Springate — 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 [illegible] 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 M (10¢/share) or if biphenyl included $8.8 M (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 Springett

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PLASTICIZERS
(WORLD-WIDE)

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

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COMMENTS: DISTINCTIONS FROM F.P.

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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MARKETS	1968 SALES	MAJOR AROCLOR USED
Carbonless Carbon Paper	8.8 M lb.	Aroclor 1242
Hot Melt Adhesives	5.7 M lb.	Aroclor 5460
Swimming Pool Paints	1.7 M lb.	Aroclor 1254 ✓ Aroclor 5460)
Protective Coatings	5.3 M lb.	Aroclor 1254 ✓ Aroclor 5460)
Emulsion Adhesives	1.5 M lb.	Aroclor 1254) Aroclor 1260 ✓
Sealants	3.0 M lb.	Aroclor 1254) Aroclor 1260)
Wax Modification	2.0 M lb.	Aroclor 1254 ✓ Aroclor 5460)
Miscellaneous	5.0 M lb.	Aroclor 1260) ✓ Aroclor 1254)

COMMENTS: 1. One major customer (65% of Aroclor 1242 sold).

4. 55% of domestic Arochlors sold [illegible].

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POSSIBLE CONTAMINATION SOURCES

(PLASTICIZERS)

DEGREE OF CONTAMINATION	MARKET	APPLICATION	SOURCE	IS A-1254 /1260 USED?
Most	Coatings	Marine Paints, Water tank linings	Leaching	Yes
	Coatings	Swimming Pool Paints	Leaching	Yes
	Carbonless Carbon Paper	-	Vaporization	No
	Wax Modification	-	Vaporization	Yes
	Emulsion Adhesives	-	Contact with product via packaging. Incineration.	Yes
	Hot Melt Adhesives	-	Contact with product via packaging. Incineration.	No
Least	Sealants	Automotive (Construction) Joint Sealants	Long-term leaching	Yes

NOTES: 1. In the fluids, Aroclor plasticizers are combined into plastics to produce the final product - therefore, [illegible].

2. Problems such as wastes from our manufacturing plants, recovery plants and leasing of drums common to both groups.

3. [illegible] or protective coatings are not considered a high [illegible] of [illegible].

4. [illegible] plant processing or [illegible].

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PLASTICIZER BUSINESS THREATENED

PROGRAM	SALES RETAINED	$ G.P. RETAINED (LOST)
1. Confined to A-1254/1260 type only.	$4.3 M	$1.7 M (-$0.8 M)
2. Spreads to all chlorinated biphenyls.	$2.0	$0.6 M (-$1.9 M)
3. Spreads to all PCB's and all chlorinated biphenyls	0.0	0.0 (-$2.5 M)

Based on 469 prospects.

NOTE: Manufacturers sell Aroclor 1262/1465 which are very close to A-1254/1260 and these have been included in A-1254/1260.

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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).

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 COULD 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. Gain 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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SUMMARY

In summary, the PCB pollution problem is a very serious one. It is a worldwide ecological problem. At present the most serious offenders are the 5 and 6 chlorine containing products (Aroclors 1254 and 1260). There are some indications other members are biodegradable to varying degrees. Currently, much scientific testing is underway and more information will be forthcoming. Monsanto must act in a positive cooperative fashion. A plan of action has been discussed which we feel indicates responsible action. Our stakes are large and because of the many possible effects on the Corporation -- your guidance and approval of the suggested action program is requested.

Thank you for your consideration. May we answer any questions?

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GENTLEMEN:

MY PARTICIPATION IN THIS PRESENTATION WILL BE A BRIEF REVIEW OF THE DEVELOPMENTS WHICH INCRIMINATE THE POLY-CHLORINATED BIPHENYLS INCLUDING OUR AROCLORS AS NEARLY WORLD-WIDE ENVIRONMENTAL CONTAMINANTS.

EXAMPLES ARE THE ALMOST COMPLETE DISAPPEARANCE OF THE PEREGRINE FALCON ALONG THE NORTHEAST COAST OF THE UNITED STATES; DEPLETION IN POPULATION OF THIS SPECIES IN CALIFORNIA; AND THE REPORTED EFFECT ON THE BROWN PELICAN IN CALIFORNIA.

3) PCB'S ARE PARTICULARLY TOXIC TO SHRIMP.

AT PENSACOLA, THERE WAS A LOSS OF 1 TO 3 GALLONS PER DAY OF AROCLOR 1254 INTO THE ESCAMBIA RIVER FROM OUR NYLON PLANT. THE RESULTANT CONCENTRATIONS OF PCB ONE-QUARTER MILE BELOW THE PLANT WERE ABOVE THE LEVELS NEEDED TO KILL JUVENILE SHRIMP IN LABORATORY TESTS.

4) THERE ARE STILL MANY UNKNOWNS BUT SPECULATION AS TO THE ROLE OF PCB'S IS RAMPANT.

ALTHOUGH SOME OF THE REPORTS OF ANALYTICAL IDENTIFICATION may not be valid ARE NOT CERTAIN, THE MEDICAL DEPARTMENT--AFTER 18 MONTHS OF INVESTIGATION IN CONJUNCTION WITH THE ORGANIC DIVISION--IS CERTAIN THAT THE PCB'S CAN BE RESPONSIBLE FOR ECOLOGICAL DAMAGE. THERE IS NO SCIENTIFIC CONSENSUS AS TO THE DEGREE OF PCB INVOLVEMENT BUT THESE COMPOUNDS CANNOT ESCAPE A SIGNIFICANT SHARE OF THE BLAME FOR DAMAGE.

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5) SPECULATION IS LEADING TO CONCERN WHICH MAY GROW TO ALARM.

THE MEDICAL DEPARTMENT BELIEVES THAT THE MYRIAD OF INVESTIGATORS PRESENTLY WORKING ON PCB'S IN GOVERNMENT AND UNIVERSITY LABORATORIES IS CERTAIN TO PROMOTE A MORE PROMINENT ROLE FOR PCB DAMAGE, LEADING AT BEST TO EXTREMELY DAMAGING PUBLICITY AND, AT WORST, LEADING TO COMPLETE BANNING OF THESE PRODUCTS.

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CERTAINLY ALL OF YOU ARE AWARE OF THE PRESENT CONCERN ABOUT THE RESIDUES OF DDT, ITS METABOLITES AND OTHER CHLORINATED HYDROCARBON PESTICIDES THROUGHOUT THE WORLD. SINCE WORLD WAR II AND IN THE LAST DECADE IN PARTICULAR, THERE HAS BEEN A SAMPLING NETWORK WHICH HAS IDENTIFIED DDT AND ITS METABOLITES IN PRACTICALLY EVERY LIVING ORGANISM AND IN THE AIR, WATER AND SOIL ACROSS THE FACE OF THE GLOBE. IT WOULD NOT BE UNEXPECTED TO FIND THAT EACH OF US IN THIS ROOM HAS 5 TO 10 ppm OF DDT IN OUR FATTY TISSUES.

AS ANALYTICAL TECHNIQUES HAVE IMPROVED AND INCLUDED VERY SENSITIVE GAS CHROMATOGRAPHY METHODS, INTERFERING SUBSTANCES HAVE APPEARED WHICH RAISE QUESTIONS AS TO THE VALIDITY OF PRESENT AND EARLIER DETERMINATIONS OF DDT MATERIALS.

THIS DIAGRAM INDICATES THE GAS CHROMATOGRAMS OF SEVERAL OF OUR AROCLORS. AT THE BOTTOM THE PEAKS FOR VARIOUS HYDROCARBON PESTICIDES ARE SHOWN. IT IS OBVIOUS THAT SOME OF THE PREDOMINANT PEAKS IN THE AROCLORS FALL IN THE SAME POSITION IN TERMS OF RETENTION TIME AS DDT

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AND ITS METABOLITES. PLEASE NOTICE THAT THIS IS PARTICULARLY TRUE FOR AROCLORS 1254 AND 1260 AND IT IS THESE TWO PARTICULAR POLYCHLORINATED BIPHENYLS, WHETHER MANUFACTURED BY MONSANTO OR OUR COMPETITORS, THAT ARE THE PRODUCTS WHICH ARE MOST CONSISTENTLY IDENTIFIED (PENTA ~~TO-OCTA~~ and Hexa CHLORO). LET ME EMPHASIZE THIS POINT BECAUSE IT HAS A PARTICULAR BEARING ON THE FUTURE MANUFACTURE, SALES AND USE OF THE WHOLE PRODUCT LINE.

WHERE HAVE THE PCB'S BEEN FOUND?

THIS NEXT TRANSPARENCY INDICATES LOCATIONS WHERE THESE MATERIALS HAVE BEEN REPORTED. THE AMOUNTS FOUND VARY FROM PARTS PER TRILLION IN SOME WATER SAMPLES TO HUNDREDS OF PARTS PER MILLION IN FISH AND SOME FISH-EATING BIRDS.

LET ME DIGRESS A MOMENT TO EQUATE THESE UNITS OF PPM, PPB AND PPT TO SOMETHING THAT WE ALL RECOGNIZE (SHOW TRANSPARENCY ON COMPARISON OF PPM TO FIFTHS).

RETURNING TO THE REPORTED FINDINGS OF THE PCB'S, THE VALUES THAT HAVE BEEN REPORTED IN SWEDEN VARY FROM 10 PPB IN FISH, BIRDS AND EGGS TO 20,000 ppm IN ONE OR TWO SINGLE SPECIMENS. IN THE LATTER CASE, THESE HAVE BEEN DEAD BIRDS AND THERE IS SOME QUESTION AS TO THE VALIDITY OF THE RESULTS. IN REGARD TO CHILDREN"S HAIR, DR. JENSEN HAS POINTED OUT THAT HIS FIVE MONTH OLD CHILD HAD MORE PCB'S IN THE HAIR THAN HIS THREE AND SIX YEAR OLD CHILDREN AND HE POSTULATED THAT THIS WAS DUE TO THE PCB BEING IN MOTHER'S MILK. THE SAME LEVELS OF PCB'S HAVE BEEN FOUND IN FISH, BIRDS, AND EGGS IN

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GREAT BRITAIN AND THE NETHERLANDS. IN THE UNITED STATES AS WE HAVE INDICATED, THE PCB'S HAVE BEEN FOUND IN IN-LAND WATERS. THIS IS QUITE DIFFERENT UP TO THIS POINT AS REGARDS THEIR DISTRIBUTION IN GREAT BRITAIN, IN THE NETHERLANDS AND IN THE SCANDANAVIAN COUNTRIES. PERHAPS I SHOULD REMIND YOU THAT MONSANTO IS THE SOLE PRODUCER AND SUPPLIER OF POLYCHLORINATED BIPHENYLS IN THE UNITED STATES AND GREAT BRITAIN. THIS IS IMPORTANT SINCE ANY PUBLIC OR GOVERNMENTAL AGENCY ACTIVITY WHICH MAY LEAD TO THE RESTRICTION OF USE OF POLYCHLORINATED BIPHENYLS MAKES MONSANTO PARTICULARLY VULNERABLE FROM A PUBLIC RELATIONS STANDPOINT IN THE UNITED STATES, GREAT BRITAIN AND PROBABLY CANADA.

IN TERMS OF TOXIC OR HARMFUL EFFECTS FROM THE PRESENCE OF PCB'S, WE CAN MAKES THESE STATEMENTS SUPPORTED BY A GROWING AMOUNT OF TOXICOLOGICAL RESEARCH DATA:

1. THE AROCLOR'S ARE NOT HIGHLY TOXIC FROM AN ACUTE STANDPOINT TO MAN, ANIMALS, BIRDS OR FISH. FOR EXAMPLE, THEY ARE NOT NEARLY AS TOXIC AS DDT AND CERTAINLY MUCH LESS TOXIC THAN DIELDRIN AND ALDRIN.
2. FROM A CHRONIC TOXICITY STANDPOINT, THE PCB'S MAY BE CONSIDERED "MODERATELY TOXIC" TO MAN, ANIMALS AND FISH. FROM THE STANDPOINT OF REPRODUCTION, THE PCB'S ARE HIGHLY TOXIC TO BIRDS. THIS CONCLUSION IS BASED ON ON-GOING RESEARCH AT OUR CONSULTING LABORATORY IN CHICAGO WHERE WHITE MAE 058625 LEGHORN CHICKENS--A RELATIVELY RESISTANT MEMBER OF THE BIRD SPECIES--ARE LAYING EGGS AFTER BEING

FED A DIET OF 10 PPM WHICH FAIL TO HATCH. AT 100 PPM THE EGGS HAVE GREATLY REDUCED EGG SHELL THICKNESS AS WELL.

IN THE AQUATIC ENVIRONMENT, SHRIMP APPEAR TO BE PARTICULARLY SENSITIVE TO THE PCB'S. IN A TEST CONDUCTED AT THE BUREAU OF COMMERCIAL FISHERIES LABORATORY, GULFSTREAM, FLORIDA, 5 PPB CAUSED THE DEATH OF 18 OUT OF 25 JUVENILE SHRIMP IN 18 DAYS.

ALTHOUGH AT THIS POINT THE PCB'S ARE NOT BEING TOUTED AS SERIOUS TOXICANTS, THERE HAVE BEEN COMMENTS IN EACH OF THE PUBLICATIONS WHICH HAVE APPEARED WHICH HAVE IMPLIED--IF NOT STATED DIRECTLY--THAT THESE MATERIALS ARE "HIGHLY TOXIC".

THE FUTURE OF THESE MATERIALS IS THREATENED MORE BY THE POTENTIAL EFFECT ON SOME FORMS OF WILDLIFE RATHER THAN POTENTIAL TOXIC EFFECTS AS WE USUALLY THINK OF THEM IN RELATION TO HUMAN OR ANIMAL FOODS. IN THE ENVIRONMENT WE ARE FACED WITH THIS CYCLE--FISH IN WATER CONTAINING PPB OF PCB CONCENTRATE THE MATERIAL TO PPM. THE SWEDES SAY THAT LARGER FISH EATING SUCH SMALLER ONES SHOW A 10 FOLD INCREASE IN THE AMOUNT OF PCB IN THEIR TISSUES. BIRDS THEN EATING THESE FISH SHOW 100 FOLD CONCENTRATION OF PCB FROM THAT IN THE FISH WHICH THEY HAVE EATEN. IT IS POSTULATED AS IN THE CASE OF DDT THAT THIS CONCENTRATION LEADS TO EGGS WITH LITTLE OR NOT SHELL THICKNESS AND WITH DECREASED OR NO REPRODUCTION.

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HOW DO THE PCB'S GET INTO THE ENVIRONMENT?

OUR EFFORTS TO DATE HAVE NOT BEEN COMPLETELY SUCCESSFUL IN PIN-POINTING SOURCES OF THE PCB'S. AS MR. BERGEN AND MR. SPRINGATE WILL DISCUSS SHORTLY, WE DO HAVE SOME IDEAS CONCERNING SPECIFIC PRODUCT USES.

WE CAN, HOWEVER, MENTION THREE INSTANCES WHICH WILL GIVE SOME IMPRESSION AS TO SOURCES SUCH AS OUR MANUFACTURING PLANTS, A MONSANTO "CUSTOMER" PLANT, AND EARLY RESULTS OF WIDE-SPREAD SAMPLING IN LAKE MICHIGAN (SHOW TRANSPARENCY OF SEVERN RIVER, PENSACOLA AND LAKE MICHIGAN). THIS IS AN INDICATION OF THE PCB CONCENTRATION IN MUD NEAR THE OUTFALL OF OUR NEWPORT PLANT. YOU WILL NOTE THE SCALE IN MILES AT THE BOTTOM AND THE DISTRIBUTION OF PCB ALONG THE ESTUARY OF THE SEVERN RIVER.

SIMILAR FINDINGS COULD BE SHOWN FOR THE STREAMS BELOW OUR ANNISTON AND KRUMMRICH PLANTS.

AN INDICATION OF "CUSTOMER" USAGE AS A SOURCE IS INDICATED IN THIS SLIDE. THIS IS A MONSANTO CUSTOMER PLANT WHERE THE PENSACOLA INSTALLATION WAS USING FIRE RESISTANT AIR COMPRESSOR LUBRICANT CONTAINING AROCLOR 1254. IT WAS REPORTED THAT ONE-FOURTH MILE BELOW OUR PLANT OUTFALL, 40 PPB OF PCB WAS PRESENT. AT THE BRIDGE AT HIGHWAY 90, 0.5 PPB WAS REPORTED. THE STATE AND UNIVERSITY IN DOING FURTHER SAMPLING REACHED IN BEHIND THE SKIMMERS ON THE OUTFALL OF OUR PLANT AND FOUND 240 PPB.

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AS A FURTHER EXAMPLE OF THE POSSIBLE SOURCES FROM OUR CUSTOMER PLANTS, THIS TRANSPARENCY SHOWS EARLY REPORTS OF SAMPLES FROM LAKE MICHIGAN. WATER SAMPLES HAVE SHOWN PARTS PER TRILLION TO PARTS PER BILLION OF THE HIGHER CHLORINATED BIPHENYLS. WHEN WE BROUGHT THIS BACK TO OUR MARKETING GROUPS, THEY QUICKLY POINTED OUT THAT ONE COULD ALMOST PIN-POINT OUR CUSTOMER USAGE ALONG THE SHORES OF LAKE MICHIGAN.

THESE THREE INSTANCES REFLECT WHAT MIGHT BE TERMED DIRECT CONTAMINATION. AS YOU WILL HEAR, THE POSSIBLE SOURCES OF INDIRECT CONTAMINATION MIGHT BE RELATED TO EVERY SINGLE USE OF OUR PRODUCTS WHETHER THE USES BE IN ELECTRICAL APPLICATIONS, OTHER INDUSTRIAL FLUIDS, OR PLASTICIZER USAGE.

THE SCIENTISTS WHO HAVE PUBLISHED THEIR FINDING OF THE PCB'S IN NATURE HAVE IN EVERY INSTANCE MENTIONED THE POSSIBLE SOURCES AS THE LIQUID MATERIALS AS INDUSTRIAL POLLUTANTS AND THE PLASTICIZER USES WHERE IN THE MANUFACTURE OF A PLASTIC MATERIAL SOME VAPORS ARE LOST TO THE ATMOSPHERE AND ULTIMATELY END UP IN THE OCEAN AS CHEMICAL FALL-OUT. The PCBs ~~WE~~ HAVE THE HONOR IF IT BE SUCH OF HAVING THIS QUOTED IN THIS NEW BOOK ON CHEMICAL FALL-OUT. Scientists ~~THEY~~ HAVE POSTULATED ALSO THAT SINCE THE PCB'S ARE VIRTUALLY INDESTRUCTIBLE, EVERY POUND EVER MANUFACTURED ULTIMATELY HAS ESCAPED INTO THE ENVIRONMENT AND REMAINS THERE.

AS FAR AS FUTURE ACTION IS CONCERNED, THE MEDICAL DEPARTMENT PROPOSES TO CONTINUE A PROGRAM, AND I MIGHT ADD--AN EXPANDED

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PROGRAM--WHICH WE HOPE WILL PERMIT THE CONTINUED USE OF AROCLORS 1254 AND 1260 IN THOSE APPLICATIONS WHERE ESCAPE INTO THE ENVIRONMENT CAN BE POLICED AND PREVENTED.

SECONDLY, WE HOPE TO DEVELOP DATA THAT WILL SHOW THAT THE LOWER CHLORINATED BIPHENYLS, THAT IS--AROCLOR 1242 AND THOSE LOWER IN CHLORINATION, ARE DEGRADED IN THE ENVIRONMENT AND THUS DO NOT PRESENT A THREAT TO WILDLIFE.

THERE IS SOME INDICATION FROM WORK UNDERWAY IN RUABON THAT AROCLOR 1242 WILL INDEED DEGRADE BIOLOGICALLY. THERE IS A PUBLISHED REPORT FROM THE UNIVERSITY OF UTRECHT WHERE 1242 FED TO QUAIL SHOWED VIRTUALLY COMPLETE DEGRADATION. AS I HAVE MENTIONED EARLIER, EXCEPT FOR ONE OR TWO INSTANCES AROCLOR 1242 HAS NOT BEEN IDENTIFIED ALONG WITH THE PESTICIDE RESIDUES. THIS IN ITSELF SUGGESTS THAT THIS MATERIAL IS DEGRADED.

WE WOULD HOPE THEN THAT OUR EFFORTS WILL PROTECT THE CONTINUED SALE AND USE OF AROCLORS 1242, WHICH AS MR. BERGEN AND MR. SPRINGATE WILL INDICATE; MAKES UP A MAJOR PORTION OF OUR AROCLOR BUSINESS.

WE WOULD BE LESS THAN HONEST, HOWEVER, IF WE DID NOT POINT OUT THAT THE SCIENTIFIC DATA TO BE DEVELOPED FROM OUR OWN RESEARCH AS WELL AS BY ANY NUMBER OF THE 50 GOVERNMENTAL OR UNIVERSITY LABORATORIES THAT HAVE REQUESTED SAMPLES OF AROCLORS MAY NOT BE FAVORABLE REGARDING AROCLOR 1242.

IN SUMMARY, THE MEDICAL DEPARTMENT FEELS THAT LONG-RANGE, THERE MAY BE LESS THAN A 50% CHANCE OF SUCCESS IN PROTECTING

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THE MARKETS FOR THE POLYCHLORINATED BIPHENYLS. WE FEEL THE ODDS DEPEND ON AT LEAST FIVE FACTORS BEYOND OUR CONTROL:

1. WE MAY FIND THAT THE PREVENTION OF ESCAPE OF THESE MATERIALS TO THE ENVIRONMENT IS IMPOSSIBLE--EXCEPT IN VERY LIMITED APPLICATIONS.
2. ALTHOUGH, AS I HAVE INDICATED EARLIER, THERE IS SOME EVIDENCE THAT THE LOWER CHLORINATED MATERIALS SUCH AS AROCLOR 1242 ARE BIODEGRADABLE, FURTHER RESERACH SPONSORED BY MONSANTO OR OTHERS, MAY PROVE THAT THIS IS NOT THE CASE.
3. WE CANNOT CONTROL THE EFFORTS OF THE CHLORINATED PESTICIDE MANUFACTURES WHO--IN DEFENSE OF THEIR PRODUCTS, DDT AND THE OTHERS--HAVE BEGUN TO EMPHASIZE IN GOVERNMENT HEARINGS AND SCIENTIFIC SEMINARS THAT THE PAST AND CURRENT RESIDUE ANALYSIS MAY BE UNDULY ALARMING BECAUSE OF THE PCB INTERFERENCE.
4. IT WILL BE DIFFICULT--IF NOT IMPOSSIBLE--TO COUNTERACT THE EFFORTS OF OUR COMPETITORS IN THE FUNCTIONAL FLUID APPLICATIONS WHO HAVE BEGUN TO BROADCAST THE POTENTIAL PCB PROBLEM--NOT ONLY TO OUR CUSTOMERS BUT TO REGULATORY AGENCIES SUCH AS THE MICHIGAN DEPT. OF NATURAL RESOURCES, AND
5. WE MAY FIND IT IMPOSSIBLE TO COUNTERACT THE EFFORTS OF THOSE SCIENTISTS AND PSEUDO-SCIENTISTS NOW INVOLVED IN THE U. S. AND EUROPEAN WILDLIFE CONSERVATION EFFORT WHO--TO PUT IT MILDLY--DO NOT ALWAYS REACT RESPONSIBY.

MAE 058630

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HAVE ASKED US FOR SAMPLES MAY NOT BE FAVORABLE TO AROCLOR 1262.

AS YOU CAN IMAGINE, WE IN THE MEDICAL DEPARTMENT HAVE BEEN CONCERNED DURING THESE MANY MONTHS ABOUT THE POSSIBILITY OF LEGAL AND FINANCIAL LIABILITY WHICH MAY FACE MONSANTO IN THIS SITUATION. Dennis Miller ~~DUD FRENCH~~ IS NEXT ON THE PROGRAM TO DISCUSS THIS ASPECT OF THE PROBLEM.

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F A C T S

1) THE 5 AND 6 CHLORINATED BIPHENYLS--OUR AROCLORS 1254 AND 1260--ARE PRESENT IN THE ENVIRONMENT, IN BIRDS, FISH, AND OTHER AQUATIC LIFE.

2) THESE, IN PART OR SOLELY, ARE AFFECTING REPRODUCTION OF SOME SPECIES OF BIRDS.

3) PCB'S ARE PARTICULARLY TOXIC TO SHRIMP.

4) THERE ARE STILL MANY UNKNOWNS BUT SPECULATION AS TO THE ROLE OF PCB'S IS RAMPANT.

5) SPECULATION IS LEADING TO CONCERN WHICH MAY GROW TO ALARM.

MAE 058632

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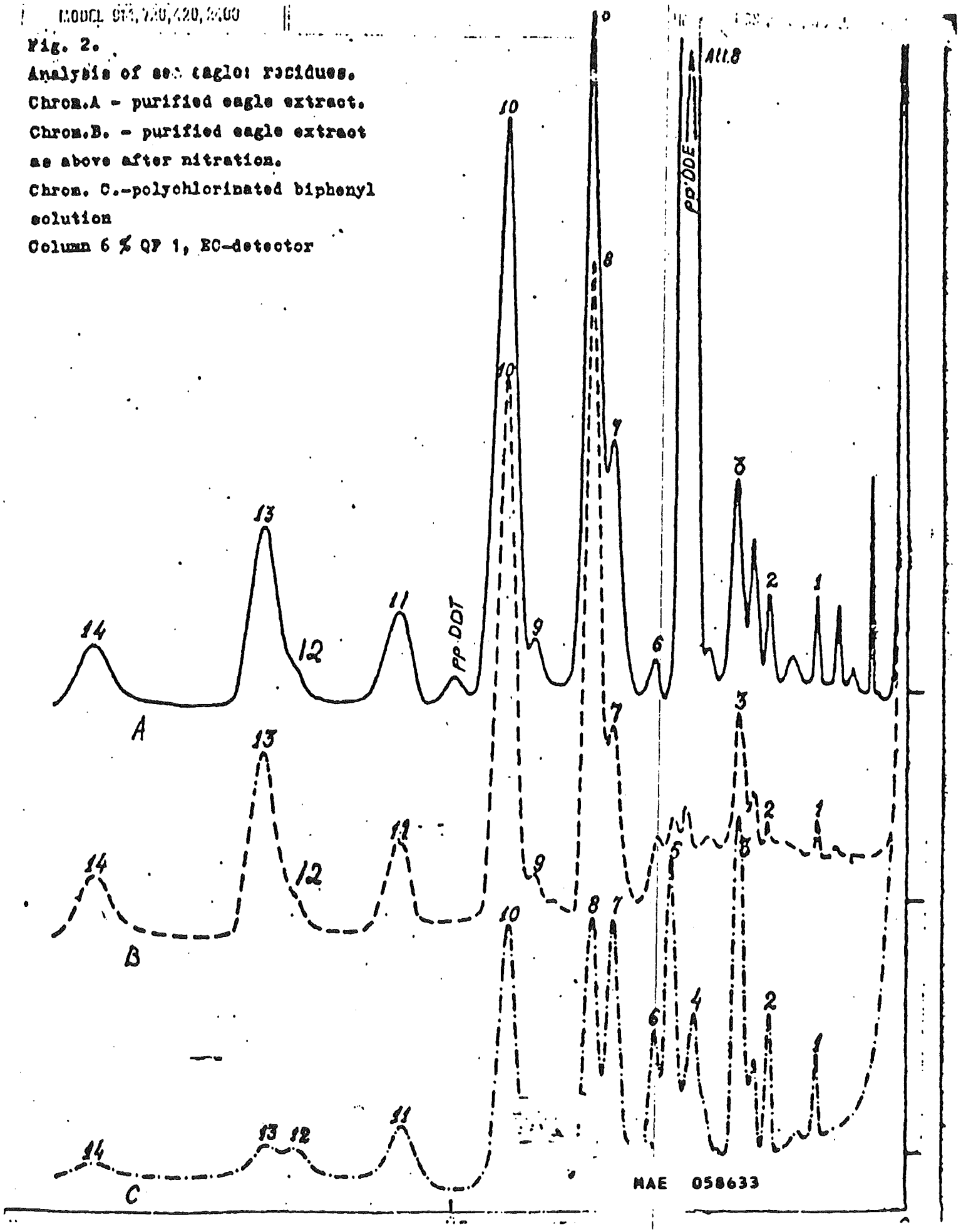
MODEL 914,720,420,2400

Fig. 2.
Analysis of sea eagle residues.
Chrom.A - purified eagle extract.
Chrom.B. - purified eagle extract as above after nitration.
Chrom. C.-polychlorinated biphenyl solution
Column 6 % QF 1, EC-detector



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1 PART PER MILLION --- 1 DROP IN 90 FIFTHS

1 PART PER BILLION --- 1 DROP IN 90,000 FIFTHS

OR --- 1 OUNCE IN 1,000 TANK CARS

MAE 058634

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NAVAL A.S.
PENSACOLA
90
BRIDGE
MONSANTO
PLANT
PENSACOLA BAY
ESCAMBIA BAY
ESCAMBIA RIVER
MILL
BOARD
EAST BAY
BLACKWATER BAY
GULF OF MEXICO
MAE 058635

TOWOLDMON0050793