Monsanto Backgrounder

PCB BACKGROUNDER

September 19

Production and Use History

Polychlorinated biphenyls (PCBs) were first sold in 1929 by the Swann Chemical Company. Monsanto Company became a manufacturer of PCBs in 1935 when it acquired Swann Chemical Company and its product lines.

PCBs are compounds consisting of carbon, hydrogen and chlorine atoms. They have a mild odor and their physical form ranges from a free-flowing, oily liquid to a waxy solid. They are chemically inert, which means they do not readily react with other substances, and they are fire resistant. These properties made them invaluable for their principal use -- as cooling and insulating fluids in heavy-duty electrical equipment, including capacitors and transformers.

For more than 40 years, the use of PCB electrical fluids was required by building safety codes in most high-rise buildings, schools, hospitals and industrial operations where the risks of fires or explosions were major concerns.

In 1970, following confirmation that PCBs were present in the environment, Monsanto voluntarily began to phase out sales of PCB products for "open applications" that could lead to uncontrolled environmental release. These uses, which represented about 65 percent of the company's PCB sales, included heat-transfer fluids, hydraulic fluids, plasticizers and other miscellaneous applications.

By 1972, Monsanto was limiting PCB sales to selected customers solely for use in totally enclosed electrical equipment. This action was endorsed by a federal task force which recommended that Monsanto continue production for these uses until effective substitute products could be developed. This view was reinforced in 1975 by the administrator of the U.S. EPA, who cautioned that massive power disruptions would occur if Monsanto were to cease production before suitable replacement fluids became available.

In October of 1976, following indications from the electrical industry that replacement products would soon be in hand, Monsanto announced that it would voluntarily cease production and sales of PCBs by October 31, 1977. In fact, Monsanto was completely out of the PCB business prior to October 1, 1977.

Largely as a result of their widespread presence in the environment, their effects on laboratory animals and their initial association with human health effects resulting from an incident

in Japan, the federal government in 1979 banned the intentional manufacture and use of PCBs except for specifically authorized activities. These regulations can be found in the Code of Federal Regulations, 40 CFR 761. For some applications, most notably in certain types of capacitors and transformers, the use of PCBs is authorized for the remainder of the useful life of the equipment.

It is important to note the following: 1) Monsanto's decision to withdraw from the PCB business was based on evidence that PCBs persist in the environment. There was not and still is not evidence that PCBs significantly affect human health; 2) In switching over to substitute products, the electrical industry was forced to accept increased risk of fires in electrical equipment; 3) PCBs continued to be manufactured for 8-10 years after Monsanto ceased production by other firms in Germany, France, Spain, Italy and eastern European countries for use in many areas of the world.

Health Effects

PCBs have been widely and mistakenly regarded as among the most toxic compounds known. They frequently have been incorrectly labeled as "deadly toxins" and "cancer-causing agents."

The weight of scientific evidence, however, including many health effects studies done in the last few years, continues to grow and indicates that PCBs are neither extremely toxic nor carcinogenic to humans.

For example, a 1987 review of the human health effects of PCBs by Dr. Renate Kimbrough, then at the Centers for Disease Control, concluded: "When humans were exposed only to PCBs ..., the only observed acute effects have generally been minor. So far, no significant chronic health effects have been causally associated with exposure to PCBs ..."(1).

Because PCBs are widespread in the environment, most humans have measurable amounts of PCBs in their blood and fat. These levels are generally very low, a few parts-per-billion in blood and low parts-per-million in fat, and not a cause for concern. People who have levels 10 to 100 times higher, because of long term exposure to high concentrations, as in an occupational setting, have shown no significant health effects. Chloracne (a skin condition resembling teenage acne) is the only clinical symptom that has been associated with high level PCB exposure. However, it gradually disappears when PCB exposure is reduced.

Yusho Incident

During 1968 in Japan, about 1600 people became ill after eating cooking oil contaminated with up to a 1000 ppm of a Japanese-manufactured PCB heat transfer fluid. This incident became known as Yusho (Japanese for rice oil disease). A similar incident occurred in 1979 in Taiwan. Symptoms included skin discoloration, acne-like conditions, eye discharges, and central nervous system irregularities. Because PCBs were present in the

fluids, they were initially blamed for these maladies. Scientists now generally agree that the symptoms resulting from these unfortunate industrial accidents were not caused by PCBs but by toxic impurities later identified as having been present in the rice oil(2).

Environmental Concentrations

Even though PCBs are frequently characterized as being environmentally persistent or resistant to degradation, it has been known for some time that lower chlorinated PCB products can be readily degraded by naturally occurring microorganisms. General Electric Company scientists have recently reported that the more highly chlorinated PCBs can also be broken down, although at a slower rate. Their work has focused on contaminated sediments in the Hudson River(3).

Numerous studies have shown that concentrations of PCBs in wildlife have been declining since their use was first restricted in the early 1970's. Largemouth and striped bass from the Hudson River, Dover sole and mussels from Southern California, and brown pelicans from California have shown significant decreases in PCB body burden(4-7).

Data from the EPA show that PCB concentrations are declining in the U.S. population. The percentage of Americans with more than 1 ppm PCBs in fat tissue dropped from about 50% in 1972 to about 9% in 1983 (the last year for which data are available)(8).

The consensus of scientific opinion is that PCBs pose no threat to human health at concentrations typically encountered in the environment. Noted European scientist Otto Hutzinger stated his opinion following an EPA symposium in 1982:

> . . . it is evident that after 50 years of industrial production and use of PCBs, no significant clinical disease or clear epidemiological correlations have been observed in occupationally exposed persons. Considering the lower and declining exposure to PCBs via the environment, it seems unlikely that significant injury will be observed from environmental exposure to PCBs(9).

Electrical Fires

PCB containing electrical equipment is occasionally involved in a building or equipment fire. These fires usually originate in non-PCB equipment and are sustained by other combustibles in the vicinity. PCBs alone do not readily support combustion but may be consumed or vaporized by high temperature fires fueled by other materials. If PCBs are incompletely burned, low levels of toxic by-products known as polychlorinated dibenzofurans (PCDFs) may be formed. Fortunately, no human deaths have ever been shown to be caused by PCDFs. This can be compared to the incomplete burning of common items such as wood, plastic and rubber which can produce toxic by-products such as carbon monoxide, hydrogen cyanide, and phosgene. Inhalation of smoke and soot, which can contain these materials, is thought to be a major cause of fire related deaths.

On several occasions news media have reported polychlorinated dibenzodioxins (commonly known as dioxins) are formed from PCBs. Laboratory studies have repeatedly shown that dioxins are not formed from PCBs(10). However, incomplete combustion of other items frequently involved in electrical fires such as chlorinated benzenes and polyvinyl chloride (PVC) insulation can produce dioxins.

Costs of cleaning up a facility following a PCB related fire can vary enormously depending on how quickly the fire is brought under control and how widespread the contamination is. Nevertheless, it is important to remember that safety was a primary reason for specifying fire resistant PCBs in certain electrical equipment. Risk analysis has shown that the risk of fire is significantly decreased when a more common mineral oil filled transformer is replaced by a PCB filled transformer.

Our Position

Monsanto has no intention or desire to reenter the PCB business. Company policy dictates that PCBs, like other industrial chemicals, receive proper handling and disposal to minimize environmental release. Also, the company is concerned that PCBs be accurately understood and fairly portrayed. This often has not occurred in the past, and the result has been

needless public concern and overzealous, costly regulation. As stated by the American Council on Science and Health: "In the case of PCBs, all studies to date have suggested that heroic, exceedingly expensive corrective measures are unwarranted and that time itself is an important factor in resolving the situation."(11)

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