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MINUTES OF MEETING OF THE CORPORATE DEVELOPMENT COMMITTEE

November 17, 1969

Present: Messrs.
E. J. Beck, Chairman
H. H. Sible
J. R. Eck
J. L. Gillis
E. J. Putzell
C. H. Sommer
J. M. Ehlers, Secretary

ORGANIC DIVISION, LAW AND MEDICAL DEPARTMENTS -- REPORT ON POLY-CHLORINATED BIPHENYLS

Present: Messrs. C. J. Smith, J. Mason, T. K. Smith, M. S. Bergen, J. E. Springgate, R. E. Kelly, E. P. Wheeler, Rodney Harris, Jr., D. W. Miller, W. C. Robinson

Monsanto's worldwide Aroclor business amounts to 104 M lbs./yr., 70M used in functional fluids and 34 M in plasticizers. This represents $22 M in sales. Products range from monochlorobiphenyl

EXHIBIT 2 SPRINGGATE 5-1-84

PLAINTIFF'S EXHIBIT P377

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to decachlorobiphenyl, terphenyls, and chlorinated terphenyls. Production locations are at Anniston, Alabama, Sauget, Illinois, Newport, U.K. and Yokkaichi, Japan.

Environmental Aspects - E. P. Wheeler

The 5 and 6 chlorinated biphenyls (Aroclor 1254 and 1260) have been found at limited locations in water, in birds and some forms of aquatic life. Recent indications are that such biphenyls may affect reproduction of fowl life and may be toxic to shrimp. These products are not toxic from the acute standpoint to man or fish but there is some evidence of ecological buildup in certain water deposits, in fish and ultimately in bird life.

- Aroclors 1248 and lower in number are believed to be biodegradable but this has not been conclusively established as yet.

Redacted

Plan of Action - H. S. Bergen and J. E. Springgate

The availability of alternate products to satisfy customer requirements was reviewed. Main problems are that no replacement product is available for capacitors and replacement products for other uses pose a pollution problem.

In plasticizer uses, evidence is not available as to whether Aroclors escape from end products, either through leaching or by dispersal in burning.

The recommended plan of action is to establish a tailored program for each business group and each customer market situation to assure that the loss of PCB's in the environment, if any, is minimal.

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1. Appoint a Project Manager - responsible for the overall management of the Aroclor pollution problem. He would be assisted by a Task Force from members of each business group plus Medical, Law, Engineering and Manufacturing.

2. Notify all Aroclor customers of PCB problem.

3. Reduce and effectively control PCB effluents from Monsanto plants.

4. Educate customers on need to reduce and effectively control PCB effluents at their plants.

5. Develop and implement new packaging systems for Aroclor 1254/1260.

6. Introduce to market, replacement products for Aroclor 1254/1260.

7. Continue and expand biodegradation test program with Aroclor series, particularly 1242, 1248 and 1254.

8. Continue toxicological test program.

9. Accelerate present analytical test program.

10. Determine feasibility and cost of eliminating 5/6 Cl_2 in Aroclors 1242 and 1248.

11. Study incineration products.

12. Develop business plan to offer:

    - Monsanto Fluid Reclamation and Recovery with Envirc Chem. (Reclamation already under way at Pindott.)

Cost of this program is estimated at approximately $400M SARE and $700M capital to change equipment.

Conclusions: In light of the recent and developing evidence of a possible threat to certain species of bird and aquatic life, we should plan to discontinue the manufacture of Aroclors 1254 and 1260. The Division is instructed to develop a program to discontinue these products and report this to the Committee.

The status of Aroclor 1242 should continue to be tested to determine whether it contributes to this problem. Other products which might be involved should also be examined.
(Excerpt to Messrs. H. L. Hinckley, Rodney Harris, Jr., R. E. Kelly, T. K. Smith.)

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Speigate - X

PCB PRESENTATION Nov 17, 1969

TO

CORPORATE DEVELOPMENT COMMITTEE

I. INTRODUCTION:

We are here today to acquaint you with the PCB (Aroclor) pollution problem and to secure your guidance and approval on a recommended plan of action.

Certain PCB's have recently been identified by various scientists along with DDT in fish, birds, and other wildlife.

From the standpoint of reproduction, the PCB's are highly toxic to birds. In a few moments, Elmer Wheeler will describe the problem in detail.

Our objective is to describe for you the basic problems, the issues involved, review alternative courses of action, and suggest an action plan program for your approval.

This is a serious matter, not only from the pollution viewpoint, but also because of the $22 M worldwide customer business involved with resultant gross profits of $10 M and a net investment of approximately $9 M. In addition, there could be possible adverse legal and public relations problems leveled against Monsanto.

Our Agenda will be as follows:

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PCB AGENDA REVIEW

I. INTRODUCTION

II. THE PROBLEM

- DEVELOPMENTS INCRIMINATING PCB's
- COMPLEXITY OF IDENTIFICATION
- NATURE OF
- SERIOUSNESS

III. LAW DEPARTMENT VIEWPOINT AND RECOMMENDATIONS

IV. EFFECT ON MONSANTO AND ALTERNATIVES

V. FUNCTIONAL FLUID BUSINESS GROUP DISCUSSION

- MARKETS, USES
- SOURCES OF POLLUTION
- CUSTOMER EFFECT

VI. PLASTICIZER BUSINESS GROUP DISCUSSION

- MARKETS, USES
- SOURCES OF POLLUTION

VII. RECOMMENDED ACTION PLAN

VIII. SUMMARY

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By way of introduction, the Organic Division and the Medical Department has been actively engaged for the last 18 months in developing facts and knowledge on this subject by personal visits to Universities and Industrial test laboratories, other worldwide producers, and other industrial collaborators, as well as keeping abreast of all literature and news sources on the subject as well as funding a toxicological and analytical test program in excess of $100 M. We established an Ad Hoc Committee of both Business Groups and Medical which recently issued a report - much of which will be discussed today. We have learned a lot, but there is much yet to learn as you will hear.

What are PCB's? They are polychlorinated biphenyls - better known to us as Aroclors. The next slide will quickly re-familiarize you with our Aroclor business.

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MONSANTO WORLDWIDE AROCLOR BUSINESS

POUNDS/YEAR	104 M (70 M in Functional Fluids 34 M in Plasticizers)
SALES/YEAR	$22 M ($16 M in Functional Fluids $ 6 M in Plasticizers)
GROSS PROFIT/YEAR	$10.0 M ($7.5 M in Functional Fluids $2.5 M in Plasticizers)
GROSS INVESTMENT	$13 M ($8.8 M net investment)
ROI	10.5%
WORLDWIDE M/I	62%
MONSANTO PRODUCTION LOCATIONS:	USA (2 plants, Anniston, Alabama Sauget, Illinois) UK (Newport) JAPAN (Yokkaichi)
OTHER PRODUCERS:	Bayer, Prodelec, Caffaro, Flick, Kanegahuchi, and several Eastern European producers (all ex-USA)

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THE AROCLOR PRODUCT LINE

CHEMICAL NAME	TRADE NAME	NATURE OF MATERIAL
MONOCHLOROBIPHENYL	AROCLOR 1221	THIN LIQUID
DICHLOROBIPHENYL	AROCLOR 1232	
TRICHLOROBIPHENYL	AROCLOR 1242	OILY LIQUID
TETRACHLOROBIPHENYL	AROCLOR 1248	
PENTACHLOROBIPHENYL	AROCLOR 1254	HEAVY MOLASSES
HEXACHLOROBIPHENYL	AROCLOR 1260	THICK TAR
HEPTACHLOROBIPHENYL	AROCLOR 1262	
OCTACHLOROBIPHENYL	AROCLOR 1268	
DECACHLOROBIPHENYL	AROCLOR 1270	SOLID
TERPHENYLS	SANTOWAX	
CHLORINATED TERPHENYL	AROCLOR 5460	SOLID

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There are theoretically 210 different isomers of chlorinated biphenyls.

Monsanto entered the Aroclor market in 1930 by acquiring Swan Chemical Company. The first load of Aroclor went out of Anniston, Alabama to General Electric in 1931. Since then, the market has grown to one of Monsanto's most profitable franchises. This franchise is now being threatened by recently found pollution problems which Elmer Wheeler will now discuss.

II. The Problem (Wheeler) - see attached Appendix A

III. Law Department Viewpoint and Recommendations (French)

IV. Effect on Monsanto and Our Alternative Courses of Action

As discussed, Aroclors 1254 and 1260 -- the 5 and 6 Cl ringed biphenyls are the ones most seriously involved in the pollution problem. Both Plasticizers and Fluids Groups are involved as shown:

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AROCLOR SALES

(M POUNDS)

	FLUIDS	PLASTICIZERS	TOTAL
AROCLOR 1254	1.45	5.4	6.85
AROCLOR 1260 & ABOVE	3.7	1.7	5.4
	5.15	7.1	12.25

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We considered 4 alternative courses of action;

(Slide)

Alternative 1: Do nothing was considered unacceptable from a legal, moral, and customer, public relations & company policy viewpoint. This is also the quickest route to being forced out of business.

Alternative 2: Go out of total Aroclor business was considered unacceptable from a Divisional viewpoint, but from a Corporate viewpoint may be necessary. Only you can make that decision. All Aroclor products are not serious pollutants - many degrade; there is too much customer/market need and selfishly too much Monsanto profit to go out. To go out would require a write off of Aroclor net investment of $7 MM (10¢/share) or if biphenyl included $8.8 MM (12¢/share). In addition, inventory disposition, continuing cost of utilities, and back-up capital and serious manpower & resources reallocation at Anniston.

Alternative 3: Go out of Aroclor 1254 and 1260. This was seriously considered and may eventually occur by our actions and customer actions, nevertheless, we feel that segments of this business are defensible or are so "confined" in use that specific plans of action are called for this portion. Our reasons for eliminating this alternative will become clearer as we outline our action plans.

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ALTERNATIVE COURSES OF ACTION

1. DO NOTHING - JUST REACT TO LEGISLATION AND EMOTION.

2. GO OUT OF TOTAL AROCLOR BUSINESS.

3. GO OUT OF AROCLOR 1254 AND 1260 PRODUCTION

4. DEVELOP SPECIFIC ACTION PLANS "TAILORED" TO EACH BUSINESS GROUP AND EACH CUSTOMER/MARKET SITUATION TO "CLEAN UP" THE MESS.

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Alternative 4: Develop specific action plans tailored to each Business Group and each customer/market situation, - was the alternative selected at this point of time and based on our knowledge from a Divisional viewpoint as making Monsanto act in the most positive, responsible way to society and our customers, as well as our interests.

However, because of the magnitude and seriousness of this problem and its total implications for Corporate Monsanto, the final decision on this matter must be made by the CDC.

V. Functional Fluids Business Group Discussion:

Aroclors are used widely in 3 of our 4 market areas in the Fluids Group:

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FLUIDS USE OF AROCLORS
BY MARKET AREA

AROCLOR PRODUCT	DOMESTIC MARKET AREA			TOTAL
	INDUSTRIAL	HEAT TRANSFER	ELECTRICAL	
1242	4.1	1.1	36	41.2
1248	1.2	1.0	-	2.2
1254	-	0.1	0.8	0.9
1260 & Above	0.6	-	3.5	4.1
	5.9	2.2	40.3	48.4

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SOURCES OF FLUIDS POLLUTION

APPLICATION	INTENSITY OF POLLUTION	
INDUSTRIAL FLUIDS	GREATEST	(DIRECT)
DIELECTRICS	↓	(INDIRECT CONTAINED)
HEAT TRANSFER	↓	(INDIRECT CONTAINED)
PRODUCING PLANTS	LEAST	(DIRECT)

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FLUIDS CUSTOMER ALTERNATIVES

AREA OF APPLICATION	PRODUCT OF CHOICE	CUSTOMER OPTIONS
Industrial Fluids	Pydraul 312/F-9/ A-200/Phosphate Esters/ Water Glycol	Customer could get along without us, but Pydraul 312 favored. H_2O Glycol has some pollution problems Phosphate ester route ok at present.
Transformer	Air/Oil/Aroclor/Gas	Could drop Aroclor at sacrifice of safety, cost or size of equipment or noise level.
Capacitors	Aroclors	No immediate replacement available. Longer term - oil at expense of size and cost of efficiency and redesign of equipment.
Heat Transfer	Therminol	No option for FR liquid market. Other system possibility.
	Oil/Dowtherm/T66 T55 T77 T88	Liquid systems favored. T66 and T55 increasing rapidly in use. Oil also a pollution problem.

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Customer Choices & Alternatives & Penalties:

Summarizing, some of our customers have no immediate alternative, some could change only at sacrifices of safety, or cost or various technical factors. Only in the Industrial field could the customer make an immediate conversion.

PCB Threat to Functional Fluids Business and Profit:

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FLUIDS BUSINESS THREATENED

(1970 BUDGET)

PROBLEM	SALES	GROSS PROFIT
1. Confined to A-1254/ 1260 only.	$ 3.0 M	$1.36 M
2. Spreads to A-1242 and 1248		
First to: a) Industrial Fluids	$ 4.0 M	$1.6 M
Then to: b) Dielectric Fluids	$ 8.0 M	$3.8 M
Then to: c) Heat Transfer	$ 1.0 M	$ .6 M
	$16.0 M	$7.36 M

... Turn over to Jim Springgate

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VI

PLASTICIZERS
(WORLD-WIDE)

	ALL ALCOHOLS	AROCLOR 1254/1260 TYPE
1969 SALES, DOLLARS	$ 6.0 MM	$1.7 MM (28%)
POUNDS	34.0 MM	9.5 MM (28%)
1969 GROSS PROFIT	$ 2.5 MM	$0.8 MM (32%)

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CONCERNS: DISTINCTIONS FROM F.F.

1. Large number of direct U.S. customers - 570.
2. Customers are small: 23 direct customers - 47% A-1254/1260 sales.
3. 50% domestic A-1254/1260 sales through distributors - difficult to police.

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[illegible]	[illegible] SALES	MAJOR AROCLOR USED
Carbonless Carbon Paper	8.8 M lb.	Aroclor 12[illegible]2
Hot Melt Adhesives	5.7 M lb.	Aroclor 5460
Swimming Pool Paints	1.7 M lb.	Aroclor 12[illegible] Aroclor 5[illegible]0
Protective Coatings	5.3 M lb.	Aroclor 125[illegible] Aroclor 5[illegible]
[illegible] Adhesives	1.5 M lb.	Aroclor [illegible] Aroclor 1260
Sealants	3.0 M lb.	Aroclor [illegible] Aroclor 1[illegible]2
[illegible] Modification	2.0 M lb.	Aroclor [illegible] Aroclor 5[illegible]
Miscellaneous	5.0 M lb.	Aroclor [illegible] Aroclor 12[illegible]

[illegible] major customer (8[illegible]% of Aroclor [illegible] sold).

[illegible] of domestic Aroclors sold [illegible].

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POSSIBLE CONTAMINATION SOURCES

(PLASTICIZERS)

SOURCE OF CONTAMINATION	EXAMPLE	APPLICATION	SOURCE	IS A-1254 /1230 USED?
Hull	Coatings	Marine Paints) Water tank linings)	Leaching	Yes
	Coatings	Swimming Pool Paints	Leaching	Yes
-	Chemicals Carbon Paper	-	Vaporization	No
	Wax Modification	-	Vaporization	Yes
	Various Adhesives	-	Contact with product via packaging. Incineration.	Yes
	Low Melt Adhesives	-	Contact with product via packaging. Incineration.	No
Hull	Sealants	Automotive [illegible] joint sealants	Long-term leaching	Yes

[illegible] of the liquids, Aroclor plasticizers are combustible [illegible] product - therefore, [illegible]

[illegible] from our manufacturing [illegible] of drums common to both [illegible]

[illegible] adhesive coatings are not considered [illegible]

[illegible]

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PLASTICIZER BUSINESS THREATENED

PROBLEM	SALES REFERENCE	S.G.P. RETAINED (LOST)
1. Confined to A-12[illegible]/1260 type only.	$4.3 M	$1.7 M (-$0.8 M)
2. Spread to all chlorinated biphenyls.	$2.0	$0.6 M (-$1.9 M)
3. Spread to all [illegible] and [illegible] chlorinated [illegible]	0.0	0.0 (-$2.5 M)

[illegible] on [illegible] prospects.

[illegible] [illegible] soil [illegible] color 1262/[illegible] which are [illegible] [illegible] to A-125[illegible]/[illegible] and these have been included [illegible] A-12[illegible]/1260.

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RECOMMENDED ACTION PLAN

THE JOINT ACTION PLAN DEVELOPED BY THE FUNCTIONAL FLUIDS AND PLASTICIZER BUSINESS GROUPS, AND THE MEDICAL AND LAW DEPARTMENTS IS AS FOLLOWS:

1. Appoint a Project Manager - responsible for the overall management of the Aroclor pollution problem. He would be assisted by a Task Force from members of each Business Group plus Medical, Law, Engineering and Manufacturing.

2. Notify all Aroclor customers of PCB problem and relabel containers - within 60 days.

3. Clean up Monsanto plants' effluents within 12 months.

4. Develop and implement new packaging systems for Aroclor 1254/1260 - within 6 months.

5. Educate customers on need for clean-up at their plants - within 4 months.

6. Introduct to market, replacement products for Aroclor 1254/1260 - beginning 1/1/70 (Fluids), 4/1/70 (Plasticizers).

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RECOMMENDED ACTION PLAN

7. Continue and expand biodegratation test program with Aroclor series, particularly 1242, 1248 and 1254.

8. Continue toxicological test program.

9. Accelerate present analytical test program.

10. Determine feasibility and cost of eliminating 5/6 Cl_2 in Aroclors 1242 and 1248. (3/70)

11. Study incineration products. (3/70)

12. Develop business plan to offer:

    Monsanto Fluid Reclamation and Recovery with Enviro Chem (4/70). (Reclamation already underway at Findett.)

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WHAT SHOULD WE EXPECT FROM THIS PROGRAM?

Through this action program, Monsanto would expect to:

1. Retain or convert a good portion of our business and profits:

PROBLEMS	CONVERT OR RETAIN	$M SALES OUT OF PRESENT	ODDS OF SUCCESS
a. Confined to A-1254/ 1260.	$20.3 M	$22 M	70%
b. Spreads to A-1248 and 1242.	$10 M	$22 M	60%

2. Obtain further valuable knowledge and time to:
   a. Learn more facts.
   b. Protect our position.
   c. Make further decisions regarding our program.
   d. Contribute to overall pollution knowledge.

3. Clean up the major contributing PCB pollution factors.

4. Minimize customer complaints and hardships.

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The Program Would:

1. Cost some money.

   Est. SARE - $400-500 M

   Est. Capital - $700 M

   $1.1 M - 1.2 M

2. Expose us to continued adverse publicity and possible law suits.

3. Cause some customer discontent - but much less than an abrupt termination of production.

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