

OUTLINE

PCB ENVIRONMENTAL POLLUTION ABATEMENT PLAN

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A. Immediate Action (12-1-59)

B. Interim 1-3 months

C. Short term - 3-6 months

D. Long term (1-3 years)

1. Research medical

2. Manufacturing

3. Engineering

4. Market

5. Patent

6. Environmental Control

7. Legal

8. Public Relations 9. Others

XIII. Probability (Success)

XIV. Cost of Program

\$220,000 and less

XV. Future

PCB ENVIRONMENTAL POLLUTION ABATEMENT PLAN

Introduction

On 15 October the "AD HOC" Committee consisting of Messrs. M. Farrar, P. Hodges, E. John, W. Richard, and E. Wheeler issued a report summarizing the polychlorinated biphenyl (PCB) pollution problems from the known available information to date. Out of this report came considerable information, conclusions, and recommendations which we have attempted to tie together into a plan of action in this document. Our objective has been to take a reasonable and responsible approach to the entire problem. Before we get into the problem, we should clarify the meaning of PCB, the nature of the entire line, and how these tie into our product line of Arcolers.

Monsanto entered the Aroclor market in 1930 by acquiring Swain

Electrical Company or known today as our Anniston, Alabama plant.

The first lot of Aroclor which incidentally was Aroclor 1254 --

went out of Anniston, Alabama to GE in 1931. Since that time the

market has grown to 170 to 200M worldwide.

Chemical

Monsanto Product Line

Nature of Material at Ambient

Biphenyl

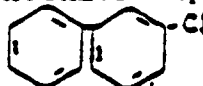


Solid at

Sublimes at

Solid

Monochlorobiphenyl



Aroclor 1221

thin liquid (oil)



Aroclor 1232

thin flush water

Trichlorobiphenyl



Aroclor 1242

oily type fluid material

Quaterchlorobiphenyl



Aroclor 1248

Thicker - transmission oil

Pentachlorobiphenyl



Aroclor 1254

Heavy-Molasses

Hexachlorobiphenyl



Aroclor 1260

Thick - tar

Heptachlorobiphenyl



Aroclor 1262

Very thick - liquid

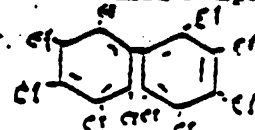
Octachlorobiphenyl



Aroclor 1268

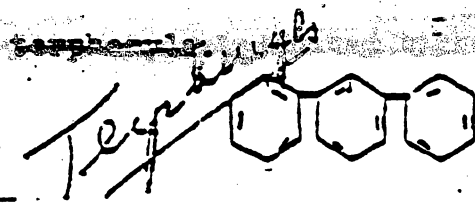
Solid

Decachlorobiphenyl



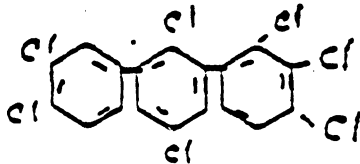
Aroclor 12715

Total possibility are 210 theoretically possible chlorinated biphenyls



Santowax or terphenyl

Solid



Aroclor 5460

Solid

II. Problem

8/2/69
5/11/69
Damage to the ecological system by contamination from polychlorinated biphenyl (PCB).

III. Extensiveness

2/6/69
The problem involves the entire United States, Canada, and sections of Europe especially the United Kingdom and Sweden. As the investigation broadens other areas of Europe, Asia and Latin America will surely become involved. Evidence of contamination have been shown in some of the very remote parts of the world. The involvement could and most likely will follow the DDT investigations.

IV. Nature of the Problem

2/6/69
Professors Widmark and Jensen of the Institute of Analytical Chemistry at Stockholm, Sweden, in November 1966, announced and confirmed finding PCB in fish, birds, and eggs. Subsequent findings were made in 1967 in Great Britain. In February 1969, Professor Elsiebrough of the University of California published an article in the San Francisco Chronicle relaying his findings of PCB in the environment of the United States. Monsanto confirmed the presence of PCB's in mid-1969 and confirmed the adequacy of work by Widmark and Jensen and others; truly, the PCB's are a worldwide ecological problem.

Analysis indicates the environmental presence of the 5 and higher chlorinated biphenyls which take the appearance of Aroclor 1254 and Aroclor 1260. We have strong indications that Aroclor 1242 or at least part of it degrades biologically. Since the Aroclor 1242 contains around 7 percent of the 5 chlorine biphenyl or higher we cannot rule out the possibility that the observations may be a concentration effect of the higher chlorinated biphenyls of Aroclor 1242.

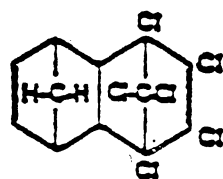
To date there have been no reports of finding Aroclor 1242 present in the environment (except outside the effluent of our plants where we know Aroclor 1242 is present).

The seriousness of the problem can best be spelled out as follows:

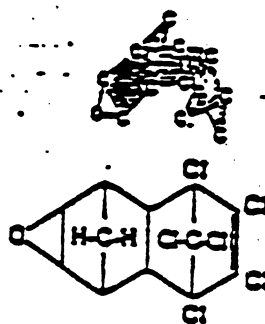
1. Fish - Marine or aquatic species concentrate PCB in the fatty tissue. Toxic in small quantities (down to 5 ppb) to sensitive sea life such as shrimp.
2. Birds - Predatory species feeding on the marine or aquatic life can further concentrate PCB to possible harmful effects. Specifically in birds PCB can affect the calcium metabolism leading to egg shell imperfections which prevents proper hatch of the young. In fact, Monsanto has confirmed the eggshell by feeding chickens, a high order of the species, PCB's in controlled tests.
3. Man - There is no harmful effect known to man or other mammals after 40 years of production. Investigations are underway by various sources.
4. Political and Public Emotion - PCB's are falsely linked with DDT because PCB's show up in the analysis for DDT. PCB's are linked with other permanent type chlorinated hydrocarbon pesticides. This becomes particularly serious since about every article of food in the country is being examined for a trace of these materials.

STR 021943

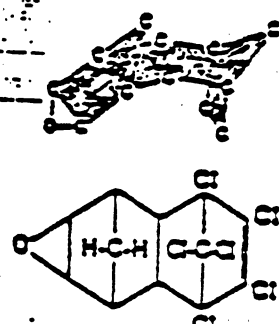
Notes: 50% of the PCB's are found in the
environment. The remaining 50% are found in the
product.



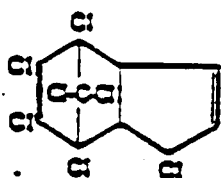
ALDRIN



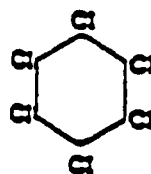
DIELDRIN



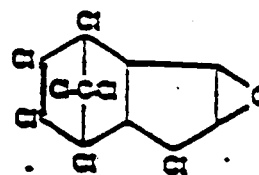
ENDRIN



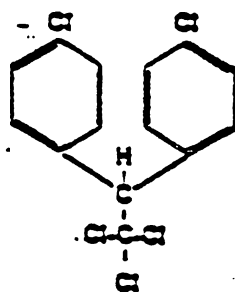
HEPTACHLOR



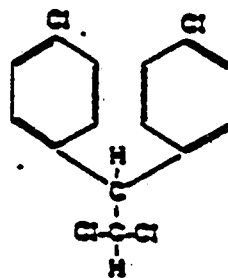
LINDANE



HEPTACHLOR
EPOXIDE



DDT



DDD

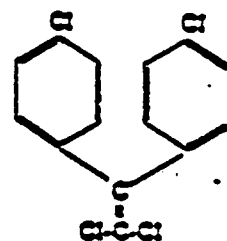
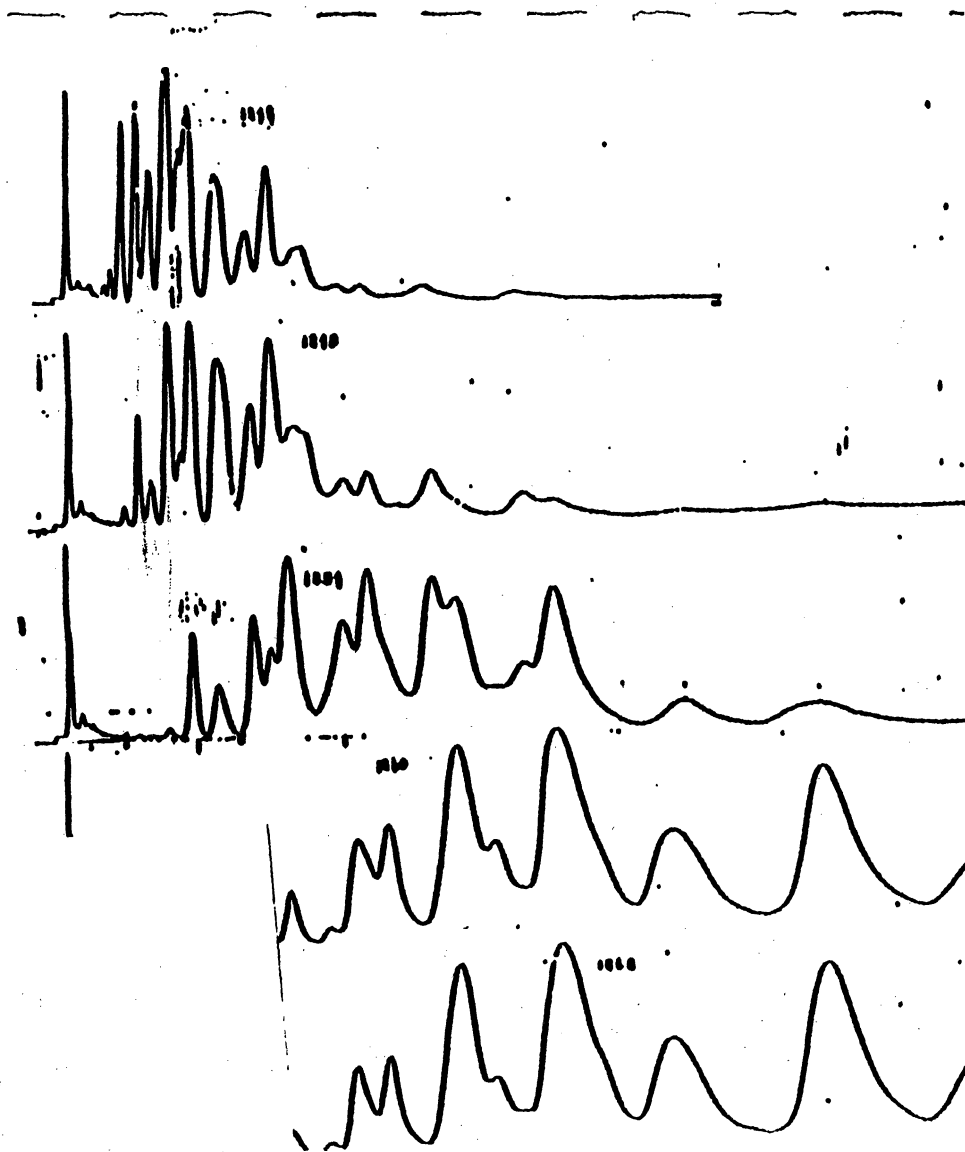


Fig 1 Structural Formulae of Nine Chlorinated Hydrocarbon P.



PESTICIDES

8	Endrin	5.13
2	Heptachlor	5.22
1	Lindane	5.50
7/8	Methoxychlor	5.17
6	o,p DDT	5.46
4	pp' DDE	5.10
8 1/2 9	pp' DDD	5.13
3	Aldrin	5.10
7	Dieldrin	5.04

V. Effect on Monsanto

Business potential at stake on a worldwide basis:

<u>Fluids</u>	<u>Plasticizers</u>	<u>Total/Year</u>
70M lbs.	34M lbs.	104M lbs.
\$16M	\$5M	\$22M
\$6-8M G.P.	\$2-3M G.P.	\$8-11M G.P.

Already competition is using certain data against us in competitive situations.

A. Legal Liability

Direct lawsuits are possible. The materials are already present in nature having done their "alleged damage". All customers using the products have not been officially notified about known effects nor our labels carry this information. These are only a few of the possible legal implications which would best be covered by the legal department.

B. Public Image

The corporate image of Monsanto as a responsible member of the business world genuinely concerned with the welfare of our environment will be adversely affected with increased publicity.

The evidence proving the persistence of these compounds and their universal presence as residues in the environment is beyond questioning. This combined with certain scare publications is certain to give an adverse image. Guilty^{by} association (with DDT) will prevail as the background while actual facts may be sparse.

C. Customer Relations

STR 021946

Some customers who presently use these materials will be "scared" of to other competitive products. Products associated with the same name or "trademark" will be adversely affected i.e., Therminol, Pydraul and Aroclor. Competitors will use the information for an

influence on Monsanto products.

Customers will seek other "outs" rather than become involved.

VI. Effect on Customers and Ultimate Consumers

One of the unique features of PCB's is their fire resistance. Here the basic decision whether to risk lives due to fire or risk extinction of, some species of birds. In this case the PCB would probably be accepted as a necessary pollutant and tolerated under controller conditions.

- A. Electrical Industry - Capacitors and Transformers use Aroclor because it is the best inexpensive dielectric fluid available.
- B. Food Processing - Bulk "deep frying" units for potato chips, fish, and doughnuts use the fire resistance fluid as an indirect heating medium.
- C. Die Caster -- and other hot metal working industries fire resistance fluids to protect the workers.

Affects a wide range of plastics and adhesives because the PCB serves as the plasticizer.

A wide range of paints and coatings are affected. The "Carbonless" carbon paper used so widely would disappear.

VII. Involvement With Other Producers

Although Monsanto is most probably responsible for the U.S. contamination and jointly responsible with MCL for the United Kingdom problem, we cannot accept responsibility for the world. There are five known producers in the free world, several possible producers behind the iron curtain and couple of additional companies making overtures about entering the business. Monsanto representatives have on one occasion discussed this problem with a couple of these producers but they expressed no great concern. In fact, it is highly possible that one c

these manufacturers is dumping his waste into the Rhine River. Certainly any action taken by one producer will most assuredly affect the other. It is entirely possible that a joint plan of action could be developed but will most probably have to be spearheaded by Monsanto. It is also likely that producers of other chlorinated products used with PCB's will be dragged into the investigation.

VIII. Sources of Contamination

Although there may be some soil and air contamination involved, by far the most critical problem at present is water contamination. To our knowledge to date the contamination can be broken down into two general categories, open and indirect pollution.

A. Open Pollution - Our manufacturing facilities sewered a sizeable quantity of PCB's in a years time.

1. Fluids

Fluids are probably the most open source of pollution because their mobility. They also may be the least serious because they are generally the lower chlorinated materials.

2. Electrical

Electrical customers have in the past sewered their wastes.

3. Heat Transfer

Heat transfer customers have sewered their objectionable and their spilled material.

4. Industrial

These fluids have generally been sprayed into drains, washed down sewers and generally regarded as very harmless.

All of the fluids have had the ^{new} "pink" constituent dumped on dirt roads a "dedusting agent" which inadvertently found its way back to the stream.

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5. Plastics

The plastics are not as mobile as the fluids so therefore they have not found and cannot find their way back to streams in a pollution.

B. Indirect

Shipping containers and the cleaning thereof for subsequent use a source of contamination.

1. Fluids

- a. Electrical - Disposal of "burned out" transformer and capacitors may find its way back to streams. Scrap units (new) are generally disposed of in land fills but could possibly get back to the stream.
- b. Heat Transfer - Leaks could contaminate.
- c. Industrial - Cross product contamination carried out of a air compressor. Residual material carried on parts.

2. Plasticizers

a. Process Contamination from Washing

(1.) Environment Contamination

Swimming pool paints

Incineration of wax coatings

Traffic paints

(2.) Product Contamination

STR 021949

Coating for tank lining

Painting inks and paper coatings

Certain adhesives

IX. Recent Technical Changes Which Have Bearing on the Contamination

A. Fluids

The sources of pollution were pointed out as they have been in the past because we are dealing with that quantity of material in the