Monsanto

FROM (NAME & LOCATION) W. B. PAPAGEORGE - ST. LOUIS

DATE MARCH 30, 1970 CC:

SUBJECT

REFERENCE

E-311

TO :

H. S. BERGEN
M. W. FARRAR - SECOND STREET
E. V. JOHN
R. 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

DSW 371798

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 attheir 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.

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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 customers 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.

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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 relaible 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

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.

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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

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	Budget $ M
Develop Analytical Procedures	$ 80
Toxicity Studies	100
Plant Effluent Studies	105
Biodegradability Studies	40
Develop disposal methods	50
Reclaiming Systems design	30
Substitute Products	150
Overall Administration	115
	$670

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Monsanto

Aroclors

FROM (NAME & LOCATION) E. S. Tucker - R&D Laboratories - South Second Street

DATE September 25, 1969

cc M. W. Farrar - Res. 1
W. R. Richard - GO
E. P. Wheeler - GO

SUBJECT WISCONSIN ALUMINI RESEARCH FOUNDATION INSTITUTE TRIP REPORT - SEPTEMBER 24, 1969

REFERENCE

TO R. E. Keller - Res. 1

A review and comparison of the PCB analytical methodology developed here and independently in the WARF laboratories was held with F. Coon (director, chemical analysis section), J. Birdsall (project coordinator), and D. Hughes (analyst) in Madison, Wisconsin at their research laboratories. Their procedures, with minor exceptions, were an exact duplication of ours and as such should produce equivalent results.

We, therefore, agreed to exchange a limited number of Lake Michigan samples and extracts for collaborative verification between the two sites. The exchange samples will be restricted to those producing abnormal electron capture chromatograms which could be misinterpreted unless subjected to GC/Mass verification. They do not presently have this capability although they are certainly thinking along these lines. They were also obviously interested in our help in identifying pollutants other than those already identified in these abnormal samples. Whether or not we share information above and beyond the PCB problem is, of course, open and obviously dependent on what other materials, in addition to PCBs, we actually find in these samples.

They requested "pint bottle" amounts of Aroclor 1242, 1254 and 1260. The reason given for the rather large amounts requested was that they have had many requests for standard samples of these materials which they would like to fill in order to maintain these contacts. While they would rather dispense the Aroclors themselves, they agreed that they could and would refer all requests to us if we felt this was better.

This laboratory, in my opinion, is well equipped and competently staffed. In addition to this, I found their attitude toward the PCB pollution problem to be acceptably scientific rather than political in nature.

Additionally, I believe that we should consider using WARF facilities to eliminate some of our current manpower and routine sample backlog problems.

The chromatograms I saw of the Lake Michigan samples they had looked at corresponded to the higher chlorinated biphenyls 1254 and 1260. The samples taken in and around the industrial areas (southern one-third of lake) appeared to contain the higher levels.

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IN-10 REV. 11-65

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In view of this, our current Pensacola problem, and other published information, I would suggest that we step up our efforts at finding immediate replacement formulations for Pydraul AC and Pydraul 625. I also feel that Aroclor 1242 should not be used in replacement formulations. If this were done, I firmly believe that in a short period of time analysts would soon be reporting Aroclor 1242 as a significant water pollutant thus seriously endangering a market which so far has not been questioned.

E. S. Tucker

db

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