Monsanto

ORGANIC CHEMICALS DIVISION

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

February 9, 1970

DEPOSITION EXHIBIT
PENGAD-Bayonne, N. J.
Olson CMC
1 ~~ID~~
11-24-81

Dear Sir:

Recently several newspaper and magazine articles have been published indicating that Polychlorinated Biphenyls (PCBs) have been discovered at some points in some marine, aquatic and wildlife environments. The quantities detected are said to be in the parts per million and parts per billion categories.

It is claimed that the PCBs found strongly resemble chlorinated biphenyls containing 54% and 60% chlorine by weight. Products which are sold by Monsanto under the trade names of Aroclor® 1254 and 1260 do contain chlorinated biphenyls. In addition to Aroclor® 1254 and 1260, Monsanto sells certain functional fluids containing Aroclor® 1254. These include Pydraul® 625, Pydraul® AC, Pydraul® AC - Winter Grade, Pydraul® 540, Therminol® FR-3 and certain dielectric formulations. Several other companies around the world also produce products containing chlorinated biphenyls.

As your supplier of Aroclor® 1254 and 1260 and formulated products containing 1254, we wish to alert you to the potential problem of environmental contamination as referred to in the newspaper and magazine articles.

We would like to point out the following additional facts.

1. Products such as Pydraul® 90, 135, 230, 312, A-200, F-9, 150 and 60, Turbinol® 153 and Therminol® FR-1 and FR-2 are not formulated with Aroclor® 1254 or 1260.

2. PCBs with a chlorine content of less than 54% have not been found in the environment and appear to present no potential problem to the environment.

0301360

WATER_PCB-SD0000068275

We have developed, and are now testing, new formulations to replace the Aroclor® 1254 and 1260 components in our Pydraul® products. The new products appear to be equal in performance and to have similar physical properties.

We feel that all possible care should be taken in the application, processing and effluent disposal of these products to prevent them becoming environmental contaminants. Of interest to you may be an article in Chemical Week, October 29, 1969 regarding water pollution standards set by each state in the Union. It is attached. This article reflects that good manufacturing practice in the future may require that no products used by any company should find their way into waterways.

Sincerely yours,

Donald A. Olson
Director of Sales
Functional Fluids Group

nlc
Attachment

0001381

WATER_PCB-SD0000068276

Monsanto

ORGANIC CHEMICALS DIVISION

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

PENGAD-Bayonne, N. J. DEPOSITION EXHIBIT Olson-OMC 2 ~~ID~~ 11-24-81

February 18, 1970

Dear Sir:

Recently several newspaper and magazine articles have been published indicating that Polychlorinated Biphenyls (PCBs) have been discovered at some points in some marine, aquatic and wildlife environments. The quantities detected are said to be in the parts per million and parts per billion categories.

It is claimed that the PCBs found strongly resemble chlorinated biphenyls containing 54% and 60% chlorine by weight. Products which are sold by Monsanto under the trade names of Aroclor® 1254 and 1260 do contain chlorinated biphenyls. In addition to Aroclor® 1254 and 1260, Monsanto sells certain functional fluids containing Aroclor® 1254. These include Pydraul® 625, Pydraul® AC, Pydraul® AC - Winter Grade, Pydraul® 540, Therminol® FR-3 and certain dielectric formulations. Several other companies around the world also produce products containing chlorinated biphenyls.

As your supplier of Aroclor® 1254 and 1260 and formulated products containing 1254, we wish to alert you to the potential problem of environmental contamination as referred to in the newspaper and magazine articles.

We would like to point out the following additional facts:

1. Products such as Pydraul® 90, 135, 230, 312, A-200, F-9, 150, and 60, Turbinol® 153 and Therminol® FR-1 and FR-2 are not formulated with Aroclor® 1254 or 1260.

2. PCBs with a chlorine content of less than 54% have not been found in the environment and appear to present no potential problem to the environment.

0001382

WATER_PCB-SD0000068277

We have developed, and are now testing, new formulations to replace the Aroclor® 1254 and 1260 components in our Pydraul® products. The new products appear to be equal in performance and to have similar physical properties.

We feel that all possible care should be taken in the application, processing and effluent disposal of these products to prevent them becoming environmental contaminants. Of interest to you may be an article in Chemical Week, October 29, 1969, regarding water pollution standards set by each state in the Union. It is attached. This article reflects that good manufacturing practice in the future may require that no product used by any company should find their way into waterways.

We realize that you have marketed or may now market transformers and other electrical equipment containing dielectric fluids which include Aroclor® 1254 and 1260. Although these fluids are sealed into such equipment it is recognized that occasionally the fluid may be lost through leaks resulting from equipment misuse or equipment repair necessitating replacement of the fluid. Since the dielectric fluid contained in this equipment is only an incidental part of the over-all unit manufactured by you, we are not notifying the purchasers of such equipment of the potential environmental contamination problem described in this letter. We do recommend, however, that you notify such equipment users of this problem.

Sincerely yours,

Don Olson

Donald A. Olson
Director of Sales
Functional Fluids Group

lb

Attachment

C001383

WATER_PCB-SD0000068278

DEPOSITION EXHIBIT
Olson - OMC
3 - ID
11-24-81
PENCAD-Baycrest, N.J.

Environment

The huge water requirements of the chemical industry—now the nation's third largest user—make water quality and availability increasingly important factors for site selectors. Legislation enacted in recent years has forced planners to pay close attention to pollution control standards.

All 50 states have had their water quality standards approved entirely or in part by the Federal Water Pollution Control Administration (FWPCA). Recently a state-by-state summary of key standards was put together for the first time. Surprisingly, it was not the FWPCA that did the job. Instead it was handled by an American Public Health Assn. (APHA) subcommittee headed by TVA Health Director F. E. Gartrell, assisted by the APHA Engineering and Sanitation Section. A portion of the study, covering standards for surface industrial water, is summarized in the tables starting on p. 80.

Contrary to widely held opinions, there is considerable variation in state standards. Take the dissolved oxygen (DO) standard, for example. Minimum allowable DO (as milligrams per liter or percent saturation) is the single most important standard to chemical site evaluators. As a rough rule of thumb, a 2-mg./l. standard is considered to be one industry can live with comfortably, while a 6.0 mg./l. value is pegged "extremely tough."

California, Wyoming and Washington have set the standard at 6 mg./l. or higher. But a few states such as Connecticut, Maine, Illinois, Indiana, Massachusetts, Virginia and Wisconsin require 2 mg./l. or lower.

Other standards—notably turbidity, taste, odor, color and solids—may also be important, depending upon the nature of the chemical plant's waste effluents. These standards also exhibit state-by-state differences. Moreover, they are generally less specific than the straight numerical DO standards.

Although chemical plant site experts see little point in "running from tough standards," the criteria do make a difference: Plans for two nonferrous metals plants in Puerto Rico are now on the shelf, because of standards that call for a 4.5 mg./l. DO, no wastes that interfere with the esthetics of the waters and other specifications.

No compilation of ground water standards has yet been published. Ground water standards may prove important in the future as companies are forced to use costly deep-well disposal for wastes. Availability of ocean waste disposal services is also looming more important.

Waste Cost.: The price tag for pollution control is high. A recent FWPCA study on the organic chemicals industry estimated that water waste-treatment facilities can increase installed capital equipment costs 40% or more. Between '69-'73, the organic chemical industry would have to shell out $182.5 million to remove 10% of its biological and chemical oxygen demand waste and 65% of its suspended solids. Removal levels of 83%, 13% and 71%, respectively, for biologic oxygen demand, chemical oxygen demand and suspended solids would require $242.6 million, while 98%, 30% and 89%, respectively, would up the ante to $608 million.

Cleaner Air: Establishment of air quality standards is not nearly as far advanced as are water standards. The National Air Pollution Control Administration (NAPCA) is still designating regional air control regions. At last count, 16 regions had been formally designated and another 41 had been proposed. NAPCA has issued air quality criteria and control technology data for sulfur oxides and particulate matter, will follow with similar studies for other pollutants.

Once criteria and control data have been issued for a pollutant and control regions have been designated, a complicated process involving standards, hearings and implementation and enforcement plans will be initiated that can take over a year to produce standards.

So far, no firm sulfur oxide or particulate standards have emerged. But NAPCA's criteria for setting the standards suggest they'll be tough. The oxide criteria report, for example, emphasizes that there are deleterious effects to man at concentrations as low as 0.04 ppm.

NAPCA's control data reports present detailed appraisals of various methods and equipment, along with estimated costs. As in the case of water, the costs will be high, although some pollutants—mainly sulfur dioxide—will have recovery values. NAPCA is sponsoring a number of research projects to improve technology. Pollution control is being spurred by financial assistance programs (mandated by state law) now operative in the following 28 states:

Arizona, Arkansas, California, Connecticut, Florida, Georgia, Idaho, Illinois, Indiana, Maine, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, Washington, Wisconsin and West Virginia.

In addition, Pennsylvania offers financial aid sanctioned by administrative regulation. Several states, including Utah and Maryland have legislative studies under way.

The incentives take a variety of forms. Most common are exemption from personal property taxes (e.g., Arkansas), fast depreciation (Arizona), exemption from ad valorem equipment and structures taxes (Connecticut), exemption from local taxes for stated period of time (New Hampshire), operating loss deductions (New York); credit against state income tax (Oregon).

Quantity: The large chemical complexes now in vogue make water—and lots of it—a major site criterion. The cooler the water is, the better, for it can reduce the investment in heat-exchange equipment. Occasionally, plants can manage on ground water, but usually surface water is required. That means location on or near the big, drought-resistant rivers. There are less than 200 rivers in the U. S. with minimum flows over 50 cu. ft. per second (*CW Oct. 5, '68, pp. 94-95*). For companies whose plant needs at least 100 cu. ft/second, the list numbers only 150 (excluding Alaska). Sea water is generally avoided because of high equipment corrosion costs.

Piping water in is expensive. Duval, now opening a 1.5 million tons/year sulfur mine in the arid Northwest area, was forced to install a 36-in., 38-mile-long water line and a 40-million-gal. reservoir. Cost of the water supply system hasn't been disclosed, but it is estimated that the tab was at least several million dollars.

The adequacy of domestic water resources in the year 2000 has recently been evaluated by the Geological Survey. Nationally, projected demand will be 173% of potentially assured supply. Only in three regions, New England, Ohio, and the South Atlantic Eastern Gulf, will future water requirements be easily met. Economic growth may be handicapped in nine regions. Eastern Great Lakes, Lower Mississippi, Upper Missouri-Hudson Bay, Lower Missouri, Western Gulf—Rio Grande, Pecos, Colorado, Great Basin, and Central and South Pacific.

WATER_PCB-SD0000068279

M2-1-6

N. T. Johnson St. Louis

February 16, 1970

POLLUTION LETTER

P. Craska - Wilmington
C. Clay - St. Louis
J. H. Davidson - Los Angeles
R. A. Damiani - Chicago
G. F. Fague - Detroit
R. A. Garcia - Akron
R. Garnsworthy - Melbourne
J. A. Heilala - Akron
R. Irwin - Houston
J. S. Pullman - New York
J. J. Roder - Chicago
R. Giles - Melbourne

cc

P. J. A. Marsh - Brussels
R. Enrhardt - New York
T. W. Oneson - Montreal
J. N. Haggart - Brussels
V. Morse - St. Louis
J. Brydon - Montreal
R. Graham - New York
P. G. Benignus
J. G. Bryant
D. E. Roush
J. R. Fallon
D. A. Hall
D. R. Pogue
D. F. Smith
D. A. Olson

Attached is a list of questions and answers which may be asked of you by customers receiving our Aroclor-PCB letter. You can give verbal answers; no answers should be given in writing. If the customer asks a question you can't answer or if he wants an answer in writing, then send his questions to me and we will answer from here.

We want to avoid any situation where a customer wants to return fluid. The new reformulated products will be available within a month. We would prefer that the customer use up his current inventory and purchase Pydraul 625A, Pydraul ACA, Pydraul ACA Winter Grade and Pydraul 540A when available. He will then top off with the new fluid and eventually all Aroclor 1254 and Aroclor 1260 will be out of his system. We don't want to take fluid back. Sell him the replacement.

We must be very positive in our approach with each customer relative to our decision to eliminate the use of Aroclor 1254 and Aroclor 1260 in our Pydraul products. We (your customer and Monsanto) are not interested in using a product which may present a problem to our environment. We certainly have no reason to be defensive or apologetic about making this change. The decision to change makes good sense and our customers should commend us, not criticize our actions. No one has forced us to make this

PENGAD-Bayonne, N. J.
DEPOSITION EXHIBIT
Olson-OMC
4-ID
11-24-81

WATER_PCB-SD0000068280

Monsanto

FROM (NAME & LOCATION): W. B. Papageorge - St. Louis

August 31, 1970

cc:

SUBJECT

REFERENCE

TO : P. B. Benignus
H. S. Bergen
J. R. Fallon
N. T. Johnson
D. A. Olson
J. Mason
W. R. Richard

Attached is a first draft of suggestions for PCB control which I propose be made available to our customers in helping us "close the loop".

Many of our transformer and capacitor customers have received individual memos which covered many of these suggestions.

I hope that these suggestions would stimulate our customers to take independent actions. Wherever required or requested, we would offer technical service and assistance on a case basis.

Will you please forward to me your comments for inclusion in the final version.

W. B. Papageorge

/jk

PERCAD-Bergenfield, N.J.
DEPOSITION EXHIBIT
Olson OMC
5-ID
11-24-81

WATER_PCB-SD0000068281

POLYCHLORINATED BIPHENYL
WASTE CONTROL & DISPOSAL

With increasing evidence that some polychlorinated biphenyls are being found in the environment and indications that some species of birds and marine animals are being affected, extreme care must be taken to prevent any entry into the environment of these materials through spills, leakage, use, disposal, vaporization or otherwise. Suggestions are offered below for effective containment of PCB's.

Liquids

1. Every effort must be made to prevent the mixing of PCB with water, thereby measurably reducing the opportunity for PCB's to enter a water system; e.g. sewer, creek, river or lake.
2. All liquid handling systems must be designed and maintained to assure that leaks and spills are a rarity. If they do occur, corrective measures should be taken immediately and the PCB's be properly contained.
3. All areas in which spills and leaks could occur should be paved, curbed and properly drained. In some instances such as under pumps or sampling points, drip pans or catch basins may be appropriate. These, however, must be drained properly into waste collecting systems.
4. Drainage systems should contain interceptor basins to trap the heavy PCB for subsequent recovery.

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5. If PCB's are present in waste water streams, these streams must be treated before release to the environment. Detergent emulsions must be broken, free PCB must be removed after phase separation and dissolved PCB can be reduced by absorption on activated carbon.

6. Waste liquid PCB's can be destroyed by incineration at temperatures above 600°C. Temperatures below this level will result in vaporization to the atmosphere, or in the possible formation of severely toxic oxygen-containing materials. The stack gases from incineration must be scrubbed to remove the resulting HCl gas and then neutralized before disposal toplant effluent.
If incineration facilities are not available, waste liquid containing PCB may be shipped to Monsanto for disposal. Cost has been tentatively set at 3 cents per pound of material to be disposed and does not include container and freight costs. Material returned to Monsanto should be addressed to: Attention Supervisor Department 946, W. G. Krummrich Plant, Monsanto Company, Sauget, Illinois.

Vapors

1. Vapor generation should be reduced by limiting the heating of PCB to the lowest temperature required for the process.

2. The vapor handling facilities should be designed and maintained to assure no vapors escape to the atmosphere. The use of liquid vent seals, condensers and entrainment separators are recommended. Incineration of vent

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lines to contain vapors within the system helps.

Solids

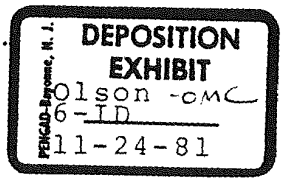
1. Solids contaminated with PCB must be segregated from other plant solid wastes.
2. Disposal may be made in a properly operated landfill which is not located near any water system.
3. Ordinary burning of these materials must be avoided. Steel or copper wastes may be reclaimed in high temperature furnaces.
4. Steel drums which contained PCB should not be reused for any other material.

WATER_PCB-SD0000068284

23-5J-13

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

Exhibit # 5



August 27, 1970

Dear Sir:

In February we advised you of the newspaper and magazine articles indicating that polychlorinated biphenyls (PCBs) have been discovered at some points in some marine, aquatic and wildlife environments. It was claimed that the PCBs found strongly resembled chlorinated biphenyls containing 54% and 60% chlorine by weight. The quantities detected are said to be in the parts per million and parts per billion categories.

Pydraul F-9 has been formulated with polychlorinated biphenyls. A new formulation has been developed and tested to provide equal or better performance. The new formulation will be designated Pydraul F-9-A. This formulation is completely compatible with the old formulation and does not contain polychlorinated biphenyls.

During the next 90 days, as inventory is depleted in warehouses around the country the new formulations will be shipped to fill your orders.

If we can be of further assistance or answer any questions you might have please contact our local representative or me in St. Louis.

Very truly yours,

Norman T. Johnson
Marketing Manager
Industrial Fluids

1b

WATER_PCB-SD0000068285

D. A. Olson - St. Louis

May 5, 1970

PYDRAUL PRODUCT LINE - PCB

E. S. Bergen - MBERG
H. T. Johnson - MJOTN
W. D. Papageorge - WPAPA
W. R. Richard - WRICH

J. Mason

1. Completed Reformulations

+540

Pydraul 625, AC and AC (Winter Grade) have been reformulated without PCB and are now being manufactured. Our timetable is:

May 15 - Completion of production and letter announcement that reformulated products are available.

July 15 - Most customers will have converted. Letters to others that we will not offer old products after August 15.

August 15 - Completion of switch to reformulation. The scope of these products is shown below:

	Domestic + Export (Annual)		
	Sales	Pounds	Pounds PCB
625			
AC			
AC-WG			

2. Reformulation Status

The reformulation of Pydraul F-9 has been completed and testing is underway. We expect to meet this timetable:

August 1 - Begin customer transition.
November 1 - Complete transition.

F-9 domestic and export statistics are:

Sales
Pounds
Pounds PCB

Bill Richard can most give you estimates of product reformulation dates for the remaining Pydrauls. After completion of testing, we would estimate a three-month time period would be necessary for proper assimilation in the market.

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Olson-OMC
7-ID
11-24-81
PENGAD-Bayonne, N.J.

0001628

WATER_PCB-SD0000068286

3. Customer Containment

Pydraul are used by the metal-working industries, specifically steel, aluminum, die-casting, and foundries. The alternatives that we have available to provide improved containment on a short-term basis are limited but, on a longer-term approach, may present business opportunities to us for the control of all types of hydraulic fluids.

When viewing the magnitude of the Pydraul situation, however, we should be sure that proper perspective is maintained since the customer operations are not uncontrolled. The steel and aluminum industries are currently at the forefront of environmental contamination pressure and generally have good operating procedures and waste treatment facilities.

Several factors at customers in the die-casting (and foundry) applications help to minimize environmental loss. These are:

a. Larger customers have, in several instances, developed reclamation programs for capture and re-use of fluid. We have long assisted in these efforts and include discussion or reclamation in our technical literature. Active reclamation programs are being accomplished by:

Johnson Motors

b. Cooling water is used to control the temperature of the dies. In many shops, this water is continuously re-cycled through a cooling tower, back through enclosed water lines to each machine. These water lines are isolated and underground, thus preventing contamination by hydraulic or other fluids.

c. Our studies to date indicate that as much as 60% of the loss of hydraulic fluid is absorbed onto clay. While we have not traced the eventual disposition of the clay, this large percentage of the loss is not directly discharged into streams.

The above is pointed out, not to say that we shouldn't have a definite concern, but to show that some compensating factors do exist.

D. A. Otter

0001629
WATER_PCB-SD0000068287

D. A. Olson - St. Louis

May 5, 1970

HYDRAUL PRODUCT LINE - PCB

E. S. Bergen - MBERG
H. T. Johnson - MARTIN
W. D. Papageorge - WDARA
W. R. Richard - WRICH

J. Mason

1. Completed Reformulations

Hydraul 625, AC and AC (Winter Grade) have been reformulated without PCB and are now being manufactured. Our timetable is:

May 15 - Completion of production and letter announcement that reformulated products are available.

July 15 - Most customers will have converted. Letters to others that we will not offer old products after August 15.

August 15 - Completion of switch to reformulation. The scope of these products is shown below:

	Domestic + Export (Annual)		
	Sales	Pounds	Pounds PCB
625			
AC			
AC-HG			

2. Reformulation Status

The reformulation of Hydraul F-9 has been completed and testing is underway. We expect to meet this timetable:

August 1 - Begin customer transition.
November 1 - Complete transition.

F-9 domestic and export statistics are:

Sales
Pounds
Pounds PCB

Bill Richard can best give you estimates of product reformulation dates for the remaining Hydrauls. After completion of testing, we would estimate a three-month time period would be necessary for proper assimilation in the market.

DEPOSITION EXHIBIT Olson-OMC 7-ID 11-24-81 PENCAD-Bayonne, N. J.

0001628

WATER_PCB-SD0000068288

3. Customer Contaminant

Pydraul are used by the metal-working industries, specifically steel, aluminum, die-casting, and foundries. The alternatives that we have available to provide improved containment on a short-term basis are limited but, on a longer-term approach, may present business opportunities to us for the control of all types of hydraulic fluids.

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Johnson Motors

b. Cooling water is used to control the temperature of the dies. In many shops, this water is continuously re-cycled through a cooling tower, back through enclosed water lines to each machine. These water lines are isolated and underground, thus preventing contamination by hydraulic or other fluids.

c. Our studies to date indicate that as much as 80% of the loss of hydraulic fluid is absorbed onto clay. While we have not traced the eventual disposition of the clay, this large percentage of the loss is not directly discharged into streams.

The above is pointed out, not to say that we shouldn't have a definite concern, but to show that some compensating factors do exist.

D. A. Olsen

0001629

WATER_PCB-SD0000068289

W. B. PAPAGEORGE - ST. LOUIS

MARCH 30, 1970 cc

H. S. BERGEN
M. W. FARRAR - SECOND STREET
E. V. JOHN
M. E. KELLER
D. A. OLSON
P. S. PARK
C. PATON
W. R. RICHARD
J. E. SPRINGGATE
E. P. WHEELER

Attached is a copy of a rough draft of a plan for managing the PCB problem. I realize much of the information is known to you, but I hope to consolidate in one document a summary of all of our activities. I also recognize that I have probably missed some important activities or approaches.

Will each of you review this draft and plan to meet jointly in Conference Room C-303 on Thursday, April 2, at 9:00 A.M. for a thorough discussion. Our objective will be to develop a finished plan which will eventually be presented to the CMC by mid-April.

W. B. Papageorge

W. B. PAPAGEORGE

ms

Attachment

DEPOSITION EXHIBIT
Olson - CMC
8-ID
11-24-81
PERKUD-Bayonne, N.J.

10975

ROUGH DRAFT

MANAGEMENT PLAN

POLYCHLORINATED BIPHENYL ENVIRONMENTAL PROBLEM

I. THE PROBLEM

The presence of materials identified as polychlorinated biphenyl (PCB) in marine environments was first noted by Professors G. Widmark and S. Jensen of the Institute of Analytical Chemistry, Stockholm, Sweden and reported in November, 1966. Since then and with increasing frequency, other investigators have identified PCB in marine and animal life. Increasing evidence has been noted that indicates PCB in ubiquitously present in the environment and is resulting in damage to the ecological system. Monsanto is a major producer of PCB (Aroclors) worldwide and has been mentioned in many of the reports.

II. BASIC STRATEGY

With the growing evidence of the presence of PCB and the apparent damage it can do to the world environment, Monsanto must respond as a responsible member of the business world genuinely concerned with the welfare of our environment, yet not take premature action which would compromise its responsibilities to its customers, shareholders or employees. Finding ourselves on the

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defensive, lacking considerable information to help in arriving at sound business decisions and with no real influence regarding the timing of any precipitous action by the press, competitors, public or governmental agency, we are forced to commit our limited resources in several directions. Some of our efforts are being expended seeking information to help better understand and control the problem and some effort is being expended to find alternate products which we may or may not require as indicated by new research data or other developments.

Early reports had indicated that the polychlorinated biphenyls with 5 and 6 chlorines were being identified in environmental samples. From this information it was surmised that the lower chlorinated biphenyls were being degraded and probably were not a problem. Consequently, a decision was made to plan to discontinue the manufacture of Aroclors 1254 and 1260. Recent data, although still very preliminary, indicates that not enough information is available to justify this action. It appears that in those uses where control of spillage and disposal can be rigidly exercised and the Aroclors are in sealed containers; e.g. transformers, the manufacture of Aroclor 1254 and 1260 should be continued. The advantages of using these Aroclors, particularly where safety is a prime consideration, far outweigh

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the potential threat to the environment.

III. OBJECTIVES

The overall objective of this plan is to manage the PCB pollution problem to prevent it from adversely affecting the established Return-on-Investment objectives of the Functional Fluids and Plasticizers Groups, while maintaining the corporate image of Monsanto as a responsible and respected member of industry worldwide.

Objectives supporting the overall objective are as follows:

1. Reduce and effectively control the PCB content of all effluent from Monsanto plants.

2. Inform customers of the PCB problem and the importance of preventing environmental pollution both at their plants or by their products.

3. Develop products to replace Aroclors for those uses in which Aroclors have been demonstrated to be harmful to the environment and cannot be prevented from escaping into the environment.

WATER_PCB-SD0000068293

4. Develop reliable analytical procedures for determining PCB content of liquids, gases, or solids.

5. Develop methods for effective disposal of wastes containing PCB without contaminating the environment.

6. Develop methods for reclaiming and reusing off-grade fluids containing PCB.

7. Determine effects of PCB's on birds, aquatic life, animals and humans.

8. Establish and maintain favorable relationships with the press, governmental agencies, the public and the universities.

IV. ACTION PLAN

1. Objective - Reduce and effectively control the PCB content of all effluent from Monsanto plants.

   Status - A tentative target of 10 ppb of PCB in plant liquid effluent has been established. Plants at Anniston, Alabama, Newport, Wales and Sauget, Illinois have monitored plant effluents and taken action to lower PCB's in the effluent. Target of 10 ppb not yet achieved.

WATER_PCB-SD0000068294

Action - All plants to continue emphasis on control to achieve target of 10 ppb in effluent.

Responsibility - Manufacturing Manager

Date - By September 1, 1970

2. Objective - Inform customers of the PCB problem and the importance of preventing environmental pollution both at their plants or by their products.

Status - All Functional Fluid and Plasticizer customers in the U.S. have been informed. Customers in Canada, U.K., South America and Continental Europe have not been informed.

Action - Inform customers in Canada and U.K. Customers in Europe will not be informed until concensus is reached by all PCB producers in Europe. Notification of South American customers to follow.

Responsibility - Sales Directors - Functional Fluids and Plasticizer Groups

Date - Canada and U.K. by May 1, 1970
Europe and South America - as indicated.

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3. Objective - Develop products to replace Aroclors for those uses in which Aroclors have been demonstrated to be harmful to the environment and cannot be prevented from escaping to the environment.

Status - Work on product substitutes has been directed primarily at Industrial Fluids applications, and NCR Paper coating. Water-glycol mixtures, brominated Aroclors, brominated biphenyl, silicates, blends using chlorinated terphenyls with lower chlorinated biphenyls, terphenyls with phosphate esters, phenyl ether with biphenyl, chlorinated paraffins, and fractionated Aroclor 1242 are all under study for Functional Fluids application. Alkylated biphenyls and HB-40 (hydrogenated terphenyls) appear promising for NCR Paper applications.

Action - Accelerate efforts to develop acceptable substitute products.

Responsibility - Managers, Research and Development, Functional Fluids and Plasticizer Groups.

Date - Major needs by year end.

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4. Objective - Develop reliable analytical procedures for determining PCB content of liquids, gases and solids.

Status - Procedures have been developed. Copies have been offered to university and governmental laboratories. Comments regarding our procedures and comparison of results with other procedures have been solicited. Arrangements have been made for exchange of samples to verify analytical results.

Action - Continue to refine methodology until we reach a level of competence which will provide data whose accuracy will not be challenged.

Responsibility - Section Manager, Applied Sciences

Date - July 1, 1970

5. Objective - Develop methods for effective disposal of wastes containing PCB without contaminating the environment.

Status - Studies are being conducted on biodegradability, incineration and removal from water solutions.

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Biodegradability studies with aclimatized micro-organisms are being conducted at Ruabon. Data to date indicates that the monochlor and some of the di- and trichlor biphenyls degrade; remaining PCB's are highly resistant. Studies in St. Louis in river water indicate high resistance to degradation.

Incineration tests of 1242, 1260 and Inerteen PPO indicate combustion can be sustained with minimum fuel requirements. Stack gas samples were taken for analysis to determine degree of destruction.

Recovery of Aroclors from dilute water solutions is being studied at Anniston and by MRC at Dayton. At Anniston, adsorption on carbon is being evaluated. At Dayton, the use of acid clays is being studied.

At the W. G. Krummrich plant, the removal of Aroclors from HCl gas streams by high temperature cracking are being studied.

Action - Continue biodegradation work at both Ruabon and St. Louis to establish degree of degradation possible and optimum conditions required.

Responsibility - Manager, Research and Development - Functional Fluids Group

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Date - October 1, 1970

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Action - Evaluate alternate methods of disposal by incineration - Monsanto operated vs. contract.

Responsibility - Engineering Manager, Functional Fluids, CED

Date - July 1, 1970

Action - Continue the work at Anniston, Krummrich and Dayton on the removal of PCB from water streams.

Responsibility - Manager, Research and Development Functional Fluids Group

Date - September 1, 1970

6. Objective - Develop methods for reclaiming and re-using off-grade fluids containing PCB.

Status - Limited reclaiming has been achieved by Findett, Inc. Arrangements have been made for the reworking of a tank car of material at W. G. Krummrich plant. Initial efforts will be concentrated on returned material from large electrical customers. Meanwhile, customers are holding material for further instructions or are dumping in authorized

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land fills.

Action - Develop procedure for processing of returned material.

Responsibility - Manager, Research and Development Functional Fluids Group.

Date - May 1, 1970

Action - Select and modify as necessary, the required equipment at the W. G. Krummrich plant.

Responsibility - Manufacturing Manager

Date - September 1,1970

7. Objective - Determine effects of PCB's on birds, aquatic life, animals and humans.

Status - Toxicity studies are being made for Monsanto by Industrial Bio-Test Laboratories. Studies include two year oral toxicity on rats, three generation reproduction study on rats, two year oral toxicity on dogs and studies on egg production, hatchability and survival on chickens. The Aroclors used in these studies are Aroclor 1242, Aroclor 1254 and Aroclor 1260.

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Results to date indicate the following: Liver enlargement in male rats at 100 ppm; body weight loss in dogs by higher chlorinated Aroclors; rat reproduction effected by 100 ppm Aroclor 1242 or Aroclor 1254; chicken reproduction effected by lower chlorinated Aroclors.

Studies on fish were attempted, but were discontinued when cross contamination was discovered. These studies will be resumed.

Action - Continue studies now underway. Evaluate need for extending studies. Resume fish toxicity studies.

Responsibility - Medical Department

Date - Complete by mid-1971.

8. Objective - Establish and maintain favorable relationships with the press, governmental agencies, the public and the universities.

Status - Relationships are excellent. We have expressed interest in studying the problem and indicated that we wish to cooperate to help identify and solve it. Pressure to divulge more information

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will continue to increase.

Action - Appropriate Monsanto personnel will continue to participate in activities related to the PCB problem in a manner which will maintain our excellent relationship.

Responsibility - All personnel

Date - Continuing

V. COSTS

Costs for the program for 1970 have been budgeted as follows:

Program
Develop Analytical Procedures
Toxicity Studies
Plant Effluent Studies
Biodegradability Studies
Develop disposal methods
Reclaiming Systems design
Substitute Products
Overall Administration

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