HISTORICAL SUMMARY OF PCB ENVIRONMENTAL ISSUE

By

W. B. Papageorge

Polychlorinated biphenyls have been commercially available for over 40 years, and, as many of you are aware, are produced worldwide in many of the industrially developed nations.

As with many industrial chemicals, early studies to determine the toxicity properties of these materials were designed to provide the appropriate information to guide the manufacturers and users in its proper handling, storage and shipping. This understanding of the polychlorinated biphenyls resulted, through the years, in a remarkable record of very few incidences of human exposures resulting in observable effects. In each reported instance the existing evidence indicated that improper industrial hygiene practices were being followed.

During the late 1950's and 1960's increased interest in the presence and effects in the environment of chlorinated hydrocarbon pesticides resulted in the development of sophisticated analytical methodologies with capabilities of detecting these substances at extremely low levels of concentration.

In the use of gas-liquid chromatography for the determination of DDT and its metabolites, investigators were puzzled by the presence of response peaks which could not be identified. Generally, these peaks were ignored, and, in some laboratories, they were considered as possible metabolites of DDT.

In late 1966, Drs. Jensen and Widmark, Analytical Chemistry Laboratories, University of Stockholm, identified these peaks as polychlorinated biphenyls and claimed to have found these materials in many foods, human milk, infant hair, pine needles and in feathers from a mounted eagle in a museum. The results of this study were published in 1967.

During 1967 other investigators, using Jensen's method, established the presence of polychlorinated biphenyls in samples from the environment. By late 1967 and early 1968, presence in the environment was fairly well established, but in many instances could not be explained. All of the early reports indicated that the polychlorinated biphenyls being identified represented mixtures of the higher chlorinated isomers.

At this point, Monsanto launched a multi-point program aimed at obtaining more information about polychlorinated biphenyls and their presence and impact on the environment. This program included the following:

1. Develop analytical methodology

2. Conduct biodegradation studies

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3. Conduct animal toxicity studies

4. Develop alternative materials for PCB applications

5. Develop a program for the recycle or proper disposal of scrap polychlorinated biphenyls

6. Develop a continuing program of informing our customers of significant developments

7. Cooperate fully with industrial, governmental and academic laboratories

Studies performed throughout the world have resulted in the following findings:

1. The presence of polychlorinated biphenyls in the environment has been confirmed.

2. Some isomers of polychlorinated biphenyls are more resistant to degradation than others.

3. The early claims indicating that PCBs result in widespread thinning of eggshells in wild birds have not been confirmed.

4. Massive fish kills attributed to PCBs have not been confirmed.

5. Biological magnification in the food chain does occur.

6. Some species of marine and wildlife are very sensitive to low levels of PCBs, e.g. brown shrimp, some species of fish, invertebrates, mink.

7. PCBs identified in samples obtained in remote areas represent the higher chlorinated isomers. Samples obtained near a source of the commercial material contain the lower chlorinated isomers.

8. High doses of polychlorinated biphenyls present in rice bran oil resulted in the presence of toxic effects in over 1,000 Japanese.

9. The effects of chronic long-term, low-level exposure to humans has not been established.

10. High levels found in human food and animal feeds are traceable to known sources.

Because of its presence in the environment and indicated effect on some species of wildlife, coupled with the concern regarding

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the effect on humans of low-level, long-term exposure, Monsanto voluntarily instituted a worldwide program for terminating the sale of polychlorinated biphenyls to those uses in which control of escape to the environment was impractical.

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MONSANTO PCB ACTIONS

IN CANADA

by

D. Goodwillie

TRAN 071714

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MAJOR TRADITIONAL USES OF PCB [1]

- OPEN SYSTEMS
  - PLASTICIZERS
  - SOLVENTS FOR CARBONLESS COPY PAPER[2]
- CLOSED SYSTEMS
  - DIELECTRICS
  - HEAT TRANSFER
  - INDUSTRIAL HYDRAULIC FLUIDS

[1] POLYCHLORINATED BIPHENYLS

[2] NO SALES IN CANADA

TRAN 071715

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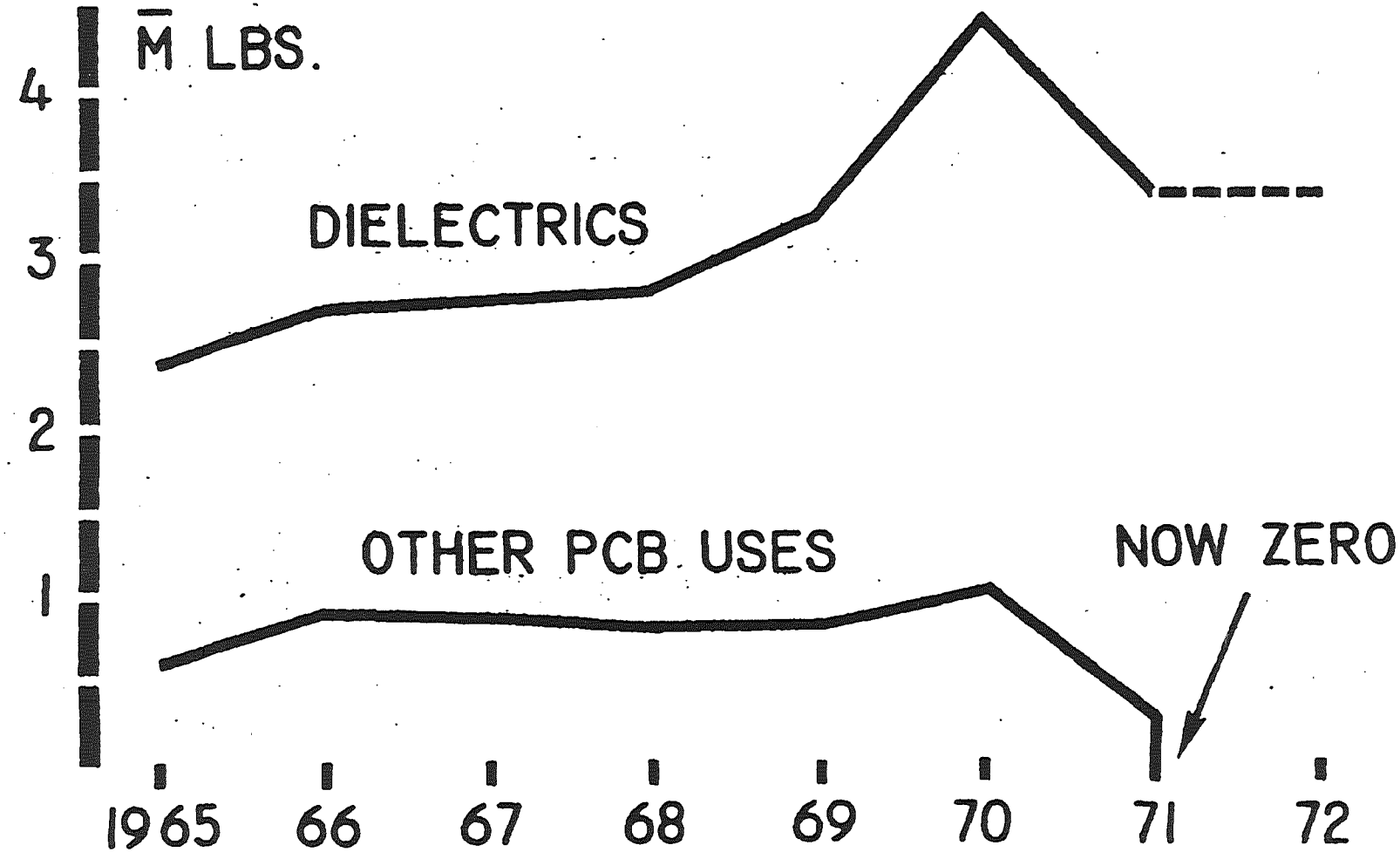
MONSANTO PCB SALES IN CANADA



TRAN 071716

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MONSANTO PCB ACTIONS

- PHASE-OUT OF PCB SALES WORLDWIDE IN ALL APPLICATIONS EXCEPT DIELECTRICS
- CONVERSION OF DIELECTRIC FLUIDS TO MORE BIODEGRADABLE PCB'S

TRAN 071717

MONSANTO PCB SALES

NORTH AMERICA

DIELECTRIC APPLICATIONS

	CANADA	U.S.A.	SALES IN CANADA
	(IN MILLIONS OF POUNDS)		%
1969	3.24	37.0	8
1970	4.44	40.5	10
1971	3.36	28.4	10
1972 EST	3.30	33.0	9

TRAN 071718

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MONSANTO PCB SALES

NORTH AMERICA

NON-DIELECTRIC APPLICATIONS

	CANADA	U.S.A.	SALES IN CANADA
	(IN MILLIONS OF POUNDS)		%
1969	0.83	30.0	2.6
1970	0.96	33.5	2.8
1971	0.22	~ 3.7	~ 5.0
1972 EST	-	-	-

TRAN 071719

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MONSANTO PCB SALES

NORTH AMERICA

CONCLUSIONS

- MONSANTO SALES FOR NON-DIELECTRIC USES IN CANADA ALWAYS WERE UNDER 3% NORTH AMERICA TOTAL
- MONSANTO SALES DIELECTRIC USES IN CANADA ARE ONLY ~10% NORTH AMERICA TOTAL

TRAN 071720

EFFECT OF
PHASE-OUT POLICY

MONSANTO PCB SALES REDUCED:

- IN NORTH AMERICA BY 31 TO 34 $\bar{M}$ POUNDS
- IN CANADA BY 0.8 TO 1.0 $\bar{M}$ POUNDS

TRAN 071721

SUMMARY

By

W. B. Papageorge

In summary, our observations, admittedly limited, both from our laboratory data and from reports of other investigators, lead us to believe with considerable confidence that PCBs do degrade in the environment. The complexity of the commercial mixtures has, however, hampered the determination of the varying rates of degradation of all the possible isomers.

Monsanto's sales actions have definitely reduced the amount of PCBs that could be introduced into the environment.

In those applications in which the use of PCBs is considered essential, namely transformers and capacitors, further actions will assure strict environmental control on PCBs.

In transformers the elimination of the use of Aroclor 1260, along with proper handling during manufacture, use and repair and proper disposal of waste fluid by high temperature incineration, should result in acceptable control.

For the capacitor application the development of Aroclor 1016, which satisfied all of the industry's requirements relating to dielectric characteristics and handling properties, as well as having Underwriters Laboratory fire-resistance approval, permits the continued use of PCBs in this important hermetically-sealed application but with a fluid that has a significantly lower content of the slower degrading isomers. The use of this material, accompanied by proper handling and disposal of the scrap fluid by high temperature incineration, represents, in our considered opinion, a significant step forward in our efforts to control the impact of PCBs on the environment.

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