineration (see insert), but public opposition and other factors have so far prevented any incinerators from being approved for commercial use in the U.S. Incineration is the only method approved by EPA for destroying high-level PCBs (those with more than 500 parts per million, a cut-off point established by EPA).

Lower-level PCBs can be discarded in approved chemical waste landfills, but only eight such landfills exist nationwide, and the cost of shipping PCBs to them is high.

Meanwhile, PCBs continue to enter the environment, even though U.S. production of them stopped three years ago. In fact, small quantities of PCBs have contaminated most of the Great Lakes. They have accumulated in large amounts in Waukegan Harbor, Ill.; the Saginaw River in Michigan; Sheboygan Harbor, Wis.; and other places around the Great Lakes.

PCBs also fall into the Great Lakes from the air. The burning of sewage sludge releases them, since the burning temperatures are too low to destroy them. PCBs also evaporate from paints, landfills, and other sources. One study estimated that 11,000 pounds of PCBs enter Lake Michigan each year with rain and snow.

Fisherman have also been affected by PCBs. State agencies have warned consumers to restrict consumption of some kinds of fish (see insert, *A Fish Eater's Guide to PCBs*). Some commercial fisherman have changed to catching less-contaminated fish. EPA is sponsoring a Michigan study of PCB levels in consumers of large quantities of Great Lakes fish. As scientists at the Great Lakes Basin Commission and elsewhere predicted, however, controls on usage have caused PCB levels in the lakes and fish to fall. There is hope for an easing of fish advisories in the future.

Companies storing PCBs are hoping a solution will be found to ease them of the burden. Incinerators in Texas and Arkansas (see map) are expected to receive approval from EPA in the next few months, but they are a long

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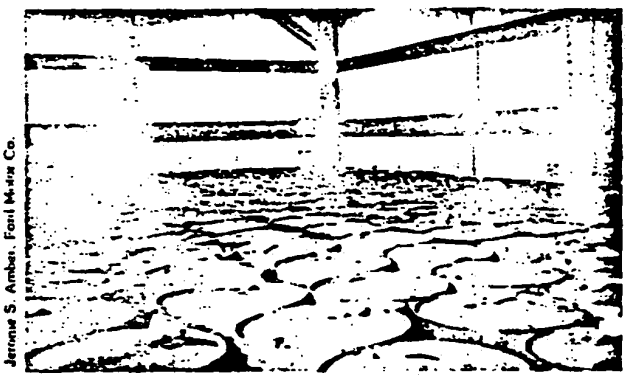
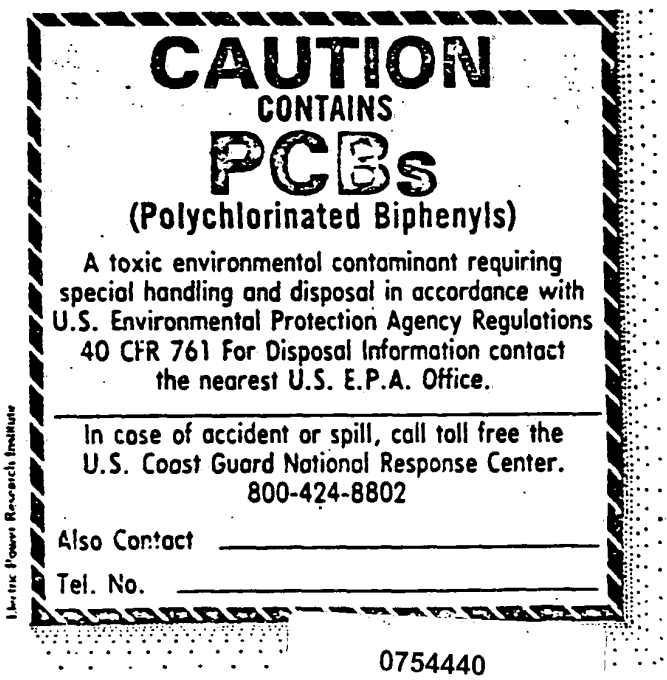
Top: Drums in a PCB storage facility built by Ford Motor Company at its Rouge plant in Dearborn, Mich. The facility was built to federal standards, and Ford hopes to dispose of the PCBs. Below: warning label for marking PCBs.



Jerome S. Amber, Ford Motor Co.



Electric Power Research Institute

Basin Briefs

Pollution Worksheets

Finding the most cost-effective pollution control program for a drainage basin is the goal of a new technique developed by the staff of the Great Lakes Basin Commission. Using a series of worksheets, decision makers can compile data on pollution sources and calculate costs and benefits of particular programs for reducing pollution. The application of this "Watershed" method will be explained in a handbook scheduled for release next summer. Copies of two preliminary reports on the technique are available from the Great Lakes Basin Commission, P.O. Box 999, Ann Arbor, MI 48106.

Corps General Retires

Major General **Richard L. Harris** retired Nov. 30 as commander of the U.S. Army Corps of Engineers' North Central Division. He is succeeded by Brigadier General **Scott B. Smith,** who will become the Corps' new commissioner on the Great Lakes Basin Commission. During his command, Harris oversaw the Corps' study of an extended shipping season on the Great Lakes and St. Lawrence Seaway.

Midwest Water Study

A study by the Northeast-Midwest Institute has declared that water quality problems and decaying municipal water supply systems may make water the area's most serious problem before long. Send $3 to the institute and request *Water Resource Priorities for the Midwest.* Address: P.O. Box 37209, Washington, D.C. 20513.

'Superfund' Support

The Great Lakes Basin Commission has endorsed swift Congressional action to pass "Superfund" legislation. The two related laws would authorize $1.2 billion to clean up abandoned hazardous waste spills in navigable waterways. Many Great Lakes congressman and senators responded to the resolution with indications of support. Both bills passed the House in late September. At this writing, the bills are pending in the Senate for possible action during the post-election "lame duck" session.

PCBs in the U.S.: The Background

PCBs are a group of chemicals, generally clear and odorless ranging in consistency from that of thin oil to that of wax.

Until the early 1970s, PCBs were used in adhesives, plastics, paints, varnishes, sealants, and even carbonless copy paper.

Although manufactured in the U.S. from 1929 to 1977, they were not seen as a problem until a decade ago. A study of museum specimens of Lake Michigan fish detected no PCBs until 1949, and a progressive increase from 1949 to 1966.

PCBs are still in use as coolants in many capacitors and transformers, espcially in the utility industry. High voltage capacitors are common on ordinary utility poles, where they store voltage momentarily and correct imbalances that occur over long distances. Capacitors are also used in air conditioners, microwave ovens, and fluorescent light ballasts made before 1977. There is no easy way to distinguish a PCB capacitor from a non-PCB one.

Transformers change electrical voltage to a level required by the equipment drawing current. They are common in industrial buildings and generating stations, and they last 30 to 40 years.

Industry has developed substitutes for PCBs in both transformers and capacitors. Fluorocarbons, silicone fluids, and mineral oils are now used in transformers.

PCBs are toxic to humans. They are suspected carcinogens. They have caused tumors in rats and mice, reproductive dysfunctions and other problems in monkeys, and increased liver weight and other problems in rats and guinea pigs. In humans, excessive PCBs may cause skin eruptions, nausea, abdominal pain, jaundice, and fatigue, among other things.

The U.S. Environmental Protection Agency considers the release of even slight amounts of PCBs significant. "The available data indicate that PCBs may cause several adverse effects in humans, mammals, birds, and aquatic organisms at extremely low concentrations," a recent EPA report said.

Avoiding contaminated foods, however, does not eliminate exposure to PCBs. Airborne PCBs may be absorbed through the lungs. PCBs circulate in the blood and accumulate in the fat, liver, kidneys, brain, heart, and other organs. Breast-fed infants may receive 50 or more times the PCBs in food their mothers eat. □

Next Month: Transportation

great lakes
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The Law and ...s

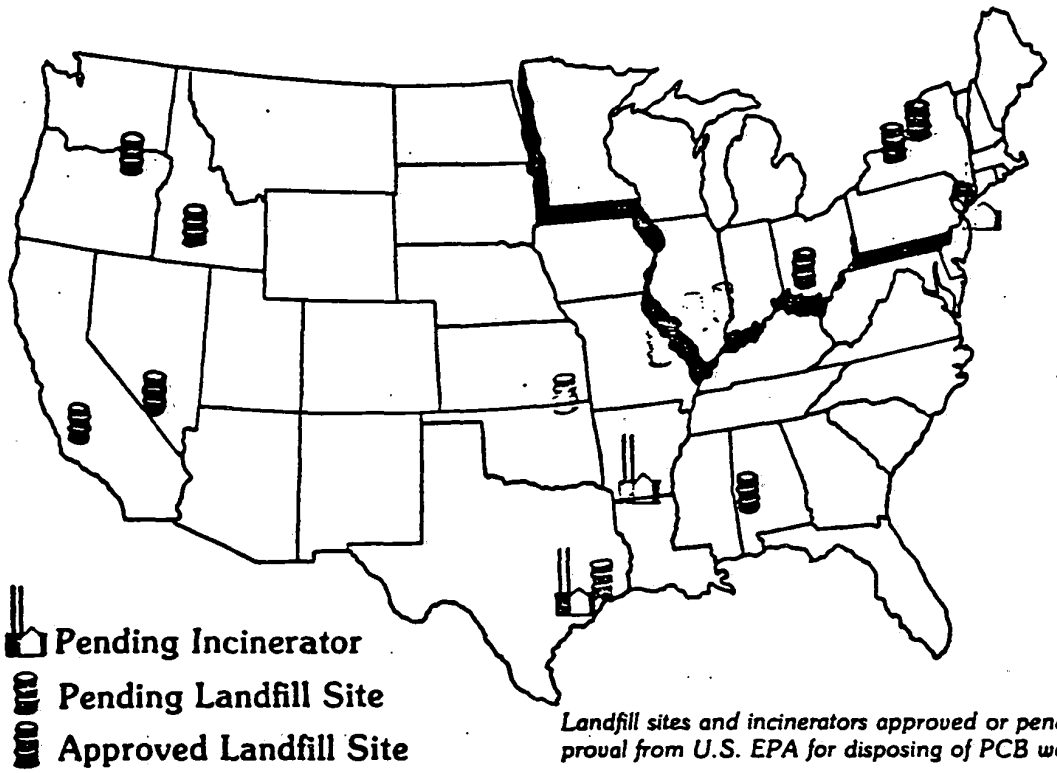
Most of the major federal regulations concerning PCBs were authorized under the Toxic Substances Control Act. But as of last month, the U.S. Environmental Protection Agency has incorporated PCB control into its regulations under the Resource Conservation and Recovery Act.

Both laws were enacted in 1976. PCB regulations under the toxic substances act did not take hold until 1979. Hazardous waste regulations under the resource conservation act were not, in large part, put into effect until 1980. Meanwhile, states such as Wisconsin, Minnesota, and Michigan began regulating PCBs by themselves.

The toxic substances act banned manufacturing of PCBs ... 1, 1979. It requires action on distribution in commerce by July 1, 1979.

Certain uses may be continued, however. PCBs in closed systems like transformers and capacitors (in which PCBs are not directly exposed to the environment) are still allowed to be used, but will gradually be taken out of service as they wear out. PCBs not in totally enclosed uses may continue until July 1, 1984, if the user receives an exemption from the EPA.

PCBs now being stored must be disposed of by 1984 in facilities that meet EPA requirements. PCBs stored after 1983 must be discarded within one year after storage begins. Until disposal facilities are available, industries must store PCBs in secure facilities whose locations, roofs, walls, floors, and openings meet EPA requirements. They must also keep careful records of the PCBs. □



Map by Connie Gill. Source: Electric Power Research Institute and EPA

Landfill sites and incinerators approved or pending approval from U.S. EPA for disposing of PCB wastes.

You Can Store PCBs, But...

From page 1

distance from the Great Lakes region's industries and are too few to handle the nation's PCBs. The Great Lakes Basin Commission has initiated a series of roundtable discussions to stimulate discussion on a regional disposal solution *(see From the Chairman, p. 7)*. One hope lies in emerging technologies that do not require large, permanent incineration facilities. But such technologies, including one highly-publicized process developed by Goodyear Tire and Rubber Company, may not be suitable for all PCB-contaminated materials (see special insert inside).

Although some chemical landfills accept low-level PCBs (those with fewer than 500 ppm), landfills are only a partial solution. And temporary storage risks accidents, fires, or spills, although federal storage rules are stringent. The Great Lakes Water Quality Board of the International Joint Commission says temporary storage of toxic substances "may be a serious threat to the health and safety of a community."

"We ought to get rid of the PCBs through destruction instead of sitting on them," says Malcolm Day, environmental advisor to Consumers Power Co. in Jackson, Mich. He and other industrial spokespersons say it will take a large effort to convince people that destruction methods are adequate to protect the environment.

David Staats □

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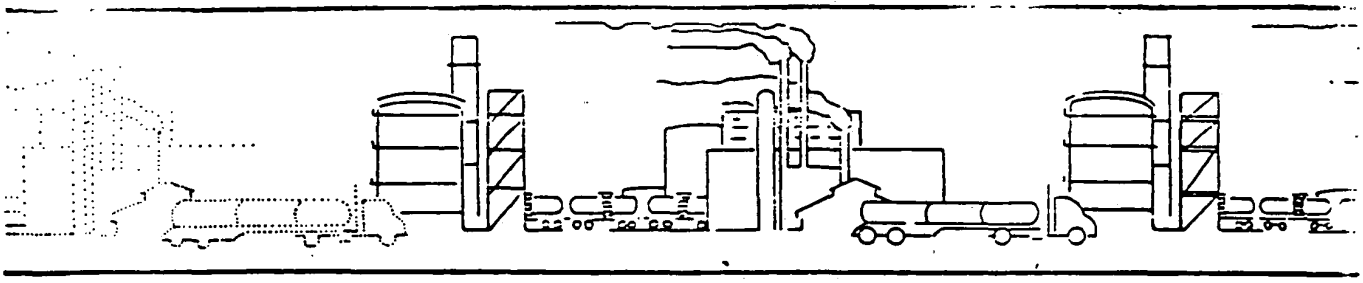

Contrary to common belief, and despite warehouses of undisposed PCBs, the technology exists to destroy PCBs safely and effectively. Several new processes have made headlines in recent months. One process, incineration, has already been approved by the U.S. Environmental Protection Agency (EPA) and successfully used to destroy PCBs.

This fact sheet is a brief overview of incineration, landfilling, and some of the emerging technologies for the destruction of PCBs.

Incineration

What It Does

Incineration of PCBs is currently the only EPA-approved method for destroying high level PCBs (500 ppm or more). However, at this writing there are no EPA approved commercial incinerators. Basically, incineration is the controlled burning of PCBs at high temperatures, at least 2200°F, for a specified length of time. Incineration works by heating the PCB compound until its chemical structure breaks apart. The resulting products are different chemical compounds, usually in the form of non-toxic gases. In test and actual burns, PCBs have been destroyed 99.99% by incineration.

Several different types of incinerators can be used to destroy PCBs. The most promising type is actually a rotary kiln used for making cement. The advantages of cement kilns include the fact that they already exist, saving construction time and costs. In addition, cement kilns operate above the high temperatures needed to destroy PCBs. The chloride salts produced by incinerating the PCBs can be used in the cement making process, and the lime used in cement making neutralizes any acidic gases that remain.

The Process

Under EPA regulations*, PCBs must be burned at 2200°F or hotter for at least 2 seconds. After the PCBs are burned, the remaining products are gases and water. These are then cleaned to remove any heavy metals and other solid particles. The cleaned gases are vented through an exhaust stack and the treated water is discharged into the municipal wastewater treatment plant or recycled. If ash or sludge remains, it is disposed of in an approved landfill.

Limitations

Incineration of PCBs is not widespread because of the high cost of constructing new facilities and public opposition to this type of facility. The principal disadvantages of incineration of PCBs are: 1) risks associated with transporting PCBs to the incinerator, and 2) the need to monitor carefully and frequently the byproducts to insure that no toxic elements are created.

Landfills

Under U.S. EPA regulations, low level PCBs, those under 500 ppm, can be disposed of in approved landfills. However, only eight approved landfills exist in the U.S. - not nearly enough for the quantity of low level PCBs needing disposal.

*For specific regulations for incineration and land disposal of PCBs see the Federal Register, May 31, 1979, pp 31551.

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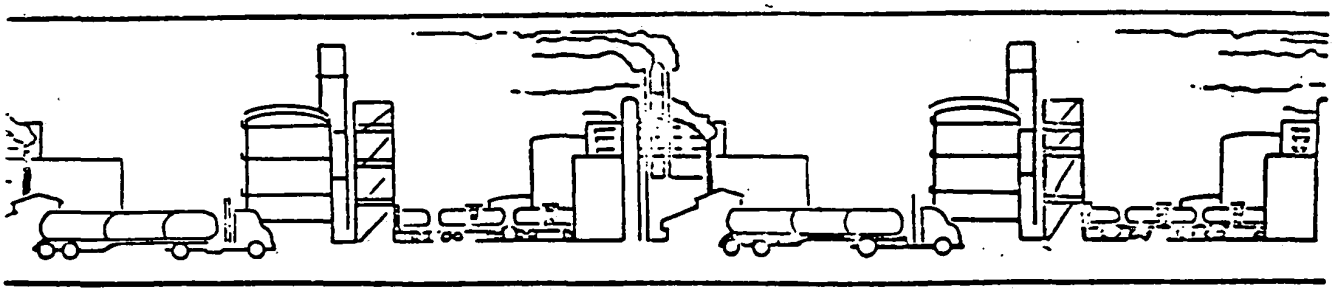


Land disposal of PCBs means permanent burial in pits. The pits are lined with an impermeable clay or plastic liner to prevent the leaking of PCBs into ground or surface waters. Several layers of soil including impermeable clay are placed on top of the hole to cover and fill it and reduce any chance of PCBs escaping into the air, or infiltration into the ground by precipitation.

Emerging Technologies*

Several companies around the U.S. are developing methods other than landfilling and incineration to destroy PCBs. Many are still under development, while others have reached U.S. EPA for review. All but the last method described below are variations on the incineration theme, using different chemical substances and temperatures to rearrange and render harmless the chemical structure of PCBs. In laboratory tests they have all achieved 99% or more destruction of PCBs. Here is a brief run-down:

Atlantic Research Corp.: has developed a process that uses ultraviolet light to destroy high and low level PCBs from contaminated transformer oils and pure PCBs. The process can be housed in a mobile unit and the end product is biodegradable biphenyls which can be safely burned.

D & D Disposal: its process burns PCBs in a diesel engine and has been effectively tested with both high and low level PCBs. The by-products are hydrochloric acid, which is a recoverable solvent, carbon, and trace elements. It is also a mobile unit.

Goodyear Tire & Rubber: this well-publicized process burns PCBs with a sodium solution to cause a chemical reaction which detoxifies low-level PCBs. The end products are sodium chloride and non-hazardous polyphenyls. This process allows contaminated heat-transfer fluids to be recovered and reused.

Lockheed: its process uses a microwave furnace to burn high level, almost pure PCBs. The microwave plasma is very destructive and capable of breaking chemical bonds that are not normally easily broken. The unit can be very compact compared to a regular incinerator and thus mobile. The by-products of this process are carbon dioxide, steam, and recoverable hydrochloric acid. In addition, this process creates its own energy supply.

Rockwell International: has developed another process which uses hot salts (molten sodium carbonate) as a catalyst and heat to incinerate high level PCBs. The end products are hydrogen chloride, carbon dioxide, and water.

Sunohio: has not released the details of its low-temperature chemical process which changes high and low level PCBs into harmless substances. The company says the process allows contaminated transformer oils to be recovered and reused.

* For more information about these processes please contact the Public Information Office, Great Lakes Basin Commission, P O. Box 999, Ann Arbor, MI 48106.

Why Public Fear Threatens Public Health

By Lee Botts

The people of the Great Lakes region need to decide what to do about the barrels of liquids containing PCBs (polychlorinated biphenyls) that are being stacked up at power plants and factories around the region.

The choice is between leaving them in storage (and trusting that they will never escape into the environment) or destroying the chemicals so they are no longer dangerous. This issue of the *Communicator* is devoted to information about the PCB dilemma—why they are being stored and ways they could be destroyed.

No region of the country has more at stake than ours in deciding how to handle PCBs safely. It was in the Great Lakes that scientists discovered that PCBs, like their cousin DDT, can enter the food chain and contaminate entire ecosystems.

This is where commerical fisherman whose families have fished the Great Lakes for four generations have had their livelihood destroyed because of the presence of PCBs in quantities almost too small to be imagined. This is where the excitement of some of the best sports fishing in the world is marred by the risk of eating more than small amounts of the lakes' huge salmon and trout.

With regulation of PCBs to keep them from further contaminating the environment, our industries are faced with huge costs for safe storage because there is no agreed-upon other way of handling them. My question is: can we afford *not* to destroy PCBs when we can?

The problem is that people are afraid of hazardous chemical wastes. Their fear is based on almost daily disclosure of public health and environmental problems caused by past unsafe handling. Their fear is making the problem worse by preventing communities and neighborhoods from allowing disposal, even if the disposal methods actually destroy the PCBs.

PCBs Are Everybody's Problem

Worse because, in the case of PCBs and other wastes, lack of accessible disposal facilities means that industries must either put the wastes in storage or get rid of them secretly and illegally. Communities need to decide whether it is riskier to allow regulated and monitored destruction or to trust that accidents and/or illegal dumping will never happen.

The assumption that there is no safe disposal technology leads to attitudes that PCBs ought to be someone else's problem. But PCBs are some of the most widely used chemicals, as well as some of the most persistent. They are everyone's problem, because everyone has benefited from their use in electrical transformers, capacitors, fluorescent lighting fixtures, television sets, and other things that we depend on in an industrial society.

Just as all communities must provide for disposal of household garbage, they also have a responsibility for safe disposal of hazardous chemicals used in the community.

PCBs were used for 40 years before we knew how dangerous they were. Now that we know the problem, laws have been passed to make their manufacture and use illegal in the U.S. Industry is removing them from use and putting them in storage. But, industry has no way at present of getting rid of high-level PCBs.

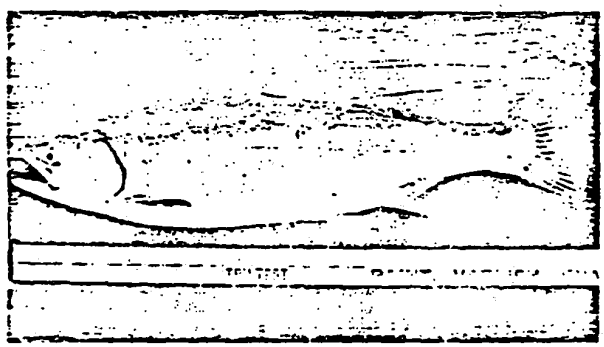
There are good signs that the PCBs already in the Great Lakes are declining. This means that if no additional PCBs get into the system, the lakes may, ultimately cleanse themselves of PCB contamination. We must destroy the PCBs removed from use under the new laws to make sure that no more get into the Great Lakes, or the rivers, or the groundwater, or the air.

In recent months the Great Lakes Basin Commission has joined forces with other agencies and institutions to draw attention to the need for deciding what to do about PCBs. In Michigan and Indiana, we have already discovered that industry and environmentalists have a common interest in providing for safe handling and disposal of PCBs. We have learned that there is great agreement on incineration as the best immediate means of disposal, but we have also learned that communities are afraid to allow it.

In coming months we will continue discussing this problem elsewhere in the region. I urge citizens in the Great Lakes to find out what is happening to PCBs in their communities, and consider under what conditions disposal should be allowed.

Obviously, officials and citizens confronted with the PCB dilemma need more information. The information we have about PCBs and their disposal is available to anyone. Let us know if you want more information and whether you would like our help in promoting consideration of the problem in your community.

Let us know also, if you have ideas about how citizens ought to be involved in deciding whether to allow PCB disposal in their community. The PCB problem will not go away. It is time to search for solutions, for the sake of the Great Lakes and the people who depend on them. □



In some places, salmon than 20 inches have high PCBs levels and may be unsafe to eat.