Plasticizers

Because all plasticizer uses of PCB were regarded as essentially "open" to the environment it was impossible to prevent the leaching and volatilization of PCBs.

Consequently Monsanto realized the untenable nature of these applications when the allegations concerning environmental contamination by PCBs were confirmed. We discontinued all sales of PCBs to domestic U.S. customers for plasticizer applications one year ago.

The type of application affected by the market withdrawal of PCBs were:

Surface Coatings

Sealants

Adhesives

Printing Inks

Miscellaneous (e.g. pesticide carriers, wax modifiers, catalyst carriers, etc.)

Coatings

starting in the 1940s

Industrial (maintenance) coatings were the main outlet for PCBs in the surface coating industry. PCBs were chosen over other plasticizer candidates because of their outstanding chemical and moisture resistance. For example, PCB-plasticized coatings have enabled industrial equipment to withstand attack in strongly corrosive atmospheres.

No real alternate Exists

At present alternates being offered to the coatings industry are chlorinated paraffins and chlorinated ~~biphenyls~~ diphenyls. Chlorinated paraffins are inferior (stability, chemical and moisture resistance) to PCBs. ~~Chlorinated terphenyls so far appear to be equivalent in performance to PCBs.~~

Sealants

In the 1950s, synthetic elastomer sealants began to replace traditional putty-type caulks and sealants. One of the major synthetic elastomers was polysulfide. PCBs were used in these sealants to give excellent adhesion to a variety of substrates, moisture and chemical resistance, and for reducing hazards with the catalyst systems employed in curing the elastomer. These PCB plasticized polysulfide sealants were essential to meet the

caulking and sealant needs of modern buildings and construction.

Our discontinuation of PCB sales to the sealant industry has created a very real technical problem for them. Totally satisfactory alternates do not yet seem to be available. ~~In fact it is reported that~~ PCBs are being imported from non-Monsanto sources for use in sealants.

Adhesives

In the 1940s and 1950s, PCBs were used in adhesives to impart tackiness and because they exhibited excellent bonding power to many substrates. They also exhibited greater compatibility with a wide variety of the many resins used by the adhesives industry. In a word their versatility led to their wide usage. They were also chemical and moisture resistant and resistant to heat and oxidation. In the mid-1960s, however, a drop in their usage had already become evident. Adhesive suppliers were increasingly called upon to supply FDA-approved, low-odor products. PCBs did not satisfy these developing market needs. Even before the environmental pollution situation arose we were engaged in developing and supplying new plasticizers to meet the needs of the adhesive market. The new products are not PCB-based.

Plasticizers

Miscellaneous Uses

Monsanto's Aroclor® Plasticizer Bulletin O/PL-306 may appear to the layman to indicate that PCB found its way deliberately into almost every product produced in the nation. Applications such as dedusting agents, pesticide carriers, catalyst carriers, impregnating compounds etc. are listed as Aroclor® and have been so publicized by the press coverage given to PCBs. The fact is, however, that very few of these uses accounted for more than 4 or 5 drums of PCB per year and in many cases the Aroclor® used was not a PCB.

In 1969 an exhaustive survey of our PCB customers was made to determine exactly where these products were being used. An example from the survey may be of interest. We found only three customers in 1969 were using any PCB in pesticide formulations. Total consumption was between 5 to 10,000 pounds PCB per year. This application was developed by U.S.D.A. scientists at Beltsville, Maryland in the early 1950s.

The aim was to incorporate "chlorinated polyphenyls" into lindane and possibly chlordane to improve the residual effects. To Monsanto's knowledge there was never any recommendation by anyone for their use on food or other crops. The principal application was to spray metal or painted surfaces to increase the effectiveness of the active pesticide against flies, ants, roaches, etc. In April, 1970 we wrote to Dr. Hayes, Director, Pesticide Regulations Division, U.S.D.A. suggesting that no approvals should be given to pesticide formulations containing PCB.

All applications of a "miscellaneous" category uncovered during our 1969 survey of customers buying PCBs through the Plasticizer Business Group of Monsanto were included in the sales ban put into effect in August, 1970.

PCB APPLICATIONS IN PLASTICIZERS

U.S.A. Only (Prior to Discontinuation)

Surface Coatings	57%
Sealants	20%
Adhesives	17%
Miscellaneous	6%

Encapsulants

The use of PCB as a solvent for the encapsulation of dyes for carbonless carbon paper began in the 1960s. Factors which influenced the selection of PCB were:

dye solubility
U.V. light stability
intensity of color development
speed of color development
moisture resistance
non-reactive with dyestuffs

In spite of research efforts for the past ten years it has only been in the past two years that the promise of satisfactory alternates have been brought to light. Since 1970 we have been supplying non-PCB alternates to this industry. The search for even better replacements continues but none of these is based on PCB.

ENCAPSULANTS

U.S. SALES OF MONSANTO PCB

1965	3.5 M lb.
1966	4.1
1967	4.4
1968	6.0
1969	6.5
1970	6.7
1971 Estimate	1.2
1972 Projection	0

do not release

3.3 M

do not disclose

Dye Carriers

Polyester fibers are notoriously difficult to dye and hence a usage of specialty dye-carriers has built up. Historically this has been based on biphenyl (i.e. a non-chlorinated product). In 1969 there was a trend toward the use of low chlorine content PCB. Biodegradation and medical feeding studies have shown this particular PCB to be non-hazardous to the environment. However, even this use is being discontinued within the next two months in favor of a monochlorinated product.

DYE CARRIERS

U.S. SALES OF MONSANTO PCBs

Prior to 1969	0
1970	1.0 M lb.
1971 Estimate	1.1
1972 Projection	0