COMPANY CONFIDENTIAL

OTHER LOCATIONS	GENERAL OFFICES	ANNISTON	
C. F. Buckley - WGK	M. E. Batz	J. N. Carpenter	W.B. Papageorge
H. M. Galloway - Nitro	P. B. Hodges	C. K. Eastman	B.O. Severson
C. G. Hoffman - Delaware R.	D. B. Hosmer	L. L. Faulkner	W.F. Taffee
J. L. Solari - JFQ	W. A. Kuhn	R. A. Haydel	H.L. Williams
E. S. Tucker - So. 2nd St.	R. J. Stratmeyer	V. R. Haupt	
		L. C. Lahman	
		J. C. Landuehr	
		A. G. McCarty	
		G. W. Miller	

PROGRESS REPORT
TECHNICAL SERVICES DEPARTMENT
ANNISTON, ALABAMA PLANT

JOB NO. 370:740 REPORT NO. 2 DATE 7/23/69

TITLE: Aroclor and HCl Department Waste Audits

OBJECTIVE: To identify the sources of waste in the Aroclor and HCl Departments and to quantify these losses.

PERSONNEL: E. G. Wright (W. F. Taffee)

REPORTED BY: E. G. Wright

SUMMARY: The major sources of organic (primarily Aroclors but with smaller amounts of Biphenyl, Santowax and HB-40) and acid waste in the Aroclor and HCl departments have been identified and quantified. The average total losses of organic material from these departments is approximately 27#/day. The new warehouse drumming and flaking area accounts for almost half of the organic losses with an average daily loss of 11#/day. The remainder of these organic losses comes from the Aroclor still room sewer (2#/day), the chlorinator sewer (8#/day) and the HCl department (6#/day). The acid losses from these departments came from two sources. The chlorinator sewer and the HCl department sewer. The chlorinator sewer showed an average loss of 1,100#HCl/day and the HCl department losses were an average of 15,500#/day.

To provide facts on the effects of P.C.B. in plant effluent water, Snow's Creek and Choccolocco Creek were investigated, Snow's Creek was checked visually for two phase systems (i.e. Aroclor and water). None was noted more than one block from the plant boundaries. Six samples of mud and water were collected downstream from the plant (see attached map for locations of sampling points). These samples are now being analyzed by organic research. The results of these samples will be communicated as soon as they are received.

PLAINTIFF'S EXHIBIT 4 3-31-98 PENGAD-Bayonne,N.J

WATER_PCB-SD0000068515

FUTURE WORK

1. Continue to monitor organic losses periodically on the total plant outflow.

2. A decision will be made on continuing to sample on Choccolocco and Snow's Creek as soon as the results from the first set of samples are received.

3. Collect one set of fish samples from Choccolocco Creek and have these analyzed for P.C.B. levels.

4. Continue to look for a better method to collect samples from two phase (i.e. Aroclor and Water) systems.

5. Conduct a correlation study between the organic research method for P.C.B. and the Anniston method for total organics.

E. G. Wright
Technical Services Department

jw

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DETAILS

1. Sampling and Analysis

All samples taken during this audit were 24 hour composite samples with the exception of the "grab" samples taken from Snow's and Choccolocco Creeks. Two very definite two phase systems were noted during this audit. These were located in the warehouse sewer and in Snow's Creek about one block below the plant outfall. Sampling this two phase system has proven to be very difficult. We tried two methods. The first method was the slow peristaltic (Randolph type) pump. We then tried a high speed peristaltic pump. Both of these were unsatisfactory. We are presently trying to trap the Aroclor phase in a sump located at the corner of the warehouse. This sump is being measured everyday and should provide a much better estimate of the volume of the second phase than we now have.

The samples which were collected in the plant were analyzed for total organics by a method which was developed by the Anniston plant laboratory. The six sets of samples which were collected in Snow's and Choccolocco Creeks will be analyzed specifically for P.C.B. by Organic Research. There were two reasons for doing these analyses differently. The first reason was that the laboratory at Anniston did not have the proper facilities such as a "clean room" and also that they did not have the correct type of electron capture detector which was specific for P.C.B. To purchase this detector and provide "clean room" (Aroclor free) working space would have cost approximately $16,000. The second reason was the time element involved. The P.C.B. method in the P.P.B. range required approximately 2-3 hours per sample. It was felt that running total organics on the in-plant samples would be sufficient for determining exactly where the losses were originating.

2. Flow Measurements

The flow from the HCl department was measured by the Lithium chloride dilution method. This flow was verified by actual physical measurement. The flows from the Aroclor still room and the warehouse were determined by physical measurement. These flows were measured twice during the time which the waste audit was being conducted.

HCl Department Audit

The HCl department receives anhydrous HCl from the chlorinators in the Aroclor department. This gas passes through a falling film type absorber where it is absorbed in water to form Muriatic Acid. The HCl gas stream during the past has contained entrained organics which have caused problems in the production of Water White, organic free Muriatic Acid. During 1968 approximately one-third of the production was severed in an attempt to solve this organics problem. This amounted to approximately 30 M #/day of HCl. In mid-1969 a catch tank and a membrane type coalescer were installed to trap out and remove these organics. These two units are operating satisfactorily and the plant is now producing Water White Muriatic Acid. The

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HCl Department Audit (Cont'd)

organic material is composed of Biphenyl, Santowax and the lower chlorinated Biphenyls. This material is presently being drummed out and sent to the toxic dump.

Sample Data

These samples were collected for a period of 26 days. They were analyzed for pH, % HCl and organics. Listed below are the daily high and low and an average value for the 26 day period. A complete list of all of the data is on the attached data sheets. The sampling point is noted on the attached process sewer map.

	HCl #/day	Orgainc #/day
Daily High	31,200 #	24 #
Daily Low	1,200 #	.1 #
Average	15,500 #	6.0 #

Average Flow = 100 G.P.M.

Warehouse Audit

This sewer collects the wastes from the Aroclor drumming and flaking area in the new warehouse. It was found to be the largest singular contributor of organics to the sewer with an average daily loss of approximately 11.0 #/day of dissolved organics. The 2nd (organic) phase of this sewer is presently being trapped in a sump located at the north-east corner of the warehouse. During a one week period we collected approximately 2.5 gallons of organics or 27# for the 7 day period. This average 3.8 #/day plus the 11 #/day of dissolved material brings the total from this source to 14.8 #/day. We will continue to monitor this sump to gather long term data. These organics come from two major sources. These are the wet scrubber which was installed to scrub the vents from the Biphenyl and Aroclor flakers. The organic material and water is drained from the scrubber once per day. It is drained by dropping the material into a drum and allowing the aqueous layer to overflow to the sewer. The other major sources are leaks and spills which are washed directly to the sewer when the floor is steam cleaned in the warehouse.

Sample Data

These samples were collected for a period of 28 days. They were analyzed for pH, % HCl, and organics. When it was found that the samples were neutral, pH and % HCl was discontinued. Listed below are the daily high and low values and an average daily value for the sampling period. A complete list of the data is on the attached data sheets. The sample point is noted on the attached process sewer map.

WATER_PCB-SD0000068518

Sample Data (Cont'd)

	Organics #/day	Organic 2nd Phase #/day
High	65#	
Low	2.2#	
Average	11.0#	3.8#

Average Flow = 90 G.P.M.

Chlorinator Sewer

This sewer catches the cooling water from the chlorinator and also the water from the drowning jets on the vents of the crude Aroclor blowing tanks. The major source of organics in this sewer are pump leaks from the circulating pumps on the chlorinators. The primary sources of HCl are the drowning jets on the blowing tanks.

Sample Data

These samples were collected for only 13 days because repairs were being made on this sewer when the audits were begun in the other parts of the Aroclor department. They were analyzed for pH, % HCl and organics. Daily highs and lows and a daily average are listed below. A complete list of all data is shown on the attached data sheet. The sampling point is noted on the attached process sewer map.

	Organics #/day	HCl #/day
High	32.8 #	3,000 #
Low	3.3 #	300 #
Average Daily	8 #	1,100 #

Average Flow = 250 G.P.M.

Aroclor Still Room Sewer

This sewer receives all of the water used on the jets on the Aroclor stills. These samples were also analyzed for pH, % HCl and organics. The pH and HCl were discontinued when there was no HCl detected in a number of samples.

Sample Data

These samples were collected for a period of 14 days. The average daily organics loss from this sewer was only 2 #/day. Listed below are the daily highs and lows as well as the average daily loss for the sampling period. A complete list of the data is located on the attached data sheet. The sampling point is noted on the attached process sewer map.

WATER_PCB-SD0000068519

Sample Data (Conc'd)

	Organics #/day
High	8.9 #
Low	1.6 #
Average Daily	2 #

Average Flow = 65 G.P.M.

Choccolocco and Snow's Creek

Due to the recent developments concerning P.C.B. in water and its effects upon wildlife, we decided to begin sampling the streams which receive our waste water from the Aroclor Manufacturing Process. We began sampling by first checking Snow's Creek for definite globules of Aroclor lying in the bottom of the creek. We were only able to detect this a distance of about 1 block from the plant boundaries. Other points further downstream were checked but no Aroclor layer was found. Samples were collected at six points downstream from the Anniston plant. One sample was caught upstream from the confluence of Snow's and Choccolocco Creeks. This sample is to be used as a blank. Both mud and water samples were caught at each of these locations. The exact locations where these samples were collected are shown on the attached map of the Choccolocco Creek watershed. The data from these samples will be published as soon as it is received.

During September of 1968 two sets of samples (mud and water) were collected from Snow's Creek. These samples were analyzed for P.C.B. by organic research. Listed below are the results from these samples.

Sample Location	Sediment	Water
Plant Outfall	0.20 ± 0.02%	58 ± 2 P.P.B.
1 Block Below Plant Outfall	1.64 ± 0.04%	Sample Broken

Calculation of the above data into #/day yields a value of approximately 1 #/day of P.C.B. which is actually lost to Snow's Creek. The probable reason for the difference between 27#/day which we lose in the plant and the 1#/day which shows up in Snow's Creek is that the analytical method used to measure losses in the plant measures total organics losses. The losses in Snow's Creek were measured using the Organic Research method which is specific for P.C.B.

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WASTE AUDIT DATA SHEET

Department Aroclor Department

Sampling Point Aroclor Still Room Sewer

Date	pH	%HCl	PPM Organics			#Organics/day			Flow	Prod. Rate	Comments
6/3	6.5	NDA	2.0			1.6			65 GPM		
6/4	6.7	NDA	11.3			8.9			-		
6/5	6.7	NDA	2.5			2.0			-		
6/6	7.2	NDA	5.5			4.2			-		
6/7	6.3	NDA	6.0			4.7			-		
6/8	6.2	NDA	NDA			-			-		
6/9	6.3	NDA	NDA			-			-		
6/10	6.2	NDA	NDA			-			-		
6/11	6.3	NDA	NDA			-			-		
6/12	7.1	NDA	NDA			-			-		
6/13	7.1	NDA	NDA			-			-		
6/14	7.1	NDA	NDA			-			-		
6/15	7.4	NDA	NDA			-			-		
6/16	7.5	NDA	7.5			5.8			-		
			AVERAGE #/DAY =			2					

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WATER_PCB-SD0000068521

WASTE AUDIT DATA SHEET

Department Aroclor Department — Sampling Point Chlorinator Sewer

Date	pH	%HCl	PPM Organics			#HCl /day	#Organics /day		Flow	Prod. Rate	Comments
6/4	3.2	.10	2.4			3,000	7.2		250 GPM		
6/5	6.2	NDA	NDA			-	-		-		
6/6	10.8	NDA	1.1			-	3.3		-		
6/7	3.6	.09	1.8			2,800	5.3		-		
6/8	4.1	.10	10.9			3,000	32.8		-		
6/9	2.7	.01	8.0			300	24.0		-		
6/10	3.7	NDA	2.0			-	6.0		-		
6/11	5.7	NDA	8.5			-	25.5		-		
6/12	3.5	.04	NDA			1,200	-		-		
6/13	3.5	.04	NDA			1,200	-		-		
6/14	3.5	.04	NDA			1,200	-		-		
6/15	4.1	NDA	NDA			-	-		-		
6/16	2.7	.05	NDA			1,500	-		-		
			AVERAGE #/DAY =			1,100	8.0				

DSW 014291

WATER_PCB-SD0000068522

WASTE AUDIT DATA SHEET

Department HCl Department Sampling Point HCl Sewer

Date	pH	% HCl	PPM Organics			#Organics / Day	#HCl / day		Flow	Prod. Rate	Comments
5/20	.9	1.1	NDA			-	13,200		100 GPM		
5/21	.7	1.7	.5			.6	20,400		-		
5/22	.9	1.2	NDA			-	14,400		-		
5/23	.8	1.4	.5			.6	16,800		-		
5/24	.8	2.6	2			2.5	31,200		-		
5/25	.8	2.6	2			2.5	31,200		-		
5/26	2.0	.1	4.0			4.8	1,200		-		
5/27	2.4	.1	5.9			7.1	1,200		-		
5/28	1.5	.3	2.5			3.0	3,600		-		
5/29	1.0	.6	12			14.4	7,200		-		
5/30	1.2	.6	7.3			8.8	7,200		-		
6/2	.4	2.3	.1			.10	27,600		-		
6/3	.8	1.9	3.3			4.0	22,800		-		
6/4	1.1	.7	20			24.0	8,400		-		
6/5	.8	1.3	4.6			5.5	15,600		-		
6/6	.8	2.2	8.6			10.3	26,400		-		
6/7	.7	2.1	5.7			6.9	25,200		-		
6/8	.9	1.3	5.7			6.9	15,600		-		

OSW 014292

WATER_PCB-SD0000068523

WASTE AUDIT DATA SHEET

Department HCl Department Organics Sampling Point HCl Sewer

Date	pH	% HCl	PPm Organics			#Organics /Day	#HCl /day		Flow	Prod Rate	Comments
6/9	.8	1.4	NDA			-	16,800		100GPM		
6/10	1.1	.5	5.0			6.0	6,000		-		
6/11	.8	1.2	6.0			7.2	14,400		-		
6/12	.7	1.2	4.5			5.4	14,400		-		
6/13	.7	1.2	4.5			5.4	14,400		-		
6/14	.7	1.2	4.5			5.4	14,400		-		
6/15	.8	.8	5.0			6.0	9,600		-		
6/16	.2	2.1	1.5			1.8	25,200		-		
			AVERAGE #/DAY =			6.0	15,000				

DSW 014293

WATER_PCB-SD0000068524

WASTE AUDIT DATA SHEET

Department Aroclor Department

Sampling Point Warehouse Sewer

Date	pH	%HCl	PPM Organics			#Organics/day			Flow	Prod. Rate	Comments
5/20	-	-	32			35.0			90 GPM		
5/21	-	-	11			12.0			-		
5/22	-	-	NDA			-			-		
5/23	-	-	7.2			7.8			-		
5/24	-	-	NDA			-			-		
5/25	-	-	NDA			-			-		
5/26	-	-	25			27.0			-		
5/27	-	-	7.5			8.1			-		
5/28	-	-	8.0			8.7			-		
5/29	-	-	2.7			29.2			-		
5/30	-	-	4.0			4.3			-		
5/31	-	-	4.0			4.3			-		
6/1	-	-	4.0			4.3			-		
6/2	-	-	2.0			2.2			-		
6/3	5.8	NDA	NDA			-			-		
6/4	6.4	NDA	15			16.2			-		
6/5	6.7	NDA	10			11.0			-		
6/6	7.2	NDA	13.3			14.4			-		

DSW 014294

WATER_PCB-SD0000068525

WASTE AUDIT DATA SHEET

Department Aroclor Department — Sampling Point Warehouse Sewer

Date	pH	%HCl	PPM Organics			#Organics /day			Flow	Prod Rate	Comments
6/7	6.4	NDA	32.6			35.2			90 GPM		
6/8	6.2	NDA	12.0			13.0			-		
6/9	-	-	5.0			5.4			-		
6/10	-	-	8.0			8.7			-		
6/11	6.2	NDA	5.0			5.4			-		
6/12	5.6	NDA	NDA			-			-		
6/13	-	-	NDA			-			-		
6/14	-	-	NDA			-			-		
6/15	4.5	NDA	60			65.0			-		
6/16	6.1	NDA	2.5			2.7			-		
			AVERAGE #/DAY =			11.4					

DSM 014295

WATER_PCB-SD0000068526

COMPANY CONFIDENTIAL Rough Draft for W.B Papageorge

OTHER LOCATIONS	GENERAL OFFICES	ANNISTON
	P. B. Hodges K. J. Holzapfel W. B. Papageorge J. R. Savage	J. T. Bell J. L. Brown J. L. Corder V. R. Haupt G. L. Jessee L. C. Lahman J. C. Landuehr A. G. McCarty G.W.Miller/T.E.Lackey/J.E. Mund R. O. Severson

PROGRESS REPORT
TECHNICAL SERVICES DEPARTMENT
ANNISTON, ALABAMA PLANT

JOB NO. 002-1025 REPORT NO. 2 DATE July 21, 1970

TITLE: AROCLOR LOSSES AT THE ANNISTON PLANT

OBJECTIVE: To report all data which is available to data on Aroclor losses in the Anniston Plant. Also, to report all data on Aroclor residues in the Snow Creek - Choccolocco Creek Watershed. To summarize progress to date on Aroclor clean-up efforts at Anniston.

PERSONNEL: E. G. Wright, (J. T. Bell)

REPORTED BY: E. G. Wright

SUMMARY: Aroclor losses from the Annistor Plant for the period April 15 through June 30, 1970, averaged ≈16 lbs./day. This is a considerable improvement over the losses of ≯250 lbs./day for a comparable period during 1969. This reduction has been primarily achieved by an education program and by changing operating habits. However, projects are being installed and evaluated which will further reduce these losses toward the Business Group goal of 10 ppb.

FUTURE WORK:

1. Continue sampling and analyzing for Aroclor losses on a routine basis.
2. Continue to sample and analyze grab samples from Snow and Choccolocco Creeks for Aroclor content.
3. Sample and analyze ambient air for Aroclor content.
4. Sample and analyze tank vents in the Aroclor department to pinpoint atmospheric loss points.
5. Collect additional aquatic samples from Choccolocco Creek Watershed.
6. Issue periodical reports on Anniston Plant losses and progress toward 10 ppb goal.

MCNS 056663

E. G. Wright

/bs

PENGAD Bayonne, N.J. PLAINTIFF'S EXHIBIT 7 2-21-98

WATER_PCB-SD0000068527

DISCUSSION

I. Aroclor Department Sewers

A. HCl Sewer

Since the installation of a catch tank in the HCl gas line and a coalescer in the acid stream, the Aroclor content in the waste acid stream has been greatly reduced (i.e., Approximately 200 pounds of organic material is being removed by these two projects.). During the sampling period, this sewer averaged 13.0 ppb of Aroclor. (See Data Sheet I.) Based on this data, the decision was made not to route this stream to the sump presently being installed. This resulted in a substantial savings on installing the sump. However, at times, spent carbon from the HCl carbon towers is dumped into this sewer. Alternate methods are being evaluated to eliminate this situation.

B. Chlorinator and Still Room Sewers

At times these sewers had a two phase flow. The quantity of the Aroclor phase could not be determined. However, these two sewers are being routed through the Aroclor sump. When the sump is completed and put into operation, the Aroclor phase can then be quantified. The sump will, also, provide a means for recovering this second phase, which under present conditions eventually makes its way out of the plant.

When the sump is installed in these sewers, a daily sample will be taken and analyzed to determine the efficiency of the sump. Other projects are also scheduled which should result in a reduction of Aroclor in this process stream.

C. Warehouse Sewer

The major losses from this sewer are due to spills while drumming or flaking. These spills are then swept to the sewer during floor clean-up. Presently, clean-up is accomplished by use of Du-Bois steam cleaning which considerably raised the solubility of Aroclor in water. Alternate methods of clean-up and disposal are presently being evaluated.

D. Total Plant Effluent

During the period April 15 to June 30, 1970, the total plant losses averaged 16 lbs./day. This is excluding the period April 21 to June 20, 1970, when the acid neutralization pit was being cleaned out. During this period, the losses ran very high (See Data Sheet V.) due to the fact that the Aroclor which was trapped in the pit was being stirred and entrained into the plant effluent.

The discrepancy between the 1.7 lbs./day losses from the sewers and the 16 lbs./day losses reported from the plant effluent may possibly be due to two things: 1) Samples from the sewers did not include any of the Aroclor phase and 2) Due to the mixing and the velocity at the plant effluent sampler, some of the Aroclor was being entrained and therefore

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giving higher results. A closer correlation is hoped for when an accurate measure of the Aroclor phase can be accomplished. Close observation of the sump should provide this information.

E. Miscellaneous Samples (Data Sheet VII)

These samples were collected from Snow and Choccolocco Creeks at various times. They show that Aroclors are present in the Choccolocco Creek even above where the Monsanto effluent enters the creek. They also indicate significant amounts of Aroclor in the mud and water of Choccolocco and Snow Creeks a considerable distance (15-20 miles) downstream from the Anniston Plant. In fact, Aroclor concentrations can probably be found in the Coosa River system.

Data Sheet VII contains a complete list of all the data to date on Snow and Choccolocco Creeks. Attached is a map of the watershed showing the sample location with respect to the plant.

WATER_PCB-SD0000068529

DATA SHEET I

Sample Location: HCl Department Sewer
Average Flow: 200 GPM

Date	Aroclor Concentration (PPB)	Aroclor Losses (#/day)
4/15	12	0.030
4/16	7.8	0.019
4/17	8.3	0.020
4/20	18.5	0.044
4/21	6.2	0.015
4/22	16.4	0.039
4/23	10.6	0.025
4/24	20.4	0.050
4/27	15.0	0.036
4/28	13.1	0.031
4/29	18.7	0.045
5/3	10.5	0.025
5/4	11.3	0.027
Average:	13.0.	0.031

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WATER_PCB-SD0000068530

DATA SHEET II

Sample Location: Warehouse Sewer
Average Flow: 65 GPM (Estimated)

Date	Aroclor Concentration (PPB)	Aroclor Losses (#/day)
4/22	2,800	2.18
4/23	2,860	2.23
4/24	1,250	0.98
4/27	1,520	1.18
4/28	1,300	1.02
4/29	2,130	1.66
5/3	1,320	1.03
5/4	1,480	1.15
Average:	1,833	1.43

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WATER_PCB-SD0000068531

DATA SHEET III

Sample Location: Aroclor Still Room Sewer
Average Flow: 150 GPM (Estimated)

Date	Aroclor Concentration (PPB)	Aroclor Losses (#/day)
4/22	12,500*	
4/23	13.8	0.025
4/24	30.0	0.054
4/27	17.0	0.036
4/28	12.2	0.022
4/29	4.8	0.009
5/4	20.0	0.036
5/6	11.0	0.020
5/8	23.4	0.042
Average:	16.5	0.031

*Contaminated sample - not included in average.

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WATER_PCB-SD0000068532

DATA SHEET IV

Sample Location: Aroclor Chlorinator Sewer
Average Flow: 275 GPM (Estimated)

Date	Aroclor Concentration (PPB)	Aroclor Losses (#/day)
4/22	80.0	0.264
4/23	46.5	0.153
4/24	35.0	0.115
4/27	51.0	0.168
4/28	56.5	0.186
4/29	70.0	0.233
5/3	81.6	0.262
5/4	73.0	0.241
5/6	85.3	0.281
Average:	64.3	0.212

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WATER_PCB-SD0000068533

DATA SHEET V

Sample Location: Total Plant Effluent
Average Flow: 900 GPM

Date	Aroclor Concentration (PPB)	Aroclor Losses (#/day)
4/15	98	1.08
4/16	150	1.65
4/17	3,300	36.30
4/21	10,800	119.00
4/22	16,000	176.00
4/23	875	9.62
4/27	13,750	151.00
5/4	18,000	198.00
5/5	3,300 *	36.30 *
5/6	9,750	107.00
5/7	9,900	109.00
5/10	3,300	36.30
5/12	1,327	14.60
5/20	2,650	29.20
5/25	68	0.75
6/2	216	2.38
6/3	880	9.70
6/5	148	1.63
6/6	360	3.96
6/7	950	10.45
6/8	315	3.46
6/9	3,100	34.10
6/10	400	4.40
6/11	760	8.35
6/12	1,540	16.90
6/13	1,875	20.60
6/14	85	0.94
6/15	820	9.00
6/16	520	5.72
6/17	1,820	20.00
6/18	490	5.40
6/19	3,500	38.50
6/20	3,825	42.00
6/21	800	8.80
6/22	720	7.92
6/23	1.920	21.10
6/24	1,620	17.80
6/25	1,460	16.10
6/26	2,940	32.40
6/27	680	7.47
6/28	3,966	43.60
6/29	3,200	35.20
6/30	4,200	46.20
Average:	1,460	15.74

MONS 050670

WATER_PCB-SD0000068534

DATA SHEET VI

Sample Location: Snow Creek Sampling Station

Date	Aroclor Concentration (PPB)	
4/15	1,800.0	
4/16	233.0	
4/17	124.0	
4/18	499.0	
4/19	5,435.0	
4/20	1,950.0	
4/21	1,220.0	
4/22	2,550.0	
4/23	3,200.0	
4/24	3,750.0	
4/25	3,800.0	
4/26	2,166.0	
4/27	1,860.0	
4/28	860.0	
4/29	2,800.0	
5/1	2,800.0	
5/2	1,450.0	*
5/7	1,320.0	
5/8	1,760.0	
5/9	1,840.0	
5/10	9,600.0	
5/11	1,740.0	
5/12	3.8	
5/13	1,566.0	
5/14	1,325.0	
5/18	1,920.0	
5/19	2,400.0	
5/20	1,320.0	
5/21	3,000.0	
5/22	1,500.0	
5/23	800.0	
5/24	1,540.0	
5/29	12.5	
5/30	5.0	
5/31	14.8	
6/1	25.0	
6/2	16.4	
6/3	33.0	
6/4	14.0	
6/5	1,320.0	
6/6	140.0	
6/7	240.0	
6/8	104.0	
6/9	420.0	

MCNS 056671

WATER_PCB-SD0000068535

DATA SHEET VI - continued.

Date	Aroclor Concentration (PPB)
6/12	630.0
6/13	760.0
6/14	254.0
6/15	1,470.0
6/16	41.5
6/17	110.0
6/19	216.0
6/20	272.0
6/21	480.0
Average:	768.0

*Limestone pit being cleaned out - Data not included in average.

COMPANY CONFIDENTIAL

WATER_PCB-SD0000068536

DATA SHEET VII

Sample No.	Date	Sample Location	Aroclor Concentration (PPB) Mud	Water
1	10-8-69	Snow Creek at Glenaddie	2.36×10^7	23.3
2	10-8-69	Choccolocco Creek at Boiling Springs (upstream from Monsanto's effluent)	78	8.1
3	10-8-69	Choccolocco Creek at City Treatment Plant (1 block below confluence of Snow and Choccolocco Creeks)	738,000	< 2.0
4	10-8-69	Choccolocco Creek at Jackson Shoals (≈20 miles downstream)	7,300	5.8
5	10-8-69	Choccolocco Creek at Eureka Bridge (≈25 miles downstream, mouth of Choccolocco into Coosa River)	3,240	< 2.0
6	11-23-69	Snow Creek - 1 block below plant	2.19×10^6	20,300
7	11-23-69	Snow Creek at Glenaddie	1.84×10^6	1,435
8	11-23-69	Choccolocco Creek at Highway 9 (≈15 miles upstream from the confluence of Snow and Choccolocco Creeks)	1,536	11
9	11-23-69	Choccolocco Creek at Boiling Springs (upstream from Monsanto's effluent)	26	10
10	11-23-69	Choccolocco Creek at City Treatment Plant (1 block below confluence of Snow and Choccolocco Creeks)	--	58
11	11-23-69	Choccolocco Creek at Jackson Shoals (≈20 miles downstream)	470	10

COMPANY CONFIDENTIAL

WATER_PCB-SD0000068537

PLAINTIFF'S EXHIBIT 9 3-31-98 PENGAD Bayonne, N.J.

Monsanto

St. Louis - General Offices

August 7, 1970

ANNISTON - PCB - CLEANUP PROGRAM

TO Mr. H. S. Bergen, Jr. - HSBERG

John Mason - JMASO
E. P. Wheeler - EWHEE
W. B. Papageorge - WPAPA
F. J. Holzapfel - FHOLZ
D. B. Hosmer - DHOSM
J. R. Savage - JSAVA
G. L. Jessee - Anniston
J. C. Landwehr - Anniston

CONFIDENTIAL - F. Y. I. AND DESTROY

Following are the moves underway resulting from the FDA findings of high levels of PCB in fish taken from Choccolocco Creek downstream from it's confluence with Snow Creek.

STATUS

(1) We are presently discharging to Snow Creek about 16#/day of PCB (down from 250#/day in '69). Measurements of departmental waste streams show a total loss of only 2#/day. The discrepancy is believed due to; (a) sampling problems in departmental waste streams where two-phase systems of water and free aroclors may be present, and (b) possible pickup of PCB by leaching previously deposited PCB from the limestone neutralization pit which also acts as a settling basin.

(2) Work to further reduce losses presently underway:

a) Sump is being installed at the aroclor department to capture free aroclors from the 275 gpm flow. This is believed to be the largest departmental source of sewer loss because of the liquid aroclors frequently observed. However, sampling work did not confirm the belief because, no doubt, of inherent sampling problems. The project was due for completion on 9/1, and had been delayed because of an underground spring.

b) Curbing is being installed at drum loading area with dry pick up of spilled aroclors planned.

c) Investigation of treatment methods - adsorption by activated carbon showing most promise to date.

(3) Joe Crockett, Secretary of the Alabama Water Improvement Commission, will try to handle the problem quietly without release of the information to the public at this time. He believes that FDA will not precipitately in this matter (he did not advise how FWQA might react). Dr. Myers, Director of Public Health of Alabama, wants toxcity information on PCB's and this will be conveyed personally to him by Jack Garrett next week.

WATER_PCB-SD0000068538

PROGRAM

(A) Public Relations - E. V. John develcped a proposed statement to be used in event of public disclosure but, after consultation with Legal, felt it should not be used because of the recent lawsuit instituted against the plant by BASS. Therefore, an innocuous, essentially "no comment" type statement is being drafted.

(B) Operator Education - All Anniston personnel have been readvised of the necessity to avoid sewering of any aroclor.

(C) Mechanical Program

(1) Departmental Sump - at extra cost of $2,000, work is proceeding on an overtime basis with completion expected 8/12/70. This will eliminate the possibility of large losses from the operating area.

(2) Loading Area - Washup of spilled aroclor has been stopped and dry pick via sand instituted. Curbing project is being expedited.

(3) Neutralization Pit Clean out

(a) Immediately, the settled material downstream of the limestone will be removed as well as possible by pumping, with minimum stirring of the water. The solids (and aroclors) will be landfilled.

(b) By-Pass of Neutralization Pt. - On crash basis, trenches will be dug to allow diversion of all water from the limestone pit. This will take 1 - 2 weeks and will cost about $10,000.

In addition, it will be necessary to provide caustic neutralization of the acid wastes. This will be handled in the aroclor department via installation of a pH controller and valve with temporary piping and trucking facilities. Cost will be about $5,000 plus about $500 per day for caustic during the period when the alternate neutralization is required. During this period, PCB losses should be no more than 5 - 10 lbs./day.

WATER_PCB-SD0000068539

(c) Cleanout - The pit will be thoroughly cleaned out with probable removal of the present deteriorated asphalt membrane and replacement (possibly) by a plastic membrane which can resist aroclors. The plant will consider possible structural changes to permit more affective operation and ability to make future cleanouts without the present by-pass steps. Recommendations relative to this will follow.

(4) Water Flow Reduction - Present total flow through pit is 700 gpm. For at least several of the streams, reduction of flow will result in immediate reduction of PCB to Snow Creek. More important, reduction of flow will minimize future treatment costs.

In conjunction with the pit by-pass work in 3(a) above, approximately 200 gpm of aroclor free water will be permanently diverted. Included in the first reduction are the chlorinator cooling streams and most of the water coming from the Niran flare tower. Details of <u>how</u> this will be accomplished will be available by 8/14/70.

Over the next 3 - 4 months, further water conservation projects will be installed with objective of reducing the stream to the lowest practical amount, now estimated to be about 300 - 400 gpm. The projects will involve multiple use of water and further diversions of aroclor - free water.

(5) Final Treatment - Based on some indications (and much hope), by September, the actions above <u>may</u> approach the present plant objective of 10 ppb of PCB's in 700 gpm (or 0.1 #/day). The hope is raised because dissolved aroclor has shown a pronounced affinity for surface adsorption (as on walls of sample bottles). The solids generated by the limestone neutralization are believed to retain aroclor passing by them. Therefore, adequate settling and/or filtration following neutralization with periodic removal of the solids <u>may</u> accomplish the necessary treatment (along with water flow reduction). The plant will proceed on preliminary design of filtration facilities <u>with and without carbon treatment</u> between neutralization and filtration. The design will be available for action in case the reduction is not as great as hoped-for or in case the control agencies demand more complete removal (control agency requirements are a completely unknown factor at present). By the time a decision must be made relative to final treatment, we should have better information on requirements and methods.

WATER_PCB-SD0000068540

(D)Fish, Mud and Water Sampling - Since our fish samples from nearby Choccolocco Creek also showed high levels of PCB's, we are instituting more sampling to determine extent of the problem. Early during the week of 8/10, legal size fish will be caught in Choccolocco Creek near to confluence with the Coosa River (Logan Martin Lake). Fish will also be taken from the lake. If these samples show high (=5.0 ppm) levels of PCB, sampling will be extended to points down the Coosa River. A high priority will be given these samples by Scott Tucker.

Progress reports will follow at suitable intervals.

Paul B. Hodges M.P.

Paul B. Hodges

/np

MONS 033854

WATER_PCB-SD0000068541

Monsanto

FROM W. B. PAPAGEORGE - ST. LOUIS

DATE SEPTEMBER 8, 1970

SUBJECT PCB ENVIRONMENTAL PROBLEM
AUGUST STATUS REPORT

cc H. S. BERGEN
J. MASON

TO D. S. CAMERON - BRUSSELS
W. S. CLARK
J. R. DURLAND - TOKYO
M. W. FARRAR - 2ND STREET
E. V. JOHN
R. E. KELLER - 2ND STREET
R. M. KOUNTZ
D. A. OLSON
P. S. PARK
W. R. RICHARD
J. R. SAVAGE
E. P. WHEELER

MARKETING:

The withdrawal from the market of PCB containing Aroclors for plasticizer applications has been completed. All orders for these products which were received up through noon on August 31, 1970 were shipped. The only product area where we were left with an inventory was in the toluene blends of Aroclor 1254/1260/1262. The exact amount of the inventory will be determined the first week in September, however, it should be less than 20,000 pounds.

Orders for samples and small production runs have been placed for Aroclors 6040, 6050, 6062, and 6070. While it is certainly too early to predict the degree of success of our replacement program, it appears that some accounts have made significant progress in reformulating with Monsanto products.

Letters have been sent to Pydraul F-9 customers notifying them of the product reformulation. Production of F-9A is scheduled for the next required run.

NEMA has recommended that American National Standards Institute form a committee to provide guidance on PCB in the electrical industry. The committee will be made up of electrical equipment manufacturers, consumers, governmental agencies, and Monsanto. Purposes will be to:

1. Issue maintenance guides, proposed labeling instructions, etc.
2. Speed development of disposal systems.
3. Actively coordinate with international committees.

PLAINTIFF'S EXHIBIT 10 3-31-99
FLNGAD Bayonne,N.J

WATER_PCB-SD0000068542

ENGINEERING:

Waste Incineration - CEA 2415

An approved project scope report has been issued, and an appropriation request data transmittal was issued. Pre-approval funds were provided by the General Manager for definitive design and the purchase of long-delivery equipment. An incineration package was ordered, and definitive design is underway on the balance of the project.

Aroclor Distillation - CEA 2417

An approved project scope report has been issued, and an appropriation request data transmittal was issued. Pre-approval funds were provided by the General Manager for definitive design and the purchase of long-delivery equipment. Preparations are underway to clean, inspect, and dismantle the phthalic column and condenser at Chocolate Bayou. Definitive design is in progress.

Tributyl Phosphate - CEA 2371

This portion of the "New Phosphate Expansion Project for the E-E Building" has been isolated, and a separate preliminary project scope report was developed. This latter scope report has been issued for review and cost estimate.

p-Cumylphenol

An evaluation report was issued to members of the Business Group and others for review and comment.

N-C Phosphate

Work was deferred pending success in Research of a modified process and for breaking out the tributyl phosphate project CEA 2371. Based on new Research data, engineering work can be resumed when manpower is available.

EUROPE

The Norwegian Government has reportedly introduced controls whereby PCB will be placed on a restricted list. All users will have to be registered and will also need a permit to use PCB. We are seeking copies of the control regulation.

Meetings with the other West European PCB manufacturers have yielded a more positive response than anticipated. There is a good deal of sympathy for joint action following the North American pattern, and the implications of unilateral Monsanto action are appreciated. Timing is a problem and if they cannot act as quickly as us, then an acceptable compromise solution seems probably.

WATER_PCB-SD0000068543

EUROPE (continued)

Draft copies of the N.E.R.C. report on the Irish Sea incident have been sent to the various contributing bodies. We have not yet seen a copy and are seeking one.

JAPAN

No new developments.

MEDICAL

Reports on the chronic dog toxicity studies through the first year of the two-year project have been received. The reports on the rats have been delayed awaiting micropathology. The other projects, i.e. rat reproduction, chicken reproduction with 1242B, repeat fish toxicity studies, and the projects on MIPB and HB-40 are on schedule. Of particular interest, it may be noted that MIPB has been classified as "extremely irritating" to the skin as a result of the standard rabbit skin tests.

Three publications referring to research on PCB in the environment ("Toxicity to Mammalian Creatures and the Development of Protocol for Toxicity to Aquatic Animals") appeared in the May/June issue of the Bulletin of Environmental Contamination and Toxicology. Copies are being circulated.

PUBLIC RELATIONS

Use of our July 16 news release on PCB increased during August. Our practice of following up each PCB story with our news release -- to those media who did not receive the initial mailing -- seems to be paying dividends. The Booth Newspaper chain in Michigan

WATER_PCB-SD0000068544

PUBLIC RELATIONS: (continued)

was the first to run our release. Other major dailies include the Austin Statesman, Milwaukee Journal, San Francisco Examiner, Akron Beacon Journal, St.Louis Post-Dispatch and the St. Louis Globe-Democrat. Trade publications using the release were the Oil Daily, Chemical Week, OP&D and C&E News.

Work continues on a Monsanto Magazine article for the winter issue detailing our actions in solving the PCB problem.

RESEARCH

Carbonless Carbon Paper Solvents

The "happiness curve" for MIPB at NCR improved with favorable results from preliminary testing on odor, eye irritation and patch test irritation by their consultants, Hilltop Laboratories. More detailed tests are to follow, however, NCR have been supplied 10,000 - 12,000 lbs. of MIPB from Queeny Plant production in July and are preparing large quantities of commercial NCR paper for testing by their customers. Results from these latter tests are not expected for four months.

Meanwhile, as an emergency stop-gap measure if needed, NCR is anxious to qualify MIPB of a composition which would not require a fractionating column for production. We will supply this grade, along with additional orders for the regular grade MIPB from the next production run at the Queeny Plant.

Higher alkylated biphenyls (butyl thru C6, 8, 10) have all given poor performance in print fade properties and are no longer of serious interest. NCR have initiated a fundamental study of the print fade problem. Our studies of print fade suggest that the problem is caused by light and excess solvent. Ways for minimizing or eliminating print fade are also under study in our laboratories.

Four additional solvent samples were sent to Nashua to zero in on the required viscosity and dye solubility in their equivalent of NCR paper.

We also agreed to supply NCR a sample of alkylated terphenyl (Santowax R) in order to provide an in extremis material for their evaluation.

Aroclor Replacements for Polysulfides

Our alternate replacement products have met mixed reaction in the field. Suggested blends of Aroclor 5460/S-261 or

WATER_PCB-SD0000068545

RESEARCH: (continued)

S-160 were rejected by Thiokol because of doubts concerning the use of any chlorinated aromatics. Other customers are evaluating suggested blends but have not yet finished reformulations. It is apparent that aggressive presentation of a new product (not simply a replacement) is needed at Thiokol. At present our best experimental candidate is B-phenoxyethyl benzyl phthalate. It is hoped that sufficient quantities for customer evaluation can be made in the near future.

MCS-1016

Drum lots of MCS 1016, (fractionated Aroclor 1242) were sent to G.E., Aerovox, Westinghouse-Bloomington and Pittsburgh, Sangamo, Cornell Dubilier, Hercules, Mitsubishi Monsanto, McGraw Edison, PR Mallory, Monsanto Ruabon, Sprague, Electronic Components for evaluation in capacitors. This new fluid removes Cl_5 and Cl_6 chlorinated biphenyl isomers to aid biodegradation. G.E. reports that 6-12 months will be required for full evaluation depending on assessing the degree of risk in making the new fluid substitution.

Aroclor 1242 Fractionation Column Bottoms

Aroclor distilled from Aroclor 1242 fractionation column bottom contains crystals when cooled to 20°C. Mass Spectrophotometry indicates that these crystals are tetra-chlorinated biphenyl. Aroclor 1242 bottoms containing the crystals were chlorinated to Aroclor 1254 and tested for insolubles. The laboratory produced Aroclor 1254 did not produce crystals after seeding and cooling to 0°C overnight.

Reclaim Aroclor

Jard #2 Aroclor 1242 was analyzed and proved satisfactory for reclaim into Pydraul 312. The material was free of low boilers with less than .01% hydrocarbon.

Krummrich began processing of Westinghouse-South Boston tank car Batch #1 material. This material was purified by batch distillation discarding the first 20% cut.

- Ruabon has followed reclamation of Pyranol 2 from BICC at Dalton to provide a reclaim service on electrical grade Aroclor in England.

WATER_PCB-SD0000068546

Removal of Aroclor 1221 and 1242 from Water Waste Streams -

A sand prefilter 3 1/2" diameter by 5 1/2" deep bed and a carbon bed are being evaluated to remove Aroclor from waste water at Anniston. The concentration of Aroclor was reduced from >1000 ppb to > 10 ppb by adsorption. Fifty gallons were passed through a 3 1/2" x 5 1/2" adsorbing bed before detecting > 1.0 ppb Aroclor.

NC Phosphate Ester

300 pounds of satisfactory product were produced by rewashing production trial material in the Pilot Plant. A trial washing run of production Batch 8 in the Podbelniak centrifuge at Baker Perkins was successful in eliminating emulsions. Soluble salts were 8 ppm.

However, two batches reworked in the pilot unit using tap water and longer hold and washing cycles had unsatisfactory O & C performance. Research doesn't know why the material is out of specification. 33,000 lbs. of material has not been successfully reworked because of lack of satisfactory rework process.

Pydraul 312 Line Replacements

Two reformulations of Pydraul 312 were investigated. The first contains Aroclor 5432, CDP, DIDA and petroleum oil. This fluid is slightly more FR than 312.

The second reformulation, without halogen, will depend on finding a solubilizing agent for oil and aromatic phosphate ester. Fatty acid esters are used in the D. A. Stuart DASCO FR 300.

Water-Glycol Fluids

A second production run was made on the water/glycol blends. No problems were encountered.

Aroclor - Environmental Program - St. Louis

The analysis of rat tissues (fat, kidney, liver and muscle) from the Industrial Bio-Test 30-day tissue collection study have been completed. The samples (72) were analyzed as outlined in Analytical Chemistry Method No. 70-1 and the PCB levels were estimated using the Aroclor fed as the standard. The results agreed very well with what is being observed environmentally, namely that the estimated PCB levels found in all tissues decreased as the degree of chlorination decreased (1260>1254>1242) and increased as the dietary level increased. The isomer distribution of all Aroclors fed were also markedly altered. A more detailed report has been issued.

WATER_PCB-SD0000068547

RESEARCH: (continued)

Several JRQ plant sewer water samples (4) were analyzed for PCB's. The N. trunk sewer contained less than 47 ppb, the S. trunk 147 ppb, a June composite sample from the main sewer effluent 46.0 ppb, and a July composite sample from the main sewer effluent, 43.5 ppb. In all cases, the PCB was identifiable as Aroclor 1248.

A second set of PCB/air samples (6) were analyzed for the Appleton Coated Paper Company. As in the past, the results were forwarded to them for interpretation.

Samples of mold sand used by Ford-Dearborn (2) and GMC-Pontiac (1) were analyzed for Aroclor 1242. The amounts found ranged from 80-1200 ppm.

The analysis of a variety of fish for PCB (31) collected during the semi-annual survey of the Choccolocco Creek have been completed and a report issued. A second set of fish samples (4) from this area are in hand and analysis of these will be completed this week.

PCB's have been observed in a number of carp and catfish (7) taken from the Mississippi river around Kimmswick, Mo. The levels found were, with one exception, in the low ppm range (>10 ppm).

Six (6) water samples from the JARD Company, Inc. have been analyzed for PCB's to establish if they have a significant effluent problem. PCB's were detected in all samples. A report is being written.

EC/GC support at the rate of 10 samples/day is being provided for the semi-continuous activated sludge degradation study of Aroclor 1130, 1242, 1254, and MCS 1016. These studies were started 8-10-70 and will run approximately 30-60 days.

A study to isolate and identify potentially toxic oxygenated impurities in Aroclors has been initiated. No compounds of this type have been observed in Aroclor 1260, Lot AK-3; detection limit ca 2 ppm. Higher levels of chlorinated naphthalenes have been observed. Aroclor 1242, Aroclor 1254 and the competitive product Pheneclor DP 6 will be investigated by this procedure.

OSW 013981

WATER_PCB-SD0000068548

Environmental Studies - Ruabon

The NERC report on the Irish Sea Incident has not yet been published, but copies of the draft have been sent to the contributing bodies. We have now made a written request for a copy of this draft, but do not yet know whether this will be approved.

A further meeting on PCB analysis has been arranged by the Ministry of Agriculture, Fisheries and Food to take place late in September.

A paper has been prepared for presentation at the CIGRE conference in Paris this month on the PCB pollution problem as it affects the use of askarels in the electrical industry. This is intended to generate discussion amongst askarel users.

Biodegradation Testing - St. Louis

Testing of Aroclor 1242, Aroclor 1254, MCS 1016 and fractionated Aroclor 1330 in our semi-continuous activated sludge units is now in progress. These units are being fed at a daily rate of one milligram under identical conditions to permit a comparison between our present Aroclor products and the proposed substitutes. EC/GC analyses for the first weeks of operation have been completed except for calculations. River die-away tests are now being started on these same products.

Biodegradation - Ruabon

Thirteen day exposure of MCS 1016 to biphenyl-active soil culture (C_2) has produced considerable degradation of all major peaks in the chromatogram. Exposure will be continued to 83 days. Qualitatively it appears that degradation is greater than for Aroclor 1242, but identification and quantification of residues must be accomplished to provide adequate definition of the extent of degradation.

Thirteen day exposure of MCS 717 to C_2 shows considerable degradation. Qualitative judgement indicates more degradation than for Aroclor 1242. MCS 762 is also being examined.

Work on the key hexa and penta chlorinated isomers has continued using C_2. Increasing agitation has failed to induce degradation so far, but work in which lower chlorine isomers have been added to increase solubility, is in progress. The degradation of HB-40 is being assessed. Sample has been exposed to C_2. Analytical work is in progress, but the complexity of the chromatograms has caused some delay in interpretation.

Development of GLC techniques to provide greater selectivity in the analysis of PCB's is proceeding satisfactorily.

WATER_PCB-SD0000068549

MANUFACTURING

Anniston

Regulatory Action

In early August, the Alabama Water Improvement Commission informed the plant that FDA had furnished them with fish flesh analyses from samples taken in the Choccolocco-Coosa River Watershed, indicating appreciable levels of Aroclor as well as DDT metabolites. Mercury was also present at low levels. The plant's previous informational contacts with AWIC had prepared them for receiving this news. Due to a high level of public concern about a ban on fishing in some state streams having high mercury level, an intensive program was started immediately to correct remaining major Aroclor discharges. This program will be discussed with AWIC in September.

Current Level

Aroclor losses during August increased to a level of 7280 ppb in plant effluent, equal to 88 #/day. This increase corresponds to high turbidity of the effluent from limestone inert material as the settling capacity of the final acid treatment pit has deteriorated since last cleanout. Process research studies indicate that removal of solids will result in removal of Aroclor.

Plant Effluent Suspended Aroclor Control

The Aroclor department sump was put into service on August 12, three weeks ahead of target, and is controlling at the 100 ppb level in department effluent waters. Second phase is being separated and a high-Aroclor scum is being collected on sump surface. An experimental mechanical skimmer will be installed in September for evaluation in removal of this scum; tests with polyelectrolites in agglomerating this scum were not productive.

Final Effluent Treatment

July and August samples from Aroclor sources indicated that the final neutralization pit is now a major remaining source of plant effluent levels. Previous practice in pit cleanout has not been adequate to remove accumulated material, and limestone inert solids apparently are an effective adsorbent in the pit environment. A two phase program based on these facts is underway: 1) a second, uncontaminated pit will be put into service by mid-September to permit shutdown and decontamination of the permanent pit and to develop procedures for alternate operation cleanout without loss of neutralization or solids-settling capability. Concurrently, gross introductions

WATER_PCB-SD0000068550

MANUFACTURING: (continued)

of Aroclor into the sewer system are being stopped with the Aroclor department sump, new operating and housekeeping procedures, and cleanout of potential collection points in the sewer system. This program is targeted for mid-September completion and should reduce plant effluent to the 200-300 ppb level that is seen in source point water phase analyses. An initial reduction in water use - 100 gpm out of 700 gpm has been accomplished through a checkoff list.

Longer term, immediate steps are being taken to develop feasibility and costs of effluent solids-Aroclor reduction through continuous coagulation and clarification. Major vendors in the water treating field are being consulted with a final proposal targeted for December 1. Six projects for water reduction and improved housekeeping are underway and are being expedited.

1. Installation of concrete pads and curbs in major spill areas to replace chat.

2. Reuse water in Aroclor department still jets and blow-tank scrubbers (reduce water-Aroclor contact target - 100 gpm).

3. Reuse water in Muriatic Acid department fume scrubbers and absorber final scrubber and divert acid sewer through Aroclor department sump. (Reduce water-Aroclor contact target - 100 gpm).

4. Upgrade HCl off-gas organics removal system to improve efficiency.

5. Provide a collection system for carbon tower spent carbon to prevent spills to sewer.

6. Further water reductions by re-routing Parathion phosphoric acid wastes.

Bulk Waste Disposal

Data has been gathered on all solid materials to be collected and disposed of. This data has been reviewed and will serve as the basis for scoping a collection system and incinerator. A report will be issued in September on the use of fuel oil to dilute Montar for improvements in handling and pumping for incineration.

OSW 013984

WATER_PCB-SD0000068551

MANUFACTURING: (continued

Sauget

PCB Levels in Sewer

Current losses to the river are about 30 to 35 #/day.

WGK laboratory is now training analysts in routine analysis of PCB's in sewer samples. This should be completed by September 4 at which time 3 to 4 samples/day will be analyzed.

One of the two chromatograph detectors was found faulty and has been returned to the manufacturer for repair. Although the instrument is operable on the remaining detector, some instrument time loss is experienced.

Projects to Reduce Sewered PCB's from Aroclor Department

Blow tank demister (Est. 2031) design package completed. Project construction will begin in September. Process Amendment has been prepared and is being circulated for approval.

Estimate being prepared for about $30,000 to provide paving, curbs, trenches and batch basin in tank car and tank truck loading areas.

Aroclor Incineration

Estimate 2292 for $7,419 capital and $4,700 expense submitted. Project will privide 150,000 gallons of storage for waste PCB's until incineration facilities are started up. Two to three weeks will be required to complete this project after approval is received. At this time, no bulk aroclors are being dumped at the sanitary landfill.

PCB Levels in Atmosphere

Report published which covered points of loss. It was pointed out that most severe vapor losses were from Therminol units in Depts. 239, 245, 248 and 255. To spur action, a meeting was held on August 17 with Bill Papageorge and Don Roush to give general philosophy and technical assistance to those responsible for correcting these problems.

Target date of 9/1 for obtaining samples has been missed. A special grade of toluene is needed for the sampling device and should be received during the week of 8/31. We should still meet our target date of 9/15 for setting air emission targets for Dept. 246 and the plant.

WATER_PCB-SD0000068552

MANUFACTURING: (continued)

Newport

Removal of Suspended Aroclors from Plant Effluent

Installation of sump level alarms now 80% complete.

Analysis of Newport plant effluent for PCB between July 1 and August 5 showed an average level of 374 ppb, with a range from less than 10 ppb to 2,500 ppb. The higher figures are thought to be due to leaks and spills and are still under investigation.

374 ppb of PCB is equivalent to approximately 3.74 lbs./day.

Spills

Drip trays have now been provided under seals of Santotherm pumps on 4NDPA plant. Work Orders have been issued for the installation of a bunded area around these pumps.

Atmospheric Emission

Preliminary Progress Report No. SQ 10306 issued. A list of twelve points to be sampled has been drawn up. Analysis work will be started as soon as the necessary sampling apparatus has been made up. The points to be sampled, and the expected levels of PCB are:

	Source	Estimated Loss
1.	Santotherm expansion tank 4NDPA plant	0.5 lbs./day
2.	Santotherm expansion tank Santolube 900 plant	0.5 lbs./day
3.	Aroclor F.P. storages	1 lb./day
4.	Still bottoms area	Anticipated to be in range 1 to 5 mg/m^3 of PCB concns.
5.	Chlorination circulating pumps	
6.	Chlorination operation floor	
7.	Tanker and tote bin loading shed	Anticipated to be in range 1 to 5 mg/m^3 PCB concns.
8.	Still ejector exhaust	
9.	Drumming off area	
10.	Lime tank area	
11.	Plant Office	
12.	Analytical special Pdts. Lab.	

OSW 013986

WATER_PCB-SD0000068553

MANUFACTURING: (continued

Aroclor Bulk Deliveries

Bulk Off-loading Procedure now in the hands of Marketing and Distribution Departments.

Used Drum Disposal

Discussions held with drum reconditioning company to evaluate setting up of official used Aroclor drum disposal service for Aroclor users. A visit is planned to the cleaning/ reconditioning plant to inspect their effluent treatment and incineration facilities and monitor trials to be sure that the operation will not result in PCB pollution emissions.

W. B. PAPAGEORGE

/jk

WATER_PCB-SD0000068554

Monsanto

E. S. Tucker - Technology Department - S. Second Street

DATE: September 15, 1970

SUBJECT: FISH SAMPLES FROM COOSA RIVER AND CHOCCOLOCCO CREEK (COLLECTED 8/9/70)

cc W. B. Papageorge - GO
E. P. Wheeler/J. T. Garrett - (
R. E. Keller - Res. 1
P. B. Hodges - GO

REFERENCE:

TO E. G. Wright
Anniston

Sample Pallet No.	OR Log No.	Collection Location	Species and Number	ppm PCB's in Fillets on a Wet Weight Basis Aroclor 1248	Aroclor 1254
1	403 407	Broken Arrow Creek confluence with Coosa River (15 mi. upstream from Choccolocco confluence)	Catfish(1) Carp(1)	10.0 2.6	11.2 0.9
2	405 404	Railroad Bridge at Riverside (10 mi. upstream from Choccolocco)	Carp(2) Catfish(1)	8.4 33.6	6.1 31.5
3	406	Choccolocco Creek (1 mi. upstream Coosa River confluence)	Drum(1)	7.1	4.8
4	402	Coosa River (1 mi. below Choccolocco confluence)	Carp(1)	-	64.0

These fish were samples in the following manner: fillets were removed from both sides of each fish and passed through a meat grinder until a homogenous tissue mass was obtained. A 50g portion of the tissue homogenate was then extracted, worked up, and analyzed in accordance with Analytical Method 70-1. All calculations were made on the basis of total peak area in the chromatographic elution region of interest. DDE was observed in samples 403-407. The results reported were corrected for DDE by subtracting the area for this peak from the total area.

E. S. Tucker

db

DSM 013566

PENGAD-Bayonne,N.J. PLAINTIFF'S EXHIBIT 111 3-31-98

WATER_PCB-SD0000068555

Monsanto

FROM (NAME & LOCATION) E. G. Wright - Anniston

DATE August 20, 1970

SUBJECT FISH SAMPLES FROM COOSA RIVER AND CHOCCOLOCCO CREEK (Collected 8/9/70)

REFERENCE

cc J. T. Bell
J. L. Corder
G. L. Jessee
P. B. Hodges
J. C. Landwehr
W. B. Papageorge

TO : Dr. E. S. Tucker - So. Second St.

Listed below are the locations and types of fish collected from the Coosa River, Choccolocco Creek Watershed on August 9, 1970. Some of the fish taken during this period are being kept in Anniston so that Don Turner can develop his technique for analyzing biological samples.

Sample Pallet No.	Location	Species	No.	ppm 48	ppm 54
1.	Broken Arrow Creek Confluence with Coosa River (15 miles upstream from Choccolocco confluence.)	Catfish	1	10.0	11.2
		Carp	1	2.6	0.9
2.	Rail Road Bridge at Riverside (10 miles upstream from Choccolocco.)	Capp	2	8.4	6.1
		Catfish	1	33.6	31.5
3.	Choccolocco Creek (1 mile upstream Coosa River confluence.)	Drum	1	7.[illegible]	[illegible]
4.	Coosa River (1 mile below Choccolocco confluence.)	Carp	1	64	—

These fish were shipped by air freight on August 19, 1970 and should arrive in St. Louis on August 20, 1970 a.m.

I will be happy to answer any questions which you might have concerning these samples.

Bunky
E. G. Wright

bym

DSW 013567

Monsanto

FROM NAME & LOCATION: Paul B. Hodges - St. Louis

DATE: September 18, 1970

SUBJECT:

REFERENCE:

TO: Toby Bell - Anniston

cc J. R. Savage - JSAVA
W. B. Papageorge - WPAPA
D. B. Hosmer - DHOSM
G. L. Jessee - Anniston
G. Miller - Anniston
J. Landwehr - Anniston
J. L. Corder - Anniston

CONFIDENTIAL

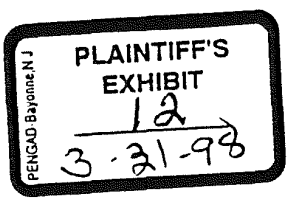
In reviewing your proposed letter to Joe Crockett with Legal, et al, we requested latest emissions data on the flow to Snow Creek. We had hoped that it might show an improvement over the 1st week in September and thus demonstrate a favorable trend to Crockett. Instead, the emissions are considerably increased with 9/13/70 at 6.25 ppm (or about 80 lbs. of PCB for the day). From the Legal standpoint, there is extreme reluctance to report even the relatively low emission figures because the information could be subpoenaed and used against us in legal actions. Obviously, having to report these gross losses multiplies, enormously, our problems because the figures would appear to indicate lack of control.

Realizing the extreme efforts the plant has gone to in order to curtail loss of PCB's, is there anything more that can be done to get the losses down? Is there a possibility that sampling practices are responsible for the wide variations shown (you might try duplicate effluent samplers)? Are there any practices in the manufacturing area which might result in the peak losses? Obviously, we cannot solve the problems from St. Louis but we do want to emphasize the concern from here.

Paul

Paul B. Hodges

/mp



DSW 014095

WATER_PCB-SD0000068557

J.R. Savage - General Office

October 7, 1970

Mr. H.S. Bergen
Mr. P.B. Hodges

SEPTEMBER PCB REPORT

Manufacturing

Mr. W. B. Papageorge
General Office

ANNISTON PLANT

PCB Levels In Snow Creek

Average PCB loss for the month was high at 2600 ppb or 32 lbs/day, largely as a result of one very bad day (400 lbs) Contributing causes were:

1. The old limestone pit was overloaded and solid sludges were carried through,

2. Detergent cleaning of the department,

3. Sewering of excessive amounts of muriatic acid.

Since the new limestone bed was placed in service on September 23, pit effluent has been at 0-3 ppb PCB's. However, leaching of PCB's from the creek bed results in a plant effluent level of 90 - 240ppb or 1.1 - 2.8 lbs/day, gradually declining. The plant believes that the new pit can handle ordinary upsets and peak loads.

Regulatory Action

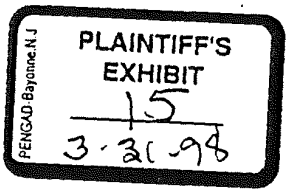
Telephone contact continued with the Alabama Water Improvement Commission. However, a planned meeting did not take place due to illness of AWIC members. Pressure for routine submission of analytical data is not intense at this time.

Department Suspended Aroclor Control

An experimental skimmer operated very well removing the PCB laden scum which accumulates in the new sump.

Solid Wastes

Solid waste data for evaluation of disposal methods has been accumulated. A report will be issued in October.



MONS 099026

WATER_PCB-SD0000068558

W. G. KRUMMRICH PLANT

PCB Levels In Sewer

Current losses to the river from the treatment plant range from 12 to 742 ppb with an average loss of 311 ppb for 11 samples. This is an equivalent average loss of 71.5 lbs/day.

Projects To Reduce Sewered PCB's From Aroclor Department.

Blow Tank Demister (Estimate 2031) project construction is underway with completion scheduled for October. A Process Amendment was approved.

Project for about $30,000 to provide paving, curbs, trenches and catch basin in tank car and tank truck loading areas will be added to the incineration project to speed approval.

Program To Eliminate Sewered PCB's From Using Departments

Departments 243 and 244

Plans are to replace the Therminol FR-1 with Therminol 55. Lab work has been conducted to verify that there is no reaction between Therminol 55 and any process materials. Engineering is underway on system modifications required for use of Therminol 55. Target date for changeover is 12/1/70.

Department 245

The major problem here is air pollution from the supply tank vent. Our target is to scope a solution and prepare an estimate by 11/1. Changeover to a different fluid is undesirable in this department due to the high fire potential.

Department 251

No work has yet been done on the lubrication and hydraulic type systems in this department.

Department 239

Work is in progress to develop project premise. We expect to eliminate two pumps and a cooler in the Therminol lines. (Pending results of thermal stability of Santophen 1 residue). The project will include a new expansion tank with submerged

WATER_PCB-SD0000068559

W. G. KRUMRICH PLANT

Department 239 (Cont'd)

pump. We also plan to upgrade controls and make furnace operation more reliable. How to sump the area around potential spills is still unresolved. To go to a flammable heat transfer fluid is considered too great a process safety hazard in this area.

Department 255

Plans are to replace FR-2 with Therminol 66 by 11/15/70.

Department 248

No progress has been made to date. A definite plan will be developed by 11/1/70 with the objective of solving any problems by 1/1/71.

Department 258 (DDS)

The unit is still down and most likely will not be started up again. The material on the pad has been removed.

Department 270

A 55-gallon drum has been placed under the vent. Chat soaked with Aroclor around the furnace must still be replaced.

Department 275

A 55-gallon drum must still be placed under the vent line (the vent will have to be shortened to do this). Chat around the furnace still needs to be replaced.

Department 273

Work completed. Drum placed under surge tank vent. Buckets placed to collect material from drip pans under Therminol circulating pumps.

Department 222

Unit in start-up. No visible source of loss observed.

Estimate 2292 will be revised. This is the project to provide 150,000 gallons of storage for scrap Aroclor. A plant level earnings expense estimate will be prepared

WATER_PCB-SD0000068560

W. C. KRUMRICH PLANT

Department 222 (Cont'd)

to cover the cost of altering the storage tanks. The 4,000 gallon trailer originally used to haul Aroclors to Queeny Plant will be used for scrap Aroclor hauling in the plant.

PCB Levels In Atmosphere

Vapor losses from the Aroclor Department are estimated at 2.3 #/day now and 1.6#/day after the installation of the blow tank demister.

1. Scrubber Stack (from blow tank drowning jet) 0.90#/day

   This is a measured quantity. With installation of the demister and closing the batch blow tanks, air flow should be decreased to about 20% of present flow. Assuming the concentration to be the same, loss would be reduced to ~0.2#/day.

2. Fume Removal Stack (from drowning area and sampling stations) 0.05#/day

   This is an estimated quantity based on most vapors coming from the drumming station and assuming 10,000,000 #/year drummed, and 1242 vapor pressure at 80°C. Samples are being taken to verify.

3. Aroclor Transfers Within Department 1.34#/day

   This is an estimated quantity assuming 70M #/year production and 2.5 transfers/pound at 100°C. Samples will be taken at storage vents to verify.

4. Steam Jets - unknown

   Will be measured.

WATER_PCB-SD0000068561

Monsanto

FROM (NAME & LOCATION): E. G. Wright - Anniston, Alabama

DATE: October 29, 1970

SUBJECT: New Sump below Plant Dump

REFERENCE:

cc: J. T. Bell
J. L. Corder
J. C. Landwehr
G. W. Miller
B. O. Severson

TO : W. F. Taffee

This memo will serve to bring you up to date on our observation on the new sump which has been constructed at the dump drain. Andy Bonds has been visually inspecting the sump every day and has collected samples of the ditch up-stream from the sump. His observations are as follows:

1. There is practically no water flow down the hill from the dump, except during rainy periods. This would indicate that there are no springs feeding this ditch.

2. The Aroclor phase in the ditch seems to be stable except during periods of rainfall.

3. The sump has collected approximately 2-3 gallons of Aroclor since it was built.

4. Some material does float on the water in the sump.

5. No second phase has been observed in the sump effluent.

Several samples have been collected from the ditch up-stream from the sump. The results are as follows.

Date	Aroclor Conc. (P.P.B.)
10/15	64,800 (1242 only)
10/21	35,000 (1242 only)
10/22	2,800 (1242 only)

The samples taken on 10/15 and 10/21 were taken from the ditch and contained visible Aroclor. The sample taken on 10/22 was taken from the top of the sump. These samples show that the sump is very definitely retaining the second phase.

We will continue to observe the sump, but we plan to sample it only when it is over-flowing to the creek. If you disagree with this approach, please let me know.

E. G. Wright

jw

PENGAD Bayonne, N.J.
PLAINTIFF'S EXHIBIT
110
3-31-98

OSW 014091

WATER_PCB-SD0000068562

Monsanto

FROM (DEPT. & LOCATION): ST. LOUIS - GENERAL OFFICES

DATE: OCTOBER 1, 1970

cc P. B. HODGES
F. J. HOLZAPFEL

SUBJECT: PCB/FISH - ANNISTON

REFERENCE:

TO : W. B. PAPAGEORGE

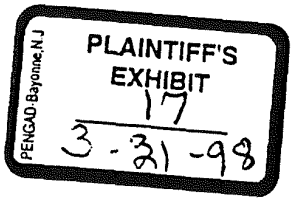
This morning I met with John Eck to discuss with him the current position on PCB contaminated fish at Anniston. Overall, he considers that we are doing everything necessary in this area, but he thought it would be useful if we could obtain additional information on the exact location of PCB deposits and have a better idea of where the fish are picking up the material.

In view of this, I think it would be useful if you and I could tour Anniston to discuss the subject in more detail, both with our consultants and with the plant personnel involved. Would you please contact me on your return to the office, so that we can arrange a visit?

Convenient dates from my point of view would be 6th, 7th October or 15th, 16th October.

JOHN MASON

ms



MONS 098219

WATER_PCB-SD0000068563

12-8-70

From the Desk of

W. B. PAPAGEORGE

Copies TO:

P. Hodges - PHODG
B. Corlew - Krummrich
Joe Landwehr - Anniston
F. Macdonald - NEWPORT

WBP

DSM 013117

PENGAD Bayonne, N.J
PLAINTIFF'S EXHIBIT
18
3-31-98

W. B. Papageorge - St. Louis

December 7, 1970

J. Mason
H. Bergen
F. Holzapfel
G. Bratsch KRUMMRICH
G. Jessee ANNISTON
D. B. Shearn - NEWPORT
P.J.A. Marsh - BRUSSELS

J. R. Savage

One very important objective of our PCB environmental control program was to control the losses of PCB in our plants to achieve a maximum of 50 ppb in the waste water effluent by 1-1-71 and 10 ppb by 9-1-71.

During the month of September, Newport reported an average of 246 ppb. During November Anniston reported 1410 ppb and the Krummrich Plant reported 495 ppb.

Because of the seriousness of the PCB problem this level of performance cannot be allowed to continue. I do not recall that any of the plants have been denied a resource they requested to achieve the stated objectives.

We do not have the luxury of unlimited time to combat this problem. What do we need to reduce losses quickly?

W. B. PAPAGEORGE

OSW 013118

WATER_PCB-SD0000068565

Anniston

J. T. Bell
J. L. Corder
G. L. Jessee
J. C. Landwehr
H. E. Schulte

General Offices

O. Danna (1)
P. B. Hodges
W. B. Papageorge
J. R. Savage

South Second St.

Other Locations

F. Macdonald - Newport

B. W. Corlew - W.G.K.

Monsanto

Anniston Plant

TECHNICAL SERVICES DEPARTMENT

MONTHLY REPORT

Summary

JAN 71 CONFIDENTIAL

Read and Destroy

AROCLOR WASTES

Current Level

Aroclor losses during Jan '71 averaged 1.8 lbs./day (307 ppb). Lbs./day level was up from December while ppb were down due to 300 gpm water flow from startup of Niran incinerator.*

The breakdown of the number is:

28 day average (*amount due to Niran incinerator)	138 ppb	0.8 lbs./day (0.4 lbs./day)
increase due to work on 36" sewer to stop contaminated ground water flow	169	1.0
Total average	307 ppb	1.8 lbs./day

Losses to Atmosphere

PCB losses to the atmosphere were revised to include a pounds/day number and reported in January. No future work is planned in this area until the manufacture of liquid Aroclors is resumed at Anniston.

Aroclor Removal from Waste Water

First formal issue of data on Aroclor removal from waste water was made in R & D Progress Report 446-514, No. 1. This data and comments on carbon adsorption, settling and pumping of solids, and clarification-flocculation were transmitted to Aroclor producing locations and concerned Business Group personnel.

DSW 013907

AN-106

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PLAINTIFF'S EXHIBIT 19 3-31-98

PENGAD-Bayonne, N.J.

Projects and Evaluations

1. No. 1 HCl pit rebuild 90% complete. Asphalt lining sprayed 1/30/71. About 2 more weeks required to have it ready for service. Included in the redesign are:

   a) Inlet weir to measure flow in

   b) Grit chamber/distribution baffle

   c) Underflow baffle

   d) Enlarged settling chamber

   e) Piping installation for pumping out inert solids collecting in settling area.

2. Revised premise for carbon collection and disposal (HCl carbon towers) will be published 2/28.

3. Solids removal pilot plant - construction complete, unit turned over to PR&D 1/19/71. Samples sent to Denver Equipment for testing with Betz coagulant which looked good in lab tests at Anniston.

Spills

There were no spills of Aroclor in Jan 71.

:kd

R. Haupt

DSM 013908

WATER_PCB-SD0000068567

Monsanto

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

DATE: January 29, 1971

SUBJECT: PCB IN PLANT EFFLUENT

REFERENCE:

J. Mason JMASO
H. Bergen HBERG
F. Holzapfel FHOLZ
P. Hodges PHODG
W. Richard WRICH

TO : J. Savage - JSAVA

Early in 1970 we established a target of 10 ppb of PCB's in our plant waste streams which we expected to achieve by the third quarter 1971. No specific target was established for the quantity of PCB we could tolerate in the atmosphere.

During the year as the plants gained tighter control of known sources of PCB pollution, it became increasingly obvious that high levels would continue because of the PCB's trapped in the soil and in the sewer systems. Clean-up of these sources can be economically impractical.

Our studies in Anniston designed to develop methods for removing PCB's from dilute water streams were intended to provide us with a method for removing PCB's from isolated small waste streams. It appears that the PCB contamination is so widespread that all of the plant's effluent must be treated. This would result in a system more complex and costly than anyone had anticipated and approaches tertiary treatment which at W. G. Krummrich plant is scheduled for completion by 1973.

For 1971 I am proposing that 1 pound per day of PCB in the water effluent be achieved in our plants by Sept. 1971 and 1 pound per day to the atmosphere by year end. These are levels which I believe the regulatory agencies might tolerate.

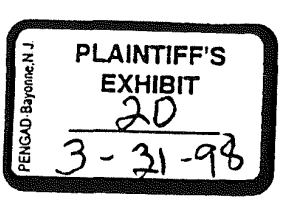
What must be done at each plant to achieve these objectives and what will it cost?

W B Papageorge

W. B. PAPAGEORGE

ms

MONS 098414



WATER_PCB-SD0000068568

From the desk of
W. B. PAPAGEORGE

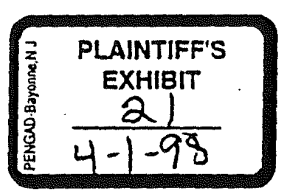
1- 11 -71

J Mason
~~H Bergen~~ → Fred Papageorge

Anniston Plant is doing very well!

P

DSW 013422



PLAINTIFF'S EXHIBIT
21
4-1-98

PENGAD-Bayonne, N.J.

BCC: J. T. Bell
J. L. Corder
G. L. Jessee
J. C. Landvehr
F. B. Hodges - G.O.
F. J. Holzapfel - G.O.
W. B. Papageorge - G.O.

Monsanto
COMPANY

Anniston, Alabama 36201
Phone (205) 236-4381

January 7, 1971

Mr. J. L. Crockett, Jr.
Technical Staff Director
Water Improvement Commission
State Office Building
Montgomery, Alabama

Dear Mr. Crockett:

Attached you will find the daily Aroclor 1242 and 1254 losses from the Anniston Plant for the month of December, 1970. The average numbers are as follows:

Average flow = 384 GPM or 553 M gals./day

Average (1242 & 1254) = .104 P.P.M.

Average # Aroclor 1242 & 1254 = .460#/day

We are continuing in our efforts to define the precision and accuracy of our sampling and analytical methods. We are making progress in this endeavor as can be noted by the daily data. However, we would ask again that this data be held as confidential material.

Yours very truly,

Eugene G. Wright

Eugene G. Wright
Pollution Control Engineer
Technical Services Department

jw
Attachment

DSW 013423

WATER_PCB-SD0000068570

Date	P.P.M.	Date	P.P.M.
Dec. 1	.065	Dec. 17	.054
2	.001	18	.005
3	.114	19	.180
4	.016	20	.049
5	.004	21	.124
6	.006	22	.157
7	.017	23	.080
8	.090	24	.009
9	.230	25	.042
10	.041	26	.010
11	.096	27	.090
12	.022	28	.094
13	.059	29	.908
14	.073	30	.320
15	.036	31	.145
16	.092		

DSW 013424

WATER_PCB-SD0000068571

cc:

J. T. Bell
J. L. Corder
G. L. Jessee
J. C. Landwehr
P. B. Hodges - G.O.
F. J. Holzapfel - G.O.
W. B. Papageorge - G.O.

Monsanto
COMPANY
Anniston Alabama 36201
Phone (205) 236-6381

April 6, 1971

Mr. J. L. Crocket, Jr.
Technical Staff Director
Water Improvement Commission
State Office Building
Montgomery, Alabama

Dear Mr. Crockett:

Attached you will find the daily Aroclor (1242 and 1254) losses from the Anniston Plant for the month of March 1971. The average daily losses are as follows:

Average flow = 846 gpm or 1.210 M gal./day

Average concentration = 0.427 ppm
(Aroclor 1242 and 1254)

Average # Aroclor = 4.33 #/day
(Aroclor 1242 and 1254)

Please note that on the 6th of March we are reporting an extremely high value. We think that this is due to some cleanup efforts which dislodged some material which was trapped in the sewer. This is not indicative of some changed operating practice.

If there are any questions regarding this data, please contact us.

Yours very truly,

EG Wright/jtb

Eugene G. Wright
Pollution Control Engineer

/dp

Att.

PENGAD-Bayonne,N.J
PLAINTIFF'S EXHIBIT
22
4-1-98

WATER_PCB-SD0000068572

Date	PPM	Date	PPM
1	.039	17	.320
2	.248	18	.012
3	.163	19	.003
4	.014	20	.010
5	.156	21	.004
6	10.260	22	.006
7	.590	23	.007
8	.098	24	.011
9	.029	25	.005
10	.460	26	.004
11	.620	27	.006
12	.004	28	.005
13	.001	29	.006
14	.001	30	.004
15	.132	31	.013
16	.004		

DSW 013409

WATER_PCB-SD0000068573

File under PCB files
Fish Analyses

Monsanto
COMPANY

Anniston, Alabama 36201
Phone: (205) 236-6381

May 24, 1971

Dr. Gerald E. Gunning
3608 45th Street
Metairie, Louisiana 70001

Dear Dr. Gunning:

Attached is the residue data compiled from the March survey of Choccolocco Creek fishes.

Please advise if there are questions concerning this data or if you require further analysis of specimen from this survey.

Sincerely,

E. G. Wright

/dp

Att.

BCC: J. T. Bell
J. L. Corder
J. C. Landwehr
W. B. Papageorge - G.O.

PENGAD-Bayonne, N.J.
PLAINTIFF'S EXHIBIT
23
4-1-98

WATER_PCB-SD0000068574

March 16-17, 1971

Results are ppm.
Top number is wet weight.
Number in parenthesis is lipid weight.

	Hypentelium etowanum — Ala. Hog Sucker			Campostoma anomalum — Stoneroller			Notropis [illegible] — Bluntnose Shiner		
	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB
(1) Shoal Creek	0.03 (1.83)	0.05 (2.42)	0.08 (4.25)	0.06 (4.13)	0.08 (6.00)	0.14 (10.13)	0.04 (0.48)	0.03 (0.42)	0.07 (0.90)
(2) Choccolocco Creek, Hwy. 9 Bridge	0.09 (1.28)	0.15 (2.08)	0.24 (3.36)	0.21 (3.42)	0.26 (4.33)	0.47 (7.75)	0.14 (1.55)	0.52 (17.40)	0.66 (22.15)
(3) Choccolocco Creek, Martha H. Williams Bridge, Hwy. 95				41.44 (571.43)	37.50 (427.27)	81.94 (1053.57)	50.78 (541.00)	117.18 (1,250.00)	167.96 (1791.00)
(4) Choccolocco Creek, Hwy. 93 Bridge				41.67 (625.00)	45.00 (675.00)	86.67 (1300.00)			
(5) Choccolocco Creek, Hwy. 77							34.00 (425.00)	32.50 (406.25)	66.50 (531.25)
(6) Chcaha Creek	—	0.35 (12.00)	0.35 (12.00)	—	1.46 (45.00)	1.46 (45.00)			
(7) Aker's Creek	0.04 (2.08)	0.06 (3.13)	0.10 (5.21)	0.04 (1.48)	—	0.04 (1.48)	—	0.53 (10.00)	0.53 (10.00)
(8) Cane Creek	—	0.63 (11.37)	0.63 (11.37)				0.24 (2.83)	0.31 (4.35)	0.51 (7.18)
(9) Stemley Bridge, Hwy. 34									
(10) Clear Creek									

DSM 014799

WATER_PCB-SD0000068575

Lepomis megalotis – Longear sunfish			Lepomis Macrochirus – Bluegill			Micropterus – salmoides – Punctulatus – Coosae Bass			Percina caprodes – Logperch		
A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB
0.07 (9.13)	0.01 (1.38)	0.08 (10.51)				0.03 (0.56)	0.05 (1.11)	0.08 (1.67)	0.13 (2.92)	0.10 (2.33)	0.23 (5.25)
0.11 (0.41)	0.17 0.66	0.28 (1.07)	0.07 (1.50)	0.11 (2.47)	0.18 (3.97)				0.11 (0.56)	0.14 (0.73)	0.25 (1.29)
24.65 (600.00)	50.00 (1216.67)	74.65 (1816.67)	10.32 650.00	23.81 (1,500.00)	34.13 (2150.00)						
Sample Broken			8.67 (65.00)	7.67 (57.50)	16.34 (122.50)						
8.20 (525.00)	18.75 (1,200.00)	26.95 (1,775.00)	1.96 (112.50)	5.44 (312.50)	7.40 (425.00)	1.77 (118.06)	5.33 (355.24)	10.10 (673.30)			
			0.04 (2.40)	0.10 (6.20)	0.14 (8.60)						
0.02 (1.60)	0.05 (3.30)	0.07 (4.90)	0.04 (1.42)	0.19 (6.17)	0.23 (7.59)	0.04 (1.60)	0.13 (5.60)	0.17 (7.20)	0.10 (2.94)	0.16 (4.56)	0.26 (7.50)
0.04 (0.58)	0.13 (2.13)	0.17 (2.71)	0.01 (0.90)	0.24 (3.20)	0.31 (4.10)	[illegible] (0.20) [illegible] 0.04 (0.50)	0.06 (1.50) 0.11 (0.35)	0.10 (2.70) 0.21 (1.05)			
0.71 (31.25)	1.14 (50.00)	1.85 (81.25)				0.31 (12.96)	1.46 (59.75)	1.78 (72.21)			
0.06 (3.50)	0.14 (9.00)	0.20 (12.50)	0.21 (9.29)	0.70 (31.07)	0.91 (40.36)	0.31 (7.31)	0.66 (15.39)	0.97 (22.70)	0.72 (17.36)	0.84 (17.81)	1.61 (35.17)

DSW 014800

WATER_PCB-SD0000068576

Monsanto

Anniston Plant

TECHNICAL SERVICES DEPARTMENT

MONTHLY REPORT

Anniston

J. T. Bell
J. L. Corder
G. L. Jessee
J. C. Landwehr
H. E. Schulte

General Offices

D. Danna (1)
C. G. Hodges
W. B. Papageorge
J. R. Savage

Other

A. E. Leisy - W.G.K.

F. Macdonald - Newport

Summary

CONFIDENTIAL

JULY 1971

Read and destroy

AROCLOR WASTES

Current Level

Aroclor losses during July '71 averaged 2.14 lbs./day (240 ppb). Breakdown of numbers are:

Normal level	140 ppb	1.24 lbs./day
Ruptured Muriatic Acid tank	45	0.40
Excessive rain	55	0.50
Totals	240 ppb	2.14 lbs./day

The month of July had an unusual amount of intermittant rain which may have caused the normal level to go above 1.0 lb./day. Since our flow measurement is one/day, it would not pick up the occasional cloudbursts.

Spills

Less than 10 gallons when Montar drawout line unplugged. No evidence of getting past the department sump pit.

J. R. Haupt

PENGAD-Bayonne,N.J.
PLAINTIFF'S EXHIBIT 24
4-1-98

DSW 013395

AM-406 REV 11/1/1966

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WATER_PCB-SD0000068577

PCB-manuf

Monsanto

Anniston Plant

TECHNICAL SERVICES DEPARTMENT

MONTHLY REPORT

Anniston

J. T. Bell
J. L. Corder
G. L. Jessee
J. C. Landwehr
H. E. Schulte

General Offices

D. Danna (1)
B. Hodges
W. B. Papageorge
J. R. Savage

South Second St.

A. E. Laisy - W.G.K.

Other Locations

F. Macdonald - Newport

Summary

CONFIDENTIAL

AUGUST 1971

Read and destroy

AROCLOR WASTE

Current Level

Aroclor losses during Aug. '71 averaged 0.28 lbs./day (32 ppb).

On August 19th two E.P.A. representatives (Mr. D. Cofara and Mr. P. London) and a representative of the A.W.I.C. (Mr. J. L. Crockett, Jr.) visited the plant to collect several samples for P.C.B. analysis by the Southeast Water Labs (E.P.A.) in Athens, Ga. These samples were requested by the Justice Department in Washington. A composite sample was furnished to them (plant effluent on August 18th, P.C.B. = 196 P.P.B.) from the plant effluent. They also collected samples from Choccolocco Creek, both upstream and downstream. A meeting was conducted with these people and Monsanto's actions toward eliminating P.C.B. from the plant effluent was reviewed. It is not known at this time what will happen as a result of this sampling. Any information received from these samples will be communicated to the appropriate persons when it is received.

Spills

There were no spills of Aroclor in the month of Aug. '71.

V. R. Haupt

PLAINTIFF'S EXHIBIT 25 4-1-98

PENGAD Bayonne, N.J.

DSW 013382

AM-406 REV 11/1/1966

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WATER_PCB-SD0000068578

C O N F I D E N T I A L

THIS POLLUTION CONTROL SECTION IS FOR IMMEDIATE INFORMATION PURPOSES ONLY.

DETACH AND DESTROY UPON READING. DO NOT FILE.

Distribution: P. B. Hodges - G.O.
W. B. Papageorge - G.O.
W. R. Robirds - G.O.
J. J. Spano - G.O.
J. T. Bell
J. L. Corder
G. L. Jessee
L. C. Lehman
J. C. Landwehr
H. E. Schulte
E. G. Wright

POLLUTION CONTROL SUMMARY FOR AUGUST 1971. E. G. Wright, M. D. Turner (J. T. Bell)

Environmental Control Log Book Information

Attached are several articles from various news media which appeared during August. The articles pertain to the senate hearings on P.C.B. and the recent chicken feed problem.

Air Pollution

1. Five air pollution complaints were received during August. Two were attributed to SO_2, one to P_2O_5 mist, one to Montar bottoms pump-out and one to odor from the lagoon (decomposing sludge).

2. Rhodia, Inc. (odor control company) was contacted concerning odor from the lagoon and are presently testing a sample of Monsanto sludge for an acceptable "odor masking" agent.

3. The Alabama legislature has passed a very strong air pollution bill. This bill is now awaiting the governor's signature, with no indication that he will fail to do so. This bill has three main objectionable points from an industry point of view. These are: (1) no industry representation on the commission, (2) provides for suits from the Attorney General or the District Attorney, and (3) local control commissions.

Water Pollution

1. 51 water samples were analyzed for P.C.B. during August. 30 fish samples were completed. Analyses of the June collection of fish are now complete.

C O N F I D E N T I A L

R e a d a n d D e s t r o y

DSW 013383

WATER_PCB-SD0000068579

Water Pollution (cont'd.)

2. The average daily Aroclor losses for August were 0.28 lbs./day compared to 2.4 lbs./day for July. This decrease can be attributed to the routing of the effluent to a new limestone pit.

	P.C.B. Losses	
	(PPB)	(#/day)
Total average	32	0.28

The average losses which will be reported to the Alabama Water Improvement Commission are as follows:

Average daily flow = 728 gpm or 1.05 M gal./day

Average concentration = 0.014 ppm
(Aroclor 1242 and 1254)

Average #/day = 0.12 #/day
(Aroclor 1242 and 1254)

3. On August 19th two individuals from the E.P.A. (Mr. D. Cofara and Mr. P. London) and a representative of the A.W.I.C. (Mr. J. L. Crockett, Jr.) visited the plant to collect several samples for PCB analysis by the Southeast Water Labs (E.P.A.) in Athens, Ga. These samples were requested by the Justice Department in Washington. A composite sample was furnished to them (plant effluent on August 18th - P.C.B. = 196 ppb) from the plant effluent. They also collected samples from Choccolocco Creek, both upstream and downstream. A meeting was conducted with these people and Monsanto's actions toward eliminating P.C.B. from the plant effluent was reviewed. It is not known at this time what will happen as a result of this sampling. Any information received from these samples will be communicated to the appropriate persons when it is received.

4. Sampling has been completed for Part II of the Corps of Engineers permit (deadline October 1). As soon as the data is obtained, the form will be completed and forwarded to St. Louis for approval.

C O N F I D E N T I A L

R e a d a n d D e s t r o y

WATER_PCB-SD0000068580

Monsanto

FROM (LOCATION): St. Louis

DATE: March 30, 1970

SUBJECT:

REFERENCE:

TO: W. B. Papageorge
MPAPA

cc. H. S. Bergen - MBERG
H. L. Minckler - HMINC
P. S. Park - PPARK
J. E. Spriggate - JSPRI

PLAINTIFF'S EXHIBIT 31

We have been in communication with a Dr. Hill of the Ohio State Board of Health. He has found PCB, particularly Aroclor 1254, in samples of milk from at least three herds in Ohio. He has traced this contamination back to silage from three different silos. Dr. Hill reported concentrations of 0.2 ppm of PCB in the silage in the center of the silo and up to 20 ppm in the material next to the walls. He also stated that concentrations in the milk were between 0.1 ppm and 0.6 ppm and that some of the milk had been destroyed.

The silos are concrete silos whose interior surfaces were painted in 1967 using a formulation that contained 1254. I don't know if there was any other Aroclor in the formulation nor do we know the coating manufacturer; although, this could be found out if important. The presence of PCB in the silage came from flaking off of the material and possibly from leaching out during the silage storage. At present they will have to destroy about 150 tons of silage which is valued at about $20 per ton. As a rough guess, they consider there may be 50 other silos involved in Ohio that were painted with the same formulation. They are also looking into the fat contamination of the cows themselves.

All in all, this could be quite a serious problem, having legal and publicity overtones.

This brings us to a very serious point. What are we going to tell our customers not to use any Aroclor in any paint formulation that contacts food, feed, or water for animals or humans? I think it is very important that this be done. It may be that some of the customers will assure themselves on the basis of non-extractability that a particular formulation might be safe but I think we should make a blanket recommendation against these uses.

R. E. Kelly

R. Emmet Kelly, M. D.

REK/ln

PLAINTIFF'S EXHIBIT 29 4-1-98 PENGAD Bayonne N.J.

PLAINTIFF'S EXHIBIT 420

STR 029900

19

WATER_PCB-SD0000068581

St. Louis

February 10, 1967

G. R. Buchanan - GBUCH
J. Piler - BRUSSELS
D.V.M. Hardy - LONDON
Eugene Wilde - EWILD

FILE
Destr.
JTG
WHH
LEJ
RJK
RAM
EPW

Mr. D. Wood
~~LONDON~~ Brussels

We have had a rather extensive meeting, which included the St. Louis individuals receiving copies of this memorandum, on Aroclor in the air and in various fish and other living reservoirs.

The decision was that more information had to be gained, and whether this would necessitate a trip from someone in the Medical Department to the various agencies working on this problem in Europe would depend upon how easily obtainable these gaps in our knowledge are by other means than personal communication.

We are very worried about what is liable to happen in the states when the various technical and lay news media pick up the subject. This is especially critical at this time because air pollution is getting a tremendous amount of publicity in the United States.

We have been receiving quite a few communications from our customers, but the most critical one is NCR, who are very much involved with their carbonless carbon paper.

I have listed a number of points referring to information I would like to have. Some of these may be easy to answer; others might take a little bit of investigation and some might not be feasible to answer at this time. However, please let me know your ideas on each one of the following items:

1. Can we get the original articles in the Swedish press, including Dagens Nyheter? I have a good fluent Dane who translates Swedish very well and is a physician and investigator, so nothing will be lost in the translation.

2. Who were the participants in the conference referred to in your memorandum to Mr. Buchanan of January 26? Under whose auspices was it held and were there any reports issued? What were the conclusions of the conference and was any action decided upon?

PLAINTIFF'S EXHIBIT 30 4-1-98
PENGAD-Bayonne, N.J.

NEV 023645

733700

3. What was the medical institute in Sweden that was going to do the toxicological work referred to in the same memorandum to Mr. Buchanan? Who was going to pay for it and what was the scope of the investigation?

4. In LKB press release of January 10, they stated that 12 OECD nations were going to do work on this problem. Can anything be found out about the extent of this work? Who is doing it, and at what institutes?

5. What is known about the work in England at the Monks Wood Experimental Station and the Laboratory of Chemists in London? How long has this gone on? Is it an ongoing study? What are the perimeters of the study?

6. Do we have the complete paper in Swedish of Jensson and Widmark entitled "Pesticide Analysis—Presence of Polychlorinated Biphenyls and Residual Analysis of Biological Samples"? This was referred to in D.V.M. Hardy's letter of January 12, 1967. I would like to get this original paper with the bibliography in Swedish.

7. Can I have more information about the Carlin Institute of Toxicology which was referred to in Mr. Widmark's letter to Mr. Ford of December 29, 1966? What do they intend to do? Who is the contact, and is it located in Stockholm?

By copy of this memorandum, I am asking Dr. Hardy to find out what the situation is in the two English contacts referred to in item 5.

The consensus in St. Louis is that while Monsanto would like to keep in the background in this problem, we don't see how we will be able to in the United States. We feel our customers, especially NCR, may ask us for some sort of data concerning the safety of these residues in humans. This obviously might be opening the door to an extensive and quite expensive toxicological/pharmacological investigation. Before starting this, we certainly want to find out what is going on and not duplicate any of the work. I have tried to call you for the last two days and I will be out of town next week, but I would like to call you the week of the 20th. Perhaps by then you might have some answers to some of the questions.

W. Emmet Kelly, M. D.

WEK/ln

NEV 023640

733701

WATER_PCB-SD0000068583

February 14, 1969

cc. J. R. Fallon
R. A. Garcia - AKRON
S. Shaw

SUBJECT: INQUIRY FROM VAPOR CORPORATION ON TOXIC EFFECT OF CHLORINATED BIPHENYL

TO : J. J. Roder - CHICAGO

Stan forwarded to me the note you received from Ed Gustaf and the accompanying letter from T. Fujiwara, Managing Director, Nipon Vapor Generator Company, and to H. J. Schickedanz, General Manager, Vapor International. We have been advised by our Japanese representatives of the bran oil poisoning of quite a number of Japanese citizens that was attributed to Kaneclor 400 (chlorinated biphenyl comparable to FR-2).

We assembled both medical and application data and sent it to our Japanese counter-parts as arguments for the safe use of chlorinated biphenyl heat transfer fluid. Essentially, we said that there are certain toxic and systemic effects that can be brought about by the vapors of chlorinated biphenyls. We did not rule specifically on the ingestion limits of this chemical. We also directed attention to the large number of applications in food processing that utilize Therminol FR heat transfer fluid. We brought out very strongly the fact that these systems have been designed to minimize accidental contamination of food products with chlorinated biphenyls.

I think we have a good track record here in the States using Therminol FR in these applications. However, it only seems a matter of time until the regulatory agencies will be looking down our throats regarding the use of this material. Possibly, by the time this comes about, we will have completed feeding studies with chlorinated biphenyls that will allow us more exact data than has been available in the past. As a matter of fact, they're feeding this stuff to chickens now, but I have no specific results of these tests. I can only suggest that you attempt to put Gustaf's mind at ease regarding the "toxic" aspects of these chlorinated biphenyls by playing down the medical reports and playing up proper system design.

Look at the bright side for us in the heat transfer fluid end of our business -- if the government closes us down on the use of chlorinated biphenyls, we have two excellent fluids in Therminol 55 and Therminol 66, as well as, a proprietary fluid in Therminol 77 to exploit. Therminol 66 will certainly be available in Japan according to recent information from our Engineering Department.

PENGAD Bayonne, N.J.
PLAINTIFF'S EXHIBIT 32
4-1-98

WATER_PCB-SD0000068584

A final caution Jim, please use the attached information with some discretion. I certainly would not pass completed sets of this data to those asking the questions, but rather extract the essential points from this data, namely, the ruling on vapor limits as handed down by the Industrial Hygienist Association, and a strong play on proper system design to prevent accidental contamination of food products and processing material by chlorinated biphenyls.

Don Roush

Don Roush

MONS 096866

=

WATER_PCB-SD0000068585

Memorandum

FROM (NAME & LOCATION): W. R. Richard - Research Center

DATE: September 9, 1969

SUBJECT: DEFENSE OF AROCLOR - F. FLUIDS

REFERENCE:

cc: P. Hodges PHODG
M. Farrar Res. 1
H. Bergen HBERG

TO : E. Wheeler - EWHEE

General Policy

Make the Govt., States and Universities prove their case, but avoid as much confrontation as possible. Comply and work with public officials to meet or exceed requirements ahead of time. Adverse publicity and competition are the real weapons.

Analytical for Aroclor { In Air - Which Aroclors are present? Where? / In Water - Which compounds / In Animals - interfere? } Govt. Agencies

Keep track of how much contamination - which sources.

Prove Bioharmful - Let Govt. prove its case, on case by case basis.

Monsanto Visit-Govt. Biolabs - in search of toxicological experiments and evidence vs. Aroclors to keep up with progress.

Monsanto Prove Bioharmless - Limited work at Ind. Bio-test -

"Safe" toxic level for { man / mammals via / fish } Rats / Chickens / Fish

Seek evidence of Biodegradation
Question evidence against us.
Question shrimp toxicology especially other toxic chemicals.
If Aroclor bad, others must be worse.

Probable Outcome

We can prove some things are OK at low concentration. Give Monsanto some defense.

We can't defend vs. everything. Some animals or fish or insects will be harmed.

Aroclor degradation rate will be slow. Tough to defend against. Higher chlorination compounds will be worse . . . other chlorine compounds.

Therefore we will have to restrict uses and clean-up as much as we can, starting immediately.

740838

NEV 027584

PLAINTIFF'S EXHIBIT 1432

PLAINTIFF'S EXHIBIT 33 11-1-98 PENGAD Bayonne, N.J.

WATER_PCB-SD0000068586

Therefore we will have to work for alternate products in end use applications; for Aroclor production facilities.

Clean Up Aroclors and substitute products where necessary and when required, before threats of publicity and competitive activity overwhelm us.

Water Pollution seems to be first issue

Aroclor product is refractive, will settle out on solids - sewerage sludge - river bottoms, and apparently has a long life.

Florida or Gulf Coast - Aroclor 1254 - Aroclor 1260 present issue.
40-200 ppb - causing problem at Pensacola (Monsanto) in plant effluent-causing " with shrimp.
- can't risk shut-down of plant.

Federal and State can extrapolate to other plants in Gulf area.

San Francisco - Aroclor 1254 and 1260

Reported Aroclor to be present in San Francisco Bay.

Reported to be thin egg shells in birds -

Lot of screaming -

Great Lakes Warf studies on DDT

Aroclor 1254 will be found!

Aroclor 1242 will be found?

Air Pollution - Possible spread - but less of an issue right now.
Analytical work more difficult.

Direct Contact with Product

Doesn't seem to be an issue - except for food heat transfer.

We don't believe Aroclor is being used as carrier for insecticide - sprayed around -

We are not positive but most uses are "closed" systems or products used in solid plastics, or adhesives, or sealants.

740839

NEV 027585

WATER_PCB-SD0000068587

F. Fluids	Possible Pollution by Customers Plant Operation	Possible Pollution by Customers Prod
Product		
Hydraulic Fluids	Yes, leakage external	Possible - See Johnson Motors Castings.
Air Compressor Fluids	Yes, leakage external	Leakage into produc
Heat Transfer	Yes, leakage external	Leakage into produc
Capacitor Fluids	Yes, leakage from plant - Scrap materials.	In product but closed for end use*
Transformer Fluids	No, Should be clean. Yes, Reworked transformers	In product but closed for end use**

* Capacitors can go to land fill dumps. Probably not burned, in Al containers.

** Need to take care of Aroclor in discarded transformers. Product could be drained and reworked.

Probable Conclusions

Hydraulic Leakage - Product could be caught at machines but will take a lot of clean-up work with customers. - Will have to have replacement product - with less-sensitive components. Work from this base on clean-up to prevent more pollution problems.

Air Compressor Fluids "

Hydraulic Fluids Must expect "shrimp" experiments, West Florida State, to be "aired" sometime soon; next few months.

This will lead to bad publicity and competitive action vs. all Pydraula.

We will have to try to confine to Aroclor 1254 and Aroclor 1260.

740840

NEV 027586

WATER_PCB-SD0000068588

We will have to take action before that time.

Gulf Coast -

Action W. Richard	Be able to replace Aroclor 1254 and Aroclor 1260 in Pydraul AC and 625 in 2 month's time before Nov. 15, 1969.
Fallon/ Richard	Have trial product in hands of Gulf Coast accounts and distributor before Dec. 15.
Fallon	Suggest possible buy of "all phosphate" ester from Food Machinery. Use this as one trial fluid MCS___ for insurance.
Richard/	Suggest possible substitution of Aroclor 5442 for Aroclor 1254 in hydraulic and compressor blends. E. Wheeler judges lower order of toxicity and solubility for 5442 series. Have to test product in pump test for deposits.
Fallon/ Richard	Suggest field trials of our own all-phosphate ester.
Fallon/ Kuhn/ Kountz	Work with large customers to clean-up streams. Bring in Findett as mfg. partner in the recycle business. Get money out of recycle operations.

Inland-Waterways-

Wheeler/ Richard	Be close enough to Great Lakes studies to judge situation. Are there animals which are being affected by the concentrations found?
Richard	Be prepared to replace Aroclor 1254 and Aroclor 1260 in 4 months in hydraulic fluids and in air compressor fluids.
Richard	Be prepared to replace all Aroclor 1242 or 1248 in 6 months in hydraulic fluids. This means replacement of Pydraul 312 series, and control of sale of Aroclor 1248 to other hydraulic accounts such as Cities Service and Mobil.

NEV 027587

Heat Transfer

Fallon/ Roush/ Kountz	Systems will have some leakage depending strongly on engineering and maintenance. Need to work with customers on clean-up.
Fallon/ Roush	Need to replace FR especially in food or sensitive product areas where the product is getting into water. See dish washer compounds. See letter E. Wheeler to T. Fallon.

We have possible replacement products in Thermin [illegible].
Therm[illegible].

740841

WATER_PCB-SD0000068589

Action

Kuhn

Try to assure adequate production of Therminol 66 in face of decreased Aroclor production. H_2 and terphenyl supply may become short.

Switch customers to Therminol 55 or Therminol 66 ahead of pollution problems in customers plant.

Work with customers on plant and dumping practices.

Kuhn/ Fallon

Findett already set up to rework. Need to make them a manufacturing arm. We get sale of recycle-rework fluid.

Capacitor Fluids

Capacitor plants have re-purification and recycle systems but up to 5% of product can be lost by poor plant producers and off-quality material.

Mkt. Benignus/ Bryant

Eng.-Kountz/ Mfg-Hodges

5% of production could be 1M lbs/year. This is a big loss for the type of pollution we are trying now to guard against.

Capacitor products

Enclosed in Al or stainless steel for 5 to 25 year period.

Will ultimately have to dispose of capacitor products.

Recommend we try to save this product for a time.

Action

Eng.,TSD-Plant Pollution Control

Hodges/ Kountz

Monsanto must start to work with capacitor people to clean up plant practices. We have set-up to accept material for rework into hydraulic fluid but this relocation is not a satisfactory solution. Material must be reworked to electrical grade or destroyed, whichever is more economical. Must start now to get control of off-grade material.

Recommend replacement of future Aroclor business with other products. Have 2 years.

Action

Monsanto must help plant clean-up of customer plants decantation, coalescing, absorption, disposal of adsorbent or recycle of adsorbents.
Monsanto badly needs "know-how" for clean-up.

Monsanto should seek Govt. contract money for clean-up research, (See MRC R. Binning, D. Nelson)

740842

NEV 0275dd

WATER_PCB-SD0000068590

Transformers	Transformer Plant can operate in a clean, efficient manner with recycle of off-grade Aroclor.	Product transformers can remain closed and no exposure for 25 yrs.
Action Benignus/ Bryant	Should advise disposal of filter element materials so as to minimize chance of water pollution. Incinerate or dispose.	
	Reworked transformers pose a threat if the Aroclor is dumped into a water stream.	Should try to retain business by clean-up; by education of customers.
Action Benignus/ Bryant	Should try to minimize chance of dumping "old" fluid by re-working and by educating co. shops and collecting product for rework or disposal.	
	Dalton is set up in England to rework electrical grade fluid.	
Kuhn/Kountz Findett?	Need rework facility here + disposal scheme.	

Monsanto Plants

The Dept. of Interior and/or State authorities could monitor plant outfall and find ppm of chlorinated biphenyls at Krummrich or Anniston anytime they choose to do so. This would shut us down depending on what plants or animals they choose to find harmed.

Action - Take steps to see that every precaution is taken to prevent Aroclor entering water streams. Try to reduce to ppb level.

P.Hodges-TSD - Seek a Govt. contract on adsorption and incineration cycles - MRC.

Engrg.-Kountz - Take samples of streams and river water and mud evidence for before and after clean-up. Samples can be stored for further analysis if we can't keep up current with analytical determinations.

Apply Monsanto clean-up methods to customer plant [illegible] procedures.

NEV 027589

740843

WATER_PCB-SD0000068591

Action - Engrg. & Mfg. Kountz and Kuhn

Evaluate liquid incinerators vs. solids handling incinerators for disposing of Aroclor and pentachlorophenol wastes. I estimate Aroclor disposal at 1-4M lbs/year, exclusive of cleaning up river bottoms or outfall bottoms.

Hydraulics	20% of 4M lbs	800,000 lbs
Heat Transfer	10% of 2M lbs	200,000 lbs
Capacitors	5% of 20M	1,000,000 lbs
Transformers	5% of 15M	750,000 lbs
		2,750,000 lbs

Central Eng. & Mfg TSD

Kountz & Kuhn

Set up an incinerator to handle Aroclor disposal - preferably one which will handle solids such as muds - slurries as well as liquids. Have in operation within 12 months. Ideally have incinerators available different sections for disposal.

Possible help from MRC

Chronic Toxicity Studies - Ind. Bio-Test

Wheeler Keller Ind.Bio-Test

Continue studies to establish FDA type limits of toxicity on Aroclor 1242, Aroclor 1254 and Aroclor 1260.

Rework with R. Keller-S. Tucker the number of samples which are to be analyzed for Aroclor in tissue. Try to see if Aroclors are changed metabolically. Does concentration level off, decline if feeding is stopped?

Institute studies against the most limiting biological parameters. If shrimp are the most limiting species for Aroclor levels of toxicity, then we will have to have biological studies on these species to confirm or deny adverse findings.

NEV 027590

740844

WATER_PCB-SD0000068592

Action - Engrg. & Mfg. Kountz and Kuhn	Evaluate liquid incinerators vs. solids handling incinerators for disposing of Aroclor and pentachlorophenol wastes. I estimate Aroclor disposal at 1-4M lbs/year, exclusive of cleaning up river bottoms or outfall bottoms.

Hydraulics	20% of 4M lbs	800,000 lbs
Heat Transfer	10% of 2M lbs	200,000 lbs
Capacitors	5% of 20M	1,000,000 lbs
Transformers	5% of 15M	750,000 lbs
		2,750,000 lbs

Central Eng. & Mfg TSD Kountz & Kuhn Possible help from MRC	Set up an incinerator to handle Aroclor disposal - preferably one which will handle solids such as muds - slurries as well as liquids. Have in operation within 12 months. Ideally have incinerators available different sections for disposal.

Chronic Toxicity Studies - Ind. Bio-Test

Wheeler Keller Ind.Bio-Test	Continue studies to establish FDA type limits of toxicity on Aroclor 1242, Aroclor 1254 and Aroclor 1260. Rework with R. Keller-S. Tucker the number of samples which are to be analyzed for Aroclor in tissue. Try to see if Aroclors are changed metabolically. Does concentration level off, decline if feeding is stopped? Institute studies against the most limiting biological parameters. If shrimp are the most limiting species for Aroclor levels of toxicity, then we will have to have biological studies on these species to confirm or deny adverse findings.

NEV 027590

740844

WATER_PCB-SD0000068593

Biodegradation Studies

Set up rate of biodegradation studies with Inorganic Div.
on Aroclor 1242 vs. Aroclor 1254
Aroclor 5442 vs. Aroclor 5460
Swisher Chlorinated diphenyl ether
Chlorinated paraffin vs. chlorinated naphthalene
Chlorobromo Aroclors 1242 and 1248

Baxter Lidgett MCL Contact Baxter and Lidgett at MCL regularly for results on Aroclor degradation. They are reported to be moving on laboratory experiments.

- Establish contact with chlorophenol degradation studies of Cellu-Chem Group.

WRR

W. R. Richard

WRR:ms

WATER_PCB-SD0000068594

COMMONWEALTH OF KENTUCKY
FRANKLIN CIRCUIT COURT
CIVIL ACTION NO. 86-CI-1566
DIVISION II

COPY

COMMONWEALTH OF KENTUCKY, NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET — PLAINTIFF

v.

ROCKWELL INTERNATIONAL CORPORATION, TIM SHOOK AND RICHARD L. MONTGOMERY — DEFENDANTS

COMMONWEALTH OF KENTUCKY
LOGAN CIRCUIT COURT
NO. 93-CI-00158

DONALD S. HOUCHENS, ET AL. — PLAINTIFFS

v.

ROCKWELL INTERNATIONAL CORPORATION, RICHARD H. RAMPON, JOHN McCLURE KERR and DAVID R. STANLEY — DEFENDANTS

COMMONWEALTH OF KENTUCKY
LOGAN CIRCUIT COURT
NO. 93-CI-00159

ROGER DALE BARNES and WILDA MAE BARNES — PLAINTIFFS

v.

ROCKWELL INTERNATIONAL CORPORATION, RICHARD H. RAMPON, JOHN McCLURE KERR and DAVID R. STANLEY — DEFENDANTS

COMMONWEALTH OF KENTUCKY
BUTLER CIRCUIT COURT
CIVIL ACTION NO. 93-CI-00119

HOBERT TRACY BELILES, ET AL. — PLAINTIFFS

v.

ROCKWELL INTERNATIONAL CORPORATION, RICHARD E. RAMPON, JOHN McCLURE KERR and DAVID R. STANLEY — DEFENDANTS

PLAINTIFF'S EXHIBIT 35 4-1-98
PENGAD Bayonne, N.J.

DEPOSITION OF WILLIAM B. PAPAGEORGE, P.E.

Taken on behalf of Defendant Rockwell International Corp.
September 23, 1993

WATER_PCB-SD0000068595

there in Anniston that you described for us.

A. Yes, sir.

Q. I understand you used dual lagoons with clay liners, and was it crushed limestone that you were using for neutralization?

A. Yes, sir.

Q. Okay. And then you would drum the sediment that would result in the aggregate and dispose of that in situ there at the facility? Do you know if they had any sort of a situation subsequent where the state of Alabama or federal EPA has come back to monitor that landfilling facility?

MR. GOEBEL: Objection. Irrelevant.

A. I know that the regulatory representatives from the state have visited the plant and made an investigation. I don't know the degree of monitoring that you might have in mind. They were satisfied with the -- with what they saw, and that's where it now stands, to the best of my knowledge.

Q. (By Mr. Cunningham) I guess I'm curious as to why you would have bothered putting that stuff out in the lagoon, why you wouldn't just let it get out into a drainage ditch and go on out to the creek or whatever. Was it your perspective that good engineering practices in the '60s would have mandated that a waste stream that

WATER_PCB-SD0000068596

potentially would have contained PCBs should have been segregated in the manner that you have described that you all did in that facility, at a minimum?

A. At a minimum, it is just not prudent to discharge knowingly any kind of industrial chemical, whether it be PCBs or any other material, and the sediment that collected in that pond was just the type of thing that you wouldn't want to discharge out into the environment. It just wasn't a practice that was considered to be responsible. That's all.

Q. It's from the nuisance aspects and esthetic aspects of discharging something like that that you just wouldn't do it, right?

A. That's part of it.

Q. Okay. Mr. Papageorge, you put a qualifier in there about not -- you wouldn't want to discharge any industrial waste stream like that into the environment knowingly. I want you to assume for the purposes of my next question that -- I think you can look at the last exhibit we had entered which would show what Rockwell's consumption of Pydraul was for -- I want to say these invoices cover from like the '71 through '72 years. I think if you look there, you will see that they were consuming Pydraul in fairly significant quantities. Sometimes it looks like ten 55-gallon drums -- 54-gallon

WATER_PCB-SD0000068597

prefer the Monsanto product.

Q. And I can't pronounce the name of the place up there. Sauget?

A. Sauget.

Q. Sauget, Illinois. They made some PCB up there. Are you aware of any sort of contamination problem they now face in Illinois by that plant as a result of use or misuse of those fluids?

A. I am not.

Q. And how many years were they actually manufacturing the stuff there at that particular facility?

A. From 1935 or 6 or somewhere in there to 1977.

Q. You were there at that plant for a while. Do you know what their process was for treating potentially contaminated -- or maybe that's too strong a word -- waste water streams that may have had contact and even contained PCB solutions and fluids at that plant?

A. All the waste water from that plant went to the Sauget Village municipal treatment plant.

Q. Okay. And do you know if that particular facility had specialized treatment mechanisms for treatment of industrial waste fluids?

A. Yes. I would -- I suspect that the word specialized might fit. They were handling industrial wastes from the entire community. The water that was

WATER_PCB-SD0000068598

ROUGH DRAFT - 11/10/69

OUTLINE

PCB ENVIRONMENTAL POLLUTION ABATEMENT PLAN

I. Introduction

II. Problem

III. Extensiveness

IV. Nature of the Problem

Research and medical input

V. Effect on Monsanto

VI. Effect on Customer

VII. Involvement with other producers

VIII. Sources of Contamination

A. Indirect Pollution

IX. Recent technical changes which have bearing on the contamination

X. Courses of Action

XI. Recommended Course of Action

XII. Implementation of the Recommended Course of Action

A. Immediate Action (12-1-69)

B. Interim 1-3 months

C. Short term - 3-6 months

D. Long term (1-3 years)

1. Research medical
2. Manufacturing
3. Engineering
4. Market
5. Patent
6. Environmental Control
7. Legal
8. Public Relations
9. Others

PLAINTIFF'S EXHIBIT 422

STR 021938

FGL 0011379

125

21

PLAINTIFF'S EXHIBIT 39 4-1-98

PENGAD Bayonne, N.J.

WATER_PCB-SD0000068599

XIII. Probability of Success

XIV. Cost of Program

$220,000 and bid with max. at $20-25M

XV. Future

STR 021939

FGL 0011380 126

WATER_PCB-SD0000068600

PCB ENVIRONMENTAL POLLUTION ABATEMENT PLAN

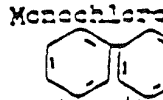
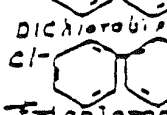
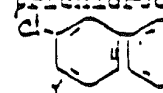
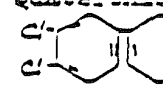
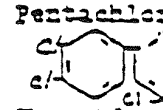
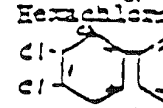
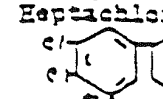
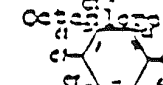
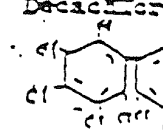
Introduction

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

STR 021940

WATER_PCB-SD0000068601

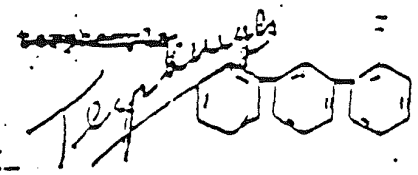
Monsanto entered the Aroclor market in 1930 by acquiring Swan Electrical Company or known today as our Anniston, Alabama plant. The first load of Aroclor which incidentally was Aroclor 1254 — went out of Anniston, Alabama to GE in 1931. Since that time the market has grown to 170 to 200M worldwide.

Chemical	Monsanto Product Line	Nature of Material at Ambient
Biphenyl  Solid at Sublimes at		Solid
Monochlorobiphenyl 	Aroclor 1221	thin liquid (oil)
Dichlorobiphenyl 	Aroclor 1232	thin flush water
Trichlorobiphenyl 	Aroclor 1242	oily type fluid material
Quaterchlorobiphenyl 	Aroclor 1248	Thicker - transmissio oil
Pentachlorobiphenyl 	Aroclor 1254	Heavy-Molasses
Hexachlorobiphenyl 	Aroclor 1260	Thick - tar
Heptachlorodiphenyl 	Aroclor 1262	Very thick - liquid
Octachlorobiphenyl 	Aroclor 1268	Solid
Decachlorobiphenyl 	Aroclor 12715	Solid

STR 021941

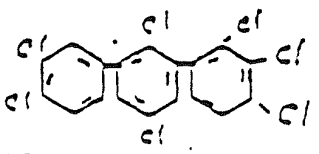
WATER_PCB-SD0000068602

Total possibility are 210 theoretically possible chlorinated biphenyls



Santowax or terphenyl

Solid



Aroclor 5460

Solid

II. Problem

Damage to the ecological system by contamination from polychlorinated biphenyl (PCB).

III. Extensiveness

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

IV. Nature of the Problem

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

WATER_PCB-SD0000068603

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

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

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

1. Fish - Marine or aquatic species concentrate PCB in the fatty tissue. Toxic is small quantities (down to 5 ppb) to sensitive m life such as shrimp.
2. Birds - Predatory species feeding on the marine or aquatic life c further concentrate PCB to possible harmful effects. Specifically in birds PCB can affect the calcium metabolism leading to egg she imperfections which prevents proper hatch of the young. In fact, Monsanto has confirmed the eggshell by feeding chickens, a high order of the species, PCB's in controlled tests.
3. Man - There is no harmful effect known to man or other mammals af 40 years of production. Investigations are underway by various sources.

STR 021943

4. Political and Public Emotion - PCB's are falsely linked with DDT because PCB's show up in the analysis for DDT. PCB's are linked other permanent type chlorinated hydrocarbon pesticides. This becomes particularly serious since about every article of food in country is being examined for a trace of these materials.

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WATER_PCB-SD0000068604

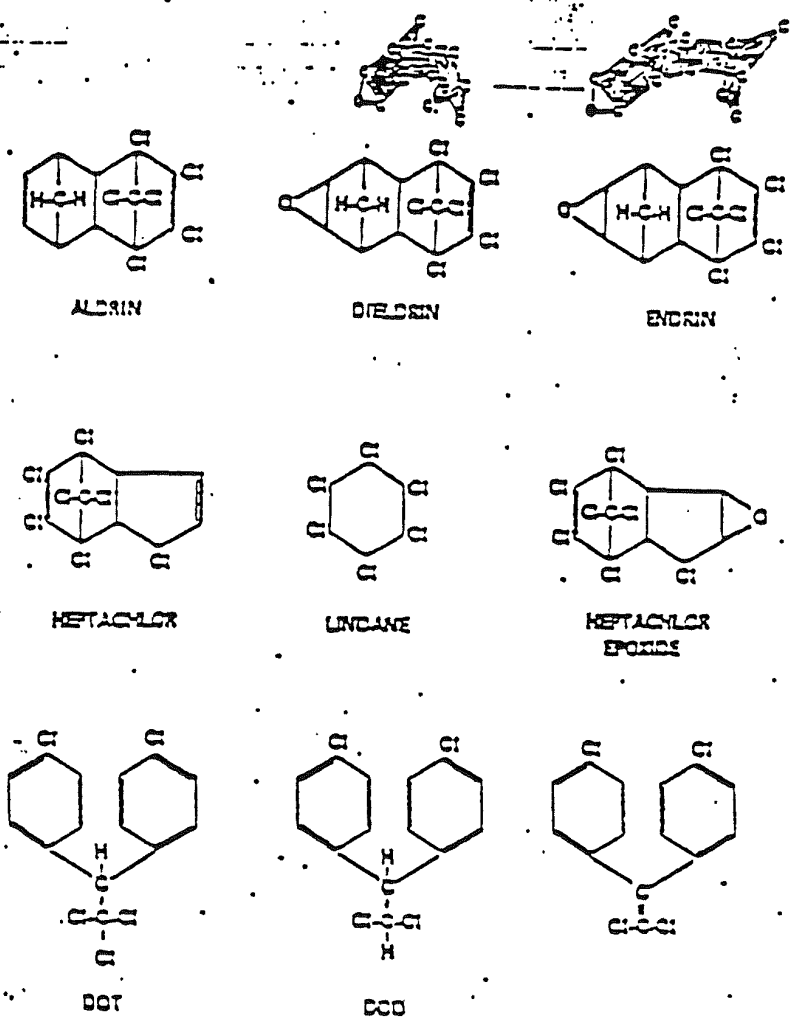

Fig 1 Structural Formulae of Nine Chlorinated Hydrocarbon P

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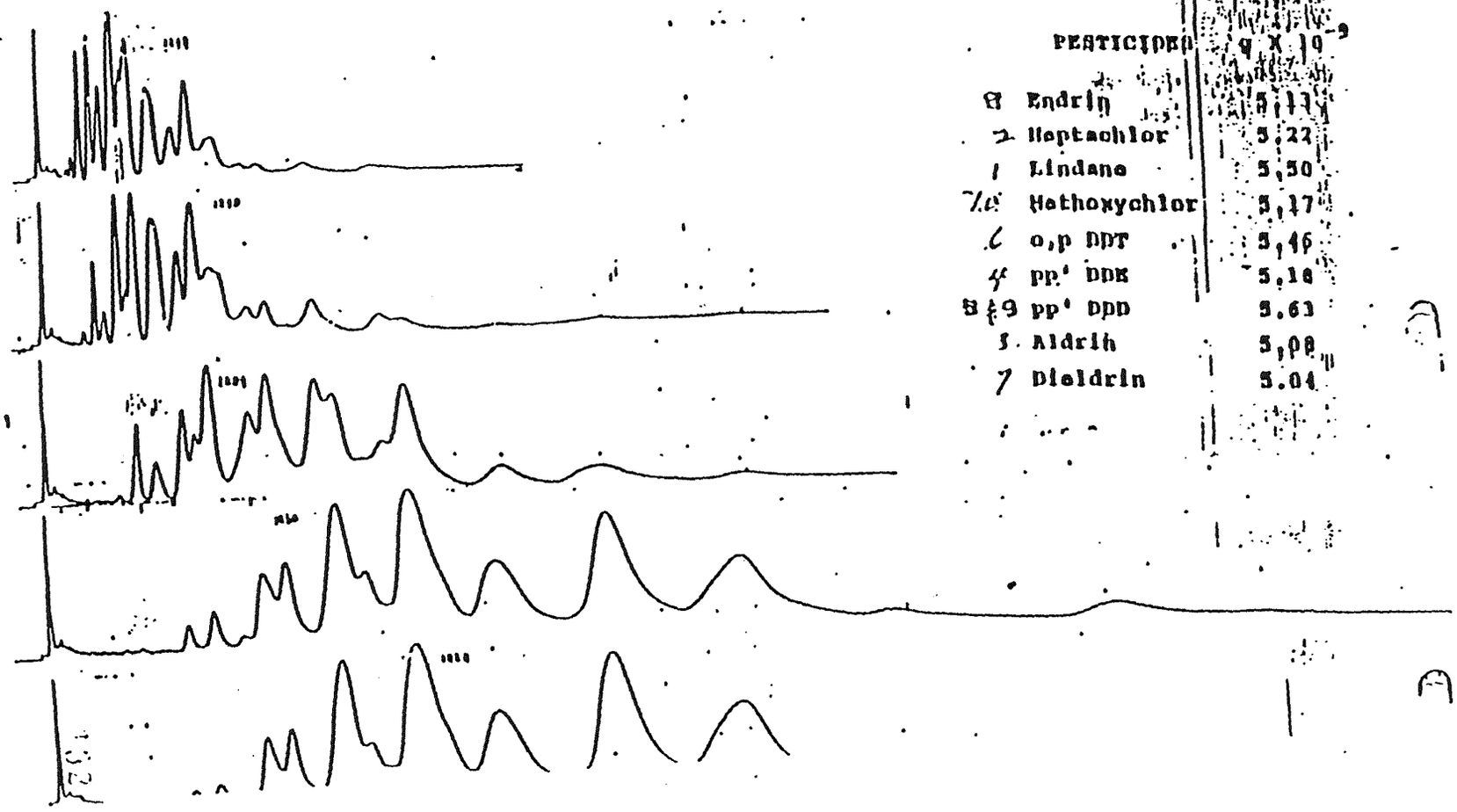
STR 021944

WATER_PCB-SD0000068605

FGL 0011386



PESTICIDES	q X 10^{-9}
Endrin	5,11
Heptachlor	5,22
Lindane	5,50
Methoxychlor	5,17
o,p DDT	5,16
pp' DDE	5,18
pp' DDD	5,61
Aldrin	5,08
Dieldrin	5,04

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V. Effect on Monsanto

Business potential at stake on a worldwide basis:

Fluids	Plasticizers	Total/Year
7[illegible] lbs.	3[illegible] lbs.	10[illegible] lbs.
$15[illegible]	$6[illegible]	$22[illegible]
$6-8[illegible] G.P.	$2-3[illegible] G.P.	$8-11[illegible] G.P.

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

A. Legal Liability

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

B. Public Image

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

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

C. Customer Relations

STR 021946

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

WATER_PCB-SD0000068607

influence on Monsanto products.

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

VI. Effect on Customers and Ultimate Consumers

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

A. Electrical Industry - Capacitors and Transformers use Aroclor because it is the best inexpensive dielectric fluid available.

B. Food Processing - Bulk "deep frying" units for potato chips, fish, and doughnuts use the fire resistance fluid as an indirect heating medium.

C. Die Caster — and other hot metal working industries fire resistant fluids to protect the workers.

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

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

VII. Involvement With Other Producers

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

WATER_PCB-SD0000068608

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

VIII. Sources of Contamination

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

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

1. Fluids

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

2. Electrical

Electrical customers have in the past sewered their wastes.

3. Heat Transfer

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

4. Industrial

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

All of the fluids have had the "[illegible]" constituent dumped on dirt roads a "dedusting agent" which inadvertently found its way back to the stream.

WATER_PCB-SD0000068609

5. Plastics

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

B. Indirect

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

1. Fluids

a. Electrical - Disposal of "burned out" transformer and capacitors may find its way back to streams. Scrap units (new) are generally disposed of in land fills but could possibly get back to the stream.

b. Heat Transfer - Leaks could contaminate.

c. Industrial - Cross product contamination carried out of
air compressor. Residual material carried on parts.

2. Plasticizers

a. Process Contamination from Washing

(1.) Environment Contamination

Swimming pool paints

Incineration of wax coatings

Traffic paints

(2.) Product Contamination

Coating for tank lining

Printing inks and paper coatings

Certain adhesives

STR 021949

II. Recent Technical Changes Which Have Bearing on the Contamination

A. Fluids

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

WATER_PCB-SD0000068610

environment today which was deposited over the past forty years. We must state that responsible people throughout the industry have taken corrective action to reduce contamination in the last two years. There have also been technical advances which have brought about the use of lower chlorinated biphenyls which may be an advantage because to date low chlorinated ones have not been identified present in nature.

1. Electrical - The large customers have established collect systems the waste is recovered. Incinerators are being investigated and built for the disposal of the materials. There has been a shift away from the higher chlorinated types products and could probably shift almost entirely away from those products.
2. Heat Transfer - System have been tightened up and redesigned to confine the contents. Here, too, the trend has been to shift away from the higher chlorinated materials.
3. Industrial - Settling ponds have been built by the large manufacturers to catch the material and decant off the PCB for reprocessing. The trend here as the other fluid areas has been towards the lower chlorinated materials.
4. Plants - The plants effluent has been passed through limestone which provides surface to catch some of the material. But high concentrations can be found in our effluent (that is relative to those findings in nature causing the problem).

B. Plasticizer

Quite opposite to fluids the trend in plasticizer Aroclor has been to higher chlorinated biphenyls. In plasticizers the lower chlorinated biphenyl will not be an acceptable solution however, the lower chlorinated terphenyls could offer a possible solution.

WATER_PCB-SD0000068611

X. Courses of Action

A. Do Nothing

We cannot deny the findings and the acquisitions by the various agencies. If we took no action we would likely face numerous suits We would let government tolerances be based on public and political pressure along with any experimental or developed data which they may generate. We would most likely be forced out of this business. Other product areas would be adversely affected. We would project an image as an irresponsible member of the busines world. Project poor customer relations. The only advantage to thi technique offers is it reduces the cost but this too must be weighed against potential loss of business.

B. Discontinue Manufacture of All Polychlorinated Biphenyls (PCB) Although we all realize this could be an eventually unfortunately the solution is not this simple. Assuming we did stop manufacture immediately, the pollutants are present in the environment, the liability is present and possibly by the shifting to the lower chlorinated materials and the recovery techniques the contamination may already be reduced to an acceptable level. Obviously the entire business would be lost without any or very few substitutes to be offered. Other product areas would be affected. Financial loss could be considered due to raw material contracts, customer contrac and royalty -- secrecy contracts. Competition would take advantage on all fronts. We would be admitting guilt by our actions. Loss of capitol investment in the plant, associated utilities, and asse- ciated processes. We would possibly gain a little public image on this action.

STX 021951

C. Respond responsibly, admitting that there is growing evidence of environmental contamination by the higher chlorinated biphenyls and take action as new data is generated to correct the problem.

FGL 0011392

WATER_PCB-SD0000068612

This approach would enable us to phase out the higher chlorinated materials in many applications where they are no longer necessary or really desired. We could maximize the corporate image by publicizing this act. We would reduce a known pollutant. Additionally we could gain precious time needed to develop new products and investigate further the lower chlorinated materials. As new research data is generated our course may be altered considerably. Certain limited actions may reduce or limit the problem.

WATER_PCB-SD0000068613

XI. Recommended Course of Action

Based on the information available today the only recommendation we can honestly make is respond responsibly admitting that there is growing evidence of environmental contamination by the higher chlorinated biphenyls and take action as new data is generated to correct the problem.

XII. Implementation of the Recommended Course of Action

A. Immediate (By 12-1-69)

1. Set up a task force under a project manager or the equivalent responsible for initiating, directing and implementing all actic that Monsanto decides to take. This includes sufficient budget necessary to cope with the immediate problem. This task force should include representatives from Medical, Legal, Research and the two involved Marketing Groups and Public Relations and must conduct liaison with MCL and other locations involved in the problem.

2. Decide on timing and content of any public and/or customer notification of PCB problem.

B. Interim (Within 3 months)

Fluids	Plasticizers
1. Confirm Aroclor 1254/Aroclor 1260 are found in the environment.	1. Announce differential betwee fluids/plasticizer uses.
2. Publicize the difficult anal. tasks.	2. Announce safety of other PCB chlorinated terphenyl.
3. Protect other PCB/chl. terph.	3. Educate customers on control effluent for all products.
4. Announce plans to reformulate certain Therminols and Pydraul where control of the product is difficult.	4. Initiate program to develop 1254 & 1260 substitutes

STR 021953

FGL 0011394

WATER_PCB-SD0000068614

5. Emphasize better control over other Aroclor 1254 & 1260 uses.

5. Investigate with manufacturers the feasibility of alternate products.

6. Initiate customer education on need for effluent control of all products.

6. ~~Analyze data~~

7. Determine composition of all PCB's.

Develop a comprehensive Program

C. Short Term (within the next 12 months)

1. Research - Medical

Expand program for more meaningful biodegradation studies and confirming analytical results. Expand toxicity studies. Follow developments concerning publicity and those developments covering political implications of PCB contamination.

2. Marketing - Discontinue or substitute replacement products for those applications of Aroclors 1254 and 1260 where the Aroclor remains mobile.

Work with customers to clean up plants on other Aroclors. Report the habitual violators or "do nothings" to the product group.

Reclaim or safely dispose of fluids. STR 021954

Consider remaking products that do not contain PCB. Follow and report market developments such as customer disposal systems. Follow and report any political or public feedback which may affect the contamination problems and must be coordinated with Medical, Research and Legal. 141

3. Production - Clean up plants and stop gross contamination.

4. Legal - Define our present position, recommend reasonable acti that will not unduly alarm the market but reduce the exposure in terms of liability. Coordinate recommendations with Market

FGL 0011395

WATER_PCB-SD0000068615

5. Public Relations - Publicize actions where believed advantage

Certainly discussions should be held with other producers with same period to determine their planned course of action, if an

D. Long Range Tentative Outline (From 1 year to 3 years)

Realizing that the comprehensive program must be outlined the "Lon Range Tentative Outline" is meant to serve as a guide: All aspect of this program should review quarterly by Organic Management.

1. Research-Medical

Continue biodegradation studies and analytical support

Isomer distribution

Toxicity and metabolism studies

Water soluble removal

Incineration analytical support

Confirmation analytical

Contract academic research for reference

Develop new and improved formulations

2. Manufacturing

a. Process Research and Development

(1.) Identification of typical Aroclor isomers

(2.) Develop control for effluent composition

(3.) Test substitute formulations, etc.

(4.) Develop new processes

b. Clean Up Plants

c. Modify processes to meet market needs

3. Engineering

a. Develop and set up on plant locations incineration system

b. Design new processing equipment as necessary

4. Marketing

a. Specify alternates or changes

b. Customer liaison

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STR 021955

FGL 0011396

WATER_PCB-SD0000068616

c. Set reclaim or disposal of fluids

d. Work on base association problems

5. Patent

Investigate trademarks registered

Cover with patents any work felt patentable

6. Environmental Control

Develop cheap disposal systems for customers

a. Incineration or pyrolysis

b. Biodegradation unit etc.

c. Consultants in pollution control

7. Legal

Investigate and define our position on Royalty secrecy agreements.

Contracts - Raw Material and Customer

8. Public Relations

Portray to public positive actions at correcting the contamination problem. Release periodical statements covering our position.

XIII. Probability of Success

STR 021954

143

FGL 0011397

WATER_PCB-SD0000068617

XIV. Cost of Program

Neither the program nor the costs have been clearly defined at this t
However, a cost estimate of $220,000 for toxicological work alone has
been presented. Tentative figures indicated under the worst conditio
the entire program could run as high as $2.0-2.5M. At this stage it
very difficult if not impossible to develop a reasonable cost figure
one point is clear it will be larger than the normal research budget
handle. For this reason, assuming the approach is acceptable, we sha
be forced to ask for additional appropriations to fund the program.

XV. Future

Follow developments on the problem as they unfold.
Develop an aggressive research program to confirm or deny findings an
better understand the problem.
Develop costs for the implementation of the Recommended course of
action.
Develop specific actions with each department involved
Submit the actions with costs for approval
Develop a timetable to solve the overall problem.
Prepare for "precipitious pullout" or drastic legislative action alth
we do not feel this is a likely possibility.

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STR 021957
FGL 0011398

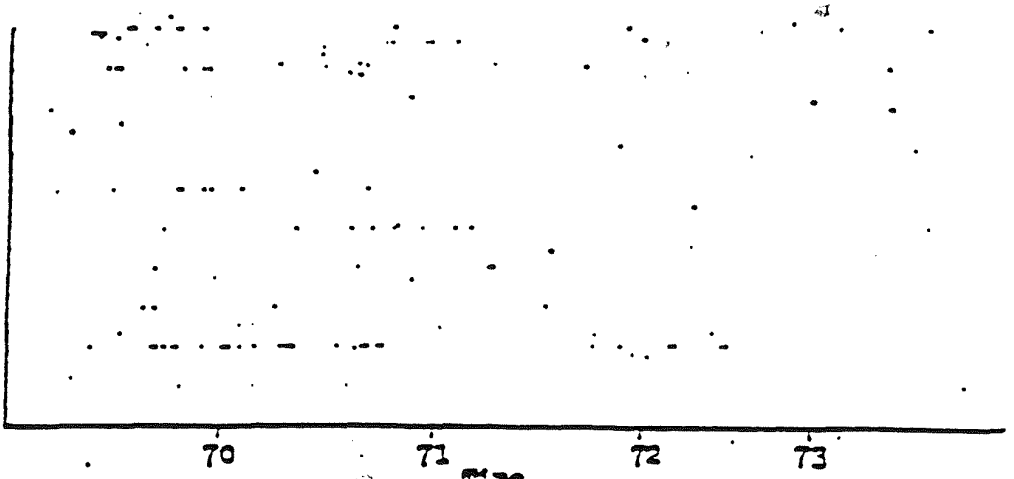
WATER_PCB-SD0000068618

PROFIT AND LIABILITY VS. TIME

ACTION

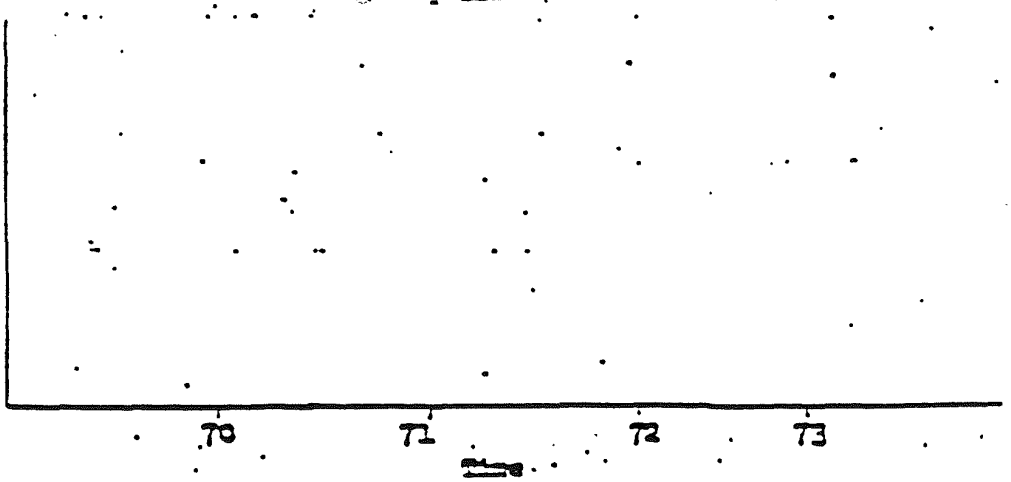
DO NOTHING

DOLLARS



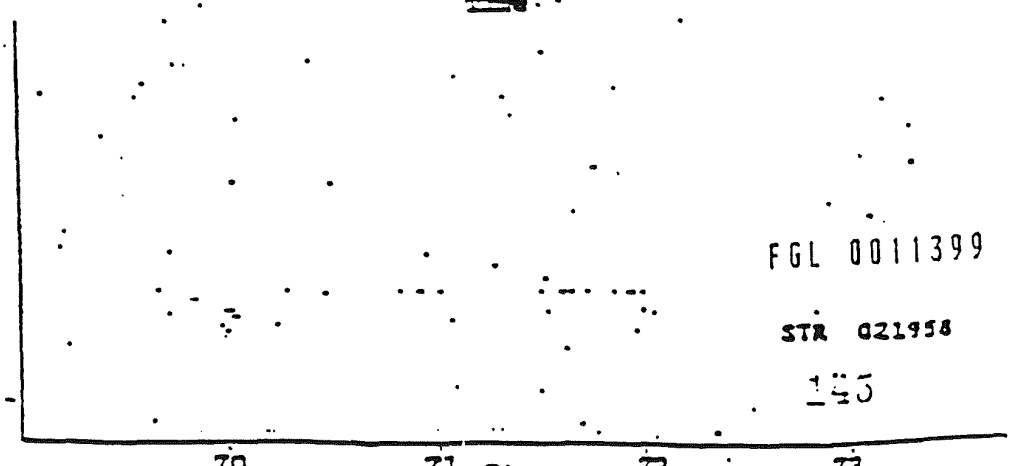
DISCONTINUE MANUFACTURE OF PCB

DOLLARS



RESPONSIBLE APPROACH

DOLLARS



FGL 0011399

STR 021958

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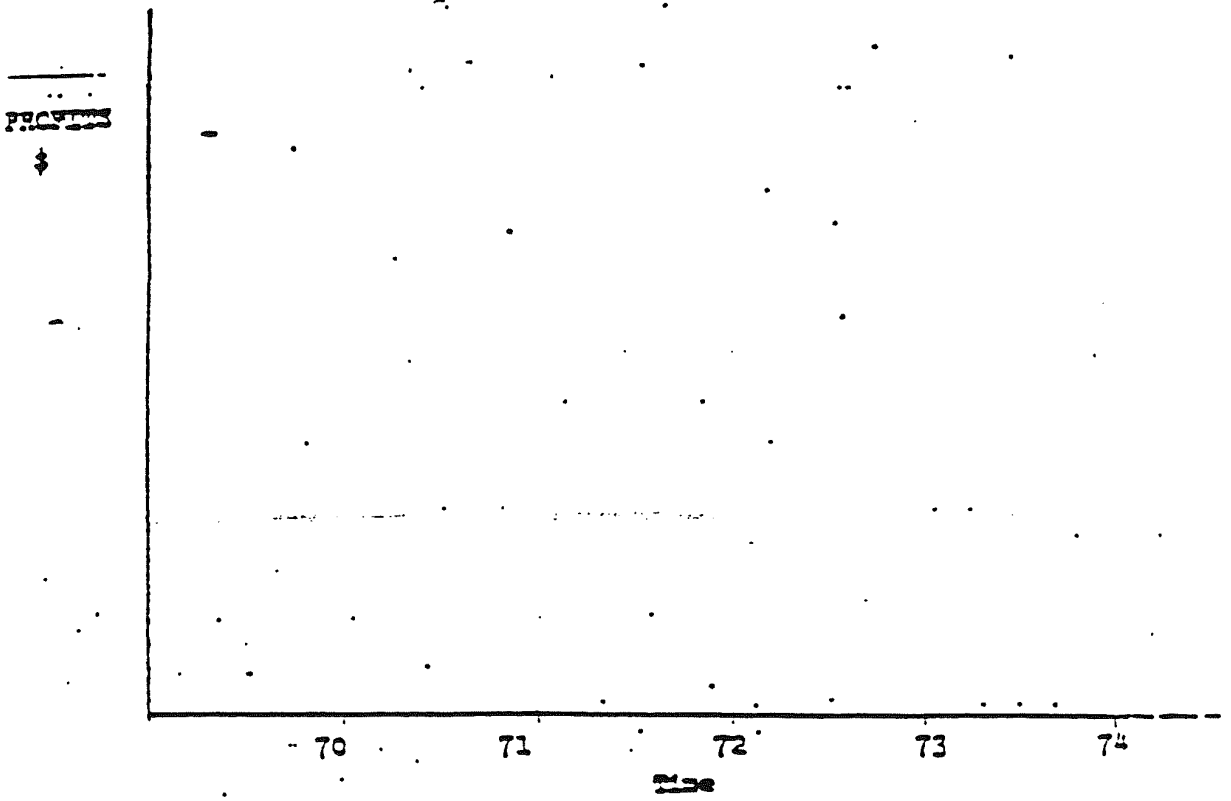
WATER_PCB-SD0000068619

PROBABILITY OF SUCCESS



146

STR 021959

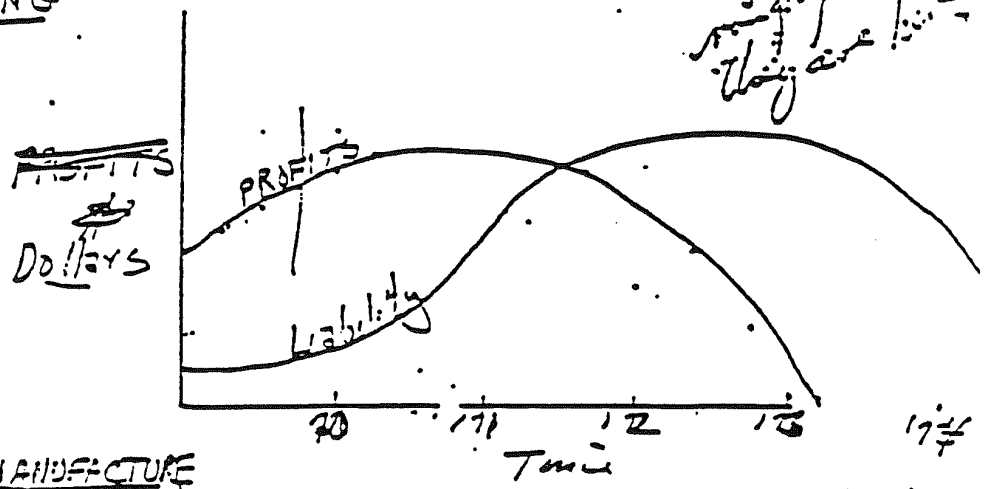
FGL 0011400

WATER_PCB-SD0000068620

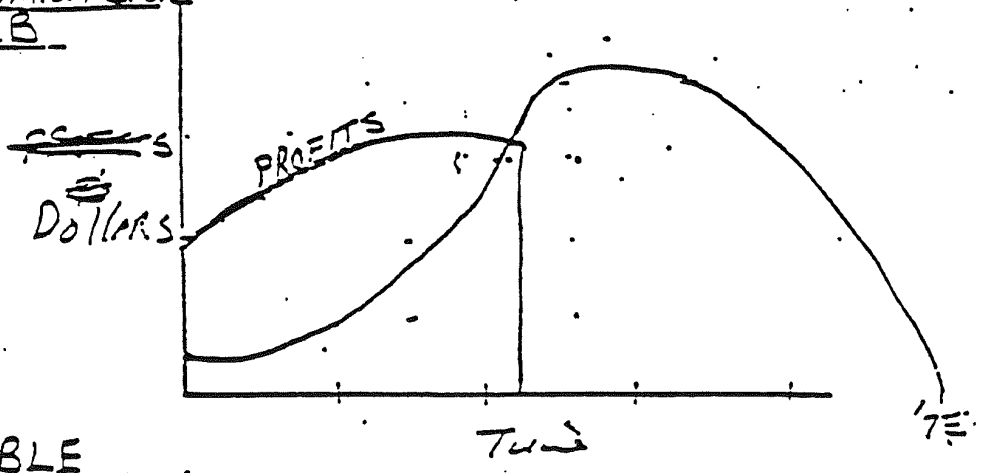
PROFIT AND LIABILITY VS TIME

ACTION

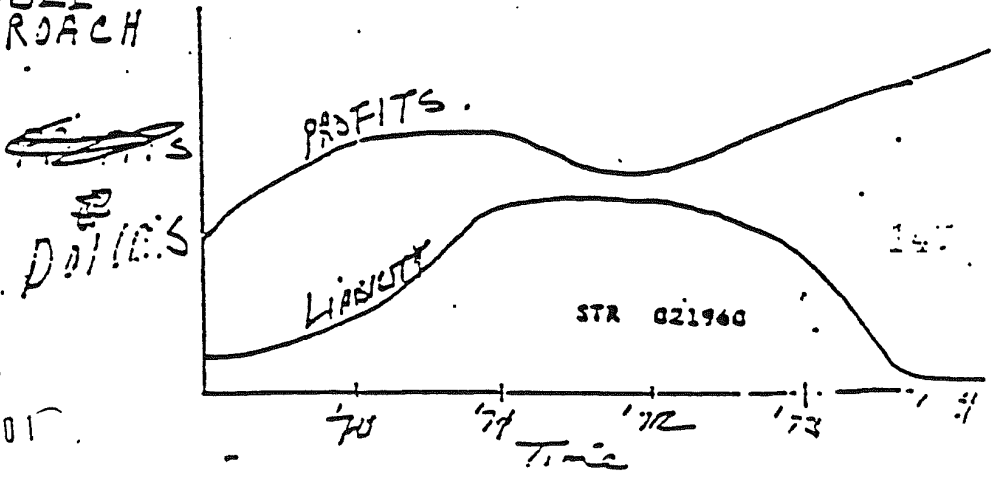
DO NOTHING



DISCONTINUE MANUFACTURE OF PCB



RESPONSIBLE APPROACH

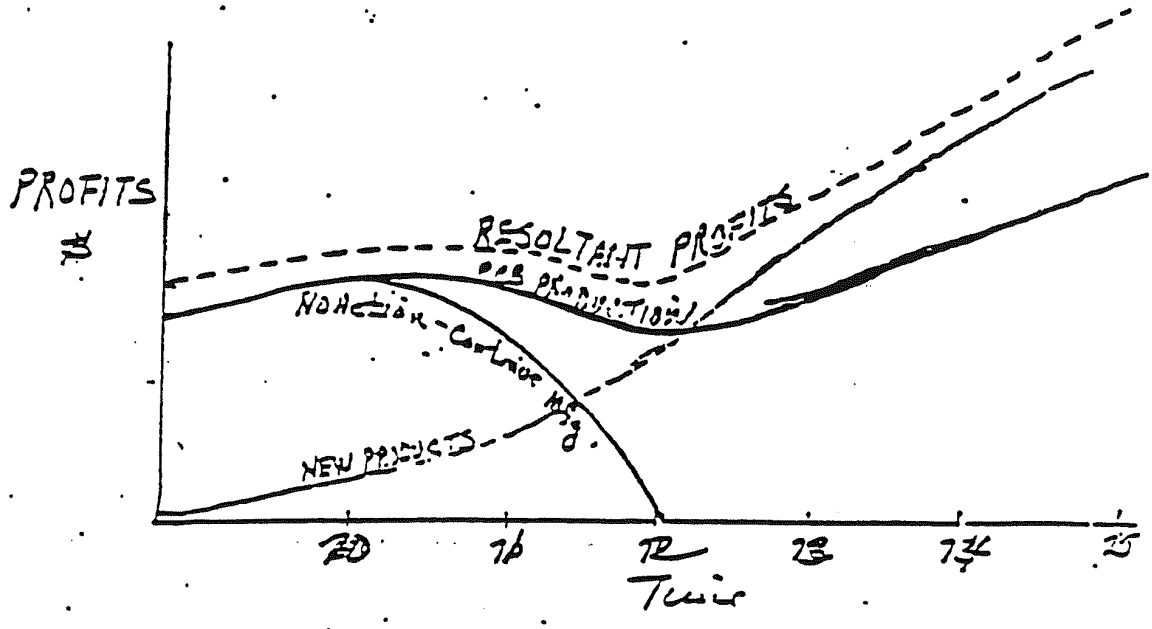


STR 021960

FGL 0011401

WATER_PCB-SD0000068621

PROBABILITY OF SUCCESS



FGL 0011402

STR 021961

WATER_PCB-SD0000068622

1.3.7

916.07

Clean Up Snows Creek – PCB Removal from Any Specified AREA from our fence to Chocco Locco.

1971 – AVOID IF POSSIBLE BUT PREPARE FOR ACTION —

	ED & S 10 MAN DAYS	= $800
50% Anniston	Mech Exp	= 200
50% Others		$1000

PLAINTIFF'S EXHIBIT 41

PENGAD-Bayonne, N.J.

DSW 013810

Item 4 - continued

b) Leaching problems - storm drain, pit bypass, ground water under Aroclor department, and abandoned dumps.

TSD, 10 mandays	$800	
Analytical	500	
Mech. expense	2,000 max.	0 min.
	$3,300 max. -	0 min.

c) Clean up Snows Creek and Area Monitoring
PCB removal from any area from our fence to Choccolocco - avoid if possible, but be prepared for action;

For investigation:

TSD, 12 mandays	$1,000	
Analytical, included in 3.	-	
Mech. expense	2,000 max.	
	$3,000 max.	0 min.

d) Disposal of Scrap and Spent Carbon-PCB containing materials, collect and dispose; expense related to projects or investigations:

TSD, 50 mandays	$4,000 -	$2,000 min
Mech. expense	1,000 max.	0 min.
	$5,000 max. -	$2,000 min.

e) Customer consultation and contingency $4,000 max. - 0 min.

TOTAL POTENTIAL BUDGET OVERRUN	$28,400 max. -	$7,000 min.

J. C. Landwehr

:kd

DSW 013776

WATER_PCB-SD0000068624

GENERAL ELECTRIC
COMPANY

WALTER A. STAPLETON, JR.

January 21, 1972

E. J. Putzell, Esq.
Vice President and General Counsel
Monsanto Company
800 North Lindbergh Boulevard
St. Louis, Missouri

Dear Mr. Putzell:

I have executed the "Special Undertaking by Purchasers of Polychlorinated Biphenyls" on behalf of General Electric subject to the following understandings, which Mr. Stapleton has informed me Monsanto will accept:

1. The Special Undertaking applies only to PCB's after risk of loss has passed to General Electric from Monsanto;

2. The Special Undertaking is not applicable to PCB's after their return to Monsanto or its agent for disposal or otherwise;

3. Monsanto shall provide General Electric with timely notice of any claims to which the indemnity applies and shall provide General Electric with reasonable assistance (at General Electric's expense) in the defense of any claim covered by the indemnity.

I would appreciate your indicating Monsanto's acceptance of these conditions by signing the copy of this letter and returning it to me.

PLAINTIFF'S EXHIBIT 43 4-1-98

PLAINTIFF'S EXHIBIT 1347

Very truly yours,

Walter A. Stapleton

ACCEPTED:

By: _____
Vice President

FGL 0100442

773194

WATER_PCB-SD0000068625

Monsanto

MONSANTO INDUSTRIAL CHEMICALS CO.
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

SPECIAL UNDERTAKING BY PURCHASERS OF POLYCHLORINATED BIPHENYLS

Monsanto Company ("Monsanto") manufactures certain polychlorinated biphenyl products ("PCB's") which General Electric Company ("Buyer") desires to purchase. While Buyer desires to purchase PCB's because of certain desirable flame resistant and insulator properties, Buyer acknowledges that it is aware and has been advised by Monsanto that PCB's tend to persist in the environment; that care is required in their handling, possession, use and disposition; that tolerance limits have been or are being established for PCB's in various food products.

Monsanto has therefore adopted certain restrictive policies with respect to its further production, sale and delivery of PCB's, including the receipt of undertakings from its customers as set forth below, and Buyer is willing to agree to such undertakings with respect to sales and/or deliveries of PCB's by Monsanto to Buyer.

Accordingly, Buyer hereby covenants and agrees that, with respect to any and all PCB's sold or delivered by or on behalf of Monsanto to Buyer on or after the date hereof and in consideration of any such sale or delivery, Buyer shall defend, indemnify and hold harmless Monsanto, its present, past and future directors, officers, employes and agents, from and against any and all liabilities, claims, damages, penalties, actions, suits, losses, costs and expenses arising out of or in connection with the receipt, purchase, possession, handling, use, sale or disposition of such PCB's by, through or under Buyer, whether alone or in combination with other substances, including, without implied limitation, any contamination of or adverse effect on humans, marine and wildlife, food, animal feed or the environment by reason of such PCB's.

D000162

FGL 024064

PLAINTIFF'S EXHIBIT 12

WATER_PCB-SD0000068626

All existing contracts for the sale of PCB's by Monsanto to Buyer are hereby amended to contain the provisions set forth above.

Nothing herein shall create or imply any duty or obligation of Monsanto to sell or deliver any PCB's to Buyer. No conditions, understandings or agreements purporting to modify or vary the terms hereof shall be binding unless hereafter made in writing specifically referring to this agreement and signed by the party to be bound and no modification or variance of the above undertaking shall be effected by the acknowledgment or acceptance of any sale document, purchase order, shipping instruction or other forms containing terms or conditions at variance herewith.

GENERAL ELECTRIC CO.
(Buyer)

BY: Walter O. Schlotterbeck

TITLE: Vice President and Corporate Counsel

DATE: January 21, 1972

MONSANTO COMPANY

BY:

000015
FGL 02406
2-23

WATER_PCB-SD0000068627

#51

BIOLOGICAL CONSULTANTS

Water Pollution · Water Quality · Biological Surveys · Fishery Biology

ROYAL D. SUTTKUS, PH. D.
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PHONE: 866-6101

GERALD E. GUNNING, PH. D.
3608 48TH STREET
METAIRIE, LOUISIANA 70001
PHONE: 888-4187

August 15, 1971

Mr. Eugene Wright
Pollution Control Engineer
Monsanto Company
Technical Services Department
Anniston, Alabama 36201

Dear Mister Wright:

As we stated to you in Anniston some weeks ago, we have worked up the P.C.B. residue data as we have received them from you and intended to report on them formally at the end of the first year of our survey of Choccolocco Creek, the Coosa River and tributaries. However, considering the unfavorable publicity Monsanto Company recently received as a result of the congressional sub-committee report, we felt it imperative that we submit an interim report to Monsanto Company at this time in order to insure that both parties (Monsanto and consultants) may know where we presently stand with regard to the P.C.B. residue analyses.

First, we have spent a great deal of time in deciding what comparisons will be most meaningful to us in looking at the total residue data available. It is our opinion that strict statistical applications are not feasible, or indeed even applicable, because of the tremendous number of variables that come into play with the residue analyses. However, some broad comparisons can be made within the confines of the data and these broad comparisons can be supported by other determinations and interpretations that are indeed justifiable.

Analysis I

We will refer to this analysis as a paired-value analysis for wet weight (Aroclor 1254). The comparison of paired values is from one quarter to the next immediate quarter, all fish species combined. Specifically, we are comparing December, 1970 with March, 1971.

CONTROLS--67% of paired values decreased (12 of 18 determinations).
EXPERIMENTALS--50% of paired values decreased (5 of 10 determinations).

Since control stations are those stations wherein the fishes present could not receive P.C.B's due to location with respect to water currents which could potentially carry P.C.B's, then experimental stations are those wherein fishes could receive P.C.B's due to location.

This comparison shows that the fishes in the experimental area do not show a corresponding decrease in P.C.B. residue levels (as Aroclor 1254) compared with the controls. There is a 17% difference.

MCNS 089995

PLAINTIFF'S EXHIBIT 51 4-1-98
PENGAD Bayonne, N.J.

WATER_PCB-SD0000068628

BIOLOGICAL CONSULTANTS
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We must conclude then for Analysis I that no improvement in fish residue levels, all species combined, is indicated.

Analysis II

The comparison is the same as for Analysis I except that lipid values for Aroclor 1254 were used. Again, all fish species were combined.

CONTROLS--50% of paired values decreased (11 of 22 determinations).
EXPERIMENTALS--30% of paired values decreased (3 of 10 determinations).

In this second analysis we see again that the fishes in the experimental area (subjected to P.C.B. residues) do not show a corresponding decrease in P.C.B. residue levels (as Aroclor 1254, lipid fraction) compared with the controls. There is a 20% difference (compared with 17% for Analysis I).

The first two analyses are indicative of the fact that the handling of the samples and subsequent analysis for P.C.B. residues have been successful and indeed repetitive when the wet weight and lipid fraction values for Aroclor 1254 are compared. This is of course what we would hope for. However, the results are not good since both analyses show us that Aroclor 1254 residues have not decreased as we had hoped they would. Considering the residual nature of P.C.B's we were certainly optimistic to say the least.

Analysis III

We made a single species analysis for each of five fish species: 1. bluegill, 2. blacktail shiner, 3. stoneroller, 4. longear sunfish, and 5. bass. In each instance the residue levels were higher in the experimental area than in the control area. We must wait for further data for the final six months of the first year of the survey to see if this trend is overturned. At this point we would have to say that the data are detrimental to Monsanto.

Analysis IV

A station-to-station comparison was made between successive stations among the 10 stations we had residue data for. Stations 6, 7, 8, and 10 (7 is Martha Williams, 8 is Highway 93, and 10 is Highway 77 for orientation) had the highest residue values for the fishes we studied. This is, of course, logical and to be expected when we consider the location of these stations with respect to the plant. In the future we must be able to demonstrate considerable decreases in residue levels here if we are to show environmental improvement.

WATER_PCB-SD0000068629

BIOLOGICAL CONSULTANTS

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PHONE: 835-4187

Our field observations over the past few years and continuing up until the present time show that the greatest number of deformed fishes have been found at Marth Williams (Station 7) and stations immediately below 7. We also see the greatest number of fishes that are either sick or listless in these areas. Of course visual observations won't tell us what caused these fishes to become deformed or sick but we must consider the total observations as a crude indication that something is indeed wrong in these areas.

In summary, there is nothing we can do with the residue data at this point that would allow Monsanto to counteract the unfavorable public opinion that may result from the congressional sub-committee report (which we have not seen). Perhaps the June, 1971 data will show a decrease that is not apparent at this point--we can only hope that this will be the case.

Let us point out one additional aspect of the problem that might allow Monsanto Company to derive some favorable publicity. It is our impression that your plant data will show that the plant effluent has been cleaned up tremendously and that on a pound for pound basis you are putting very little residue into Choccolocco Creek at the present time in comparison with past years. Certainly you would not want to give the figures in a news release, but would it not be helpful to state categorically that the effluent is relatively clean at the present time? We fully realize that Monsanto Company officials are in a better position to judge the merits of such a release than we are. It is simply passed along for what it is worth.

We are very sorry that we can't paint a brighter picture at the present time. However, we all know that we have to study these situations carefully and that we must be able to document any claims of environmental improvement before they are released for public consumption.

If you have any questions about this interim report, please let us hear from you.

Very truly yours,

Gerald E. Gunning

Royal D. Suttkus, Ph.D.
Gerald E. Gunning, Ph.D.

geg

MONS 089997

WATER_PCB-SD0000068630

esults are ppm. op number is wet weight. umber in parenthesis is pid weight.	Hypentelium etowanum - Ala. Hog Sucker			Compostoma anomalum - Stoneroller			Notropis venustus - Blacktail Shiner		
	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB
(1) Shoal Creek	0.32 (16.50)	0.02 (1.00)	0.34 (17.50)	0.06 (1.83)	0.04 (1.10)	0.10 (2.93)	0.02 (0.69)	0.11 (4.44)	0.13 (5.13)
(2) Choccolocco Creek, Hwy. 9 Bridge	0.01 (0.58)	0.03 (1.46)	0.04 (2.04)	0.04 (0.96)	0.01 (0.25)	0.05 (1.21)	0.06 (1.30)	0.14 (3.30)	0.20 (4.60)
(3) Choccolocco Creek, Martha H. Williams Bridge, Hwy. 95							3.10 (40.90)	7.76 (102.20)	10.86 (143.10)
(4) Choccolocco Creek, Hwy. 93 Bridge							9.64 (308.33)	11.72 (375.00)	21.36 (683.33)
(5) Choccolocco Creek, Hwy. 77							2.86 (70.00)	2.50 (35.00)	5.36 (75.00)
(6) Cheaha Creek	0.07 (0.85)	0.10 (1.15)	0.17 (2.00)	—	0.04 (0.32)	0.04 (0.32)	0.74 (20.83)	2.18 (61.67)	2.92 (82.50)
(7) Aker's Creek	—	—	None Found				—	0.14 (3.75)	0.14 (3.75)
(8) Cane Creek				0.18 (1.41)	0.25 (1.94)	0.43 (3.35)	0.03 (0.43)	0.11 (2.27)	0.14 (2.70)
(9) Stemley Bridge, Hwy. 34									
(10) Clear Creek									

866680 SNDW

WATER_PCB-SD0000068631

Lepomis megalotis - Longear Sunfish			Lepomis macrochirus - Bluegill			Micropterus - salmoides - punctulatus - coosae Bass			Percina caprodes - Logperch		
-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB	A-1242	A-1254	Total PCB
0.03 0.90)	0.03 (0.77)	0.06 1.67	—	—	None Found	(Coosae) 0.03 (1.30)	0.02 (0.90)	0.05 (2.20)			
0.03 0.77)	0.07 (2.06)	0.10 (2.83)	—	0.02 (0.75)	0.02 (0.75)				—	0.17 (2.25)	0.17 (2.25
			2.63 (50.00)	8.16 (155.00)	10.79 (205.00)						
			1.44 (95.00)	2.05 (135.00)	3.49 (230.00)						
3.82 86.67)	4.63 (105.00)	8.45 (191.67)	1.94 (55.00)	5.65 (160.00)	7.59 (215.00)						
—	2.20 (63.75)	2.20 (63.75)	3.54 (98.75)	8.00 (110.00)	11.54 (158.75)	(Coosae) —	0.07 (1.83)	0.07 (1.83)			
—	—	None Found	—	0.01 (0.33)	0.01 (0.33)	(Coosae) — (Salmoides) —	— 0.01 (0.29)	None Found 0.01 (0.29)	—	0.33 (2.88)	0.33 (2.88)
—	0.04 (0.75)	0.04 (0.75)	—	0.14 (4.67)	0.14 (4.67)	(Salmoides) —	0.03 (2.00)	0.03 (2.00)	0.09 (1.70)	0.27 (4.90)	0.36 (6.60)
—	0.62 (14.23)	0.62 (14.23)	—	2.50 (54.17)	2.50 (54.17)	(Punctulatus) 0.20 (1.25)	0.50 (10.75)	0.70 (15.00)			
	0.43 (10.57)	0.43 (10.57)	0.44 (9.00)	0.73 (15.00)	1.17 (24.00)	(Punctulatus) — (Salmoides) 0.31 (1.38)	— 0.66 (15.83)	None Found 0.97 (23.33)			

MONS 089999

WATER_PCB-SD0000068632

May 4, 1973

Ms. Mary A. Appelhof
Environmental Health Committee
South Central Michigan Health
Planning Council
R.R. 1, Box 249
Three Rivers, Michigan 49093

Dear Ms. Appelhof:

Your letter dated April 26 was forwarded to me for response since I have been intimately associated with the polychlorinated biphenyl environmental situation.

With increasing evidence that polychlorinated biphenyls were being identified as environmental contaminants and that some mammals, birds and marine life were being affected, Monsanto began in 1970 a program to terminate the sales of PCBs to those applications for which alternative materials were available. The program has now been successfully completed and sales of polychlorinated biphenyls are restricted to dielectric uses in electrical capacitors and transformers in which the polychlorinated biphenyls are hermetically sealed in metal containers. This application is being continued because there are no known fire resistant fluids which can perform in this service. It is our considered opinion, and also of representatives of governmental regulatory agencies, that the fire resistant benefits derived from this application far outweigh the adverse consequences to the environment in the event of an accidental spill. To further minimize environmental impact the fluids we now market have been modified to eliminate the more persistent isomers. Monsanto's total program is based on its desire to dramatically reduce further contamination of the environment and it is an action which we believe any responsible manufacturer would have taken.

PLAINTIFF'S EXHIBIT 55 5-21-98
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The problem of disposing of solid wastes containing polychlorinated biphenyls continue to plague us. Ideally, disposal should be made by exposing the waste to high temperature incineration. Unfortunately, we have not been able to locate commercial incinerators capable of reaching the high temperatures required. Additionally, the problem of segregating and collecting the waste material still remains to be solved. Lacking proper incineration, the only recourse available is the use of authorized, properly-managed dry landfills. It is our considered opinion that, as long as the polychlorinated biphenyl waste is not exposed to water and thereby transported, adverse effects to the environment will be essentially eliminated.

I am including copies of pertinent reports in the event you have not had the opportunity to review them. I hope you find these comments helpful and if I can be of further service please do not hesitate to let me know.

Sincerely,

W. B. Papageorge
Manager
Product Acceptability

WBP/bt

Enclosures

W, X, BB.

MONS 091682

WATER_PCB-SD0000068634

Monsanto

MONSANTO INDUSTRIAL CHEMICALS CO.
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
Phone: (314) 694-1000

March 18, 1975

Mr. Dan A. Albert
Staff Supervisor
Personnel Relations
Westinghouse Electric Corporation
Highway 58 West
South Boston, Virginia 24592

Dear Mr. Albert:

Attached are responses to the questions listed in your letter dated February 3, 1975.

In addition to the industrial hygiene practices described in our responses to your questions, I cannot overemphasize the need to properly control the use and handling of Inerteens to prevent their escape into the environment. Also, in discussing this information with your employees, I strongly recommend that the perspective gained from over 40 years of experience in which no human harm has resulted, be emphasized. In summary, the proper handling of Inerteens should pose no environmental or human health problems, permitting society's continued use of a very valuable material.

I hope the above information is useful to you. If I can be of further service please let me know.

Sincerely,

W. B. Papageorge

W. B. Papageorge
Manager, Product Acceptability
Specialty & Process Chemicals

WBP:pd

PLAINTIFF'S EXHIBIT 576 5-21-98
PENGAD-Bayonne,N.J.

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1. Question: Does Inerteen have permanent effects on the human body? If so, what type of permanent damage and how long a period of time does it take for this to develop? If not, explain why, if possible.

The polychlorinated biphenyls in Inerteen can have permanent effects on the human body.

The length of time or period of exposure necessary to develop symptoms depends on the degree or amount of exposure. In general, a single exposure for a few minutes to atmospheric concentrations that cause irritation to the eyes and/or respiratory tract would not be expected to cause either the skin eruptions or demonstrable liver injury. The problem arises from repeated and prolonged exposure to atmospheric concentrations in excess of the accepted Threshold Limit Levels or repeated and prolonged skin contact.

The polychlorinated biphenyls have not been recognized as skin "irritants" in the same sense that caustic materials or many organic chemicals are irritants. Because of their "solvent" action in removing the natural fats and oils from the skin, leaching, drying and chapping, repeated and prolonged skin contact should be avoided.

When the polychlorinated biphenyls are mixed with other chlorinated hydrocarbons, the mixture may be classified as a skin irritant.

The potential toxic effects in humans from excessive exposure to polychlorinated biphenyls include injury to the liver and chloracne. In animals, the liver effect is demonstrated by increased liver weights and injury to cellular tissue. Although chloracne is difficult to evaluate in animals, in humans, this take the form of comedones (large blackheads with typical acute pustules) and may be an external symptom of over exposure preceding serious liver injury.

Animal data and human experience indicate that the toxic effects are similar whether exposure results from ingestion, inhalation of vapors, or absorption of the liquid material through the unbroken skin.

(See AIHA Hygienic Guide Series - "Chlorodiphenyls" attached.)

2. Question: Several hourly employees have mentioned recently that many chemicals such as Inerteen cause sterilization after prolonged use. Is this true?

There is no evidence that polychlorinated biphenyls cause "sterilization" in humans.

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3. Question: Since Inerteen effects birds and other animals, if there is no real effects to human beings, how do you explain it to employees in such a way that they will understand why it can kill a bird and not a human?

There is a potential real effect to humans - including death - as discussed in the answer to Question 1.

Due to differences in metabolism of food (and food contaminants) in birds and humans (and particularly the difference in the reproduction process in birds and mammals - including humans), birds are particualrly sensitive to many chlorinated hydrocarbons including polychlorinated biphenyls.

4. Question: If an employee spills Inerteen on his clothing and later takes the clothing home to be wa ed with other clothes, will this have any effect on he or his family and should be carry his clothes home to be washed?

There should not be any effect on an employee or his family from home laundering of work clothing. If washed with other clothing, there may be residual odor of the chlorinated hydrocarbons in the clothing.

5. Question: Employees carry Inerteen home on the soles of their shoes and complain quite a bit about the effect Inerteen has on wearing out their shoes. Is this a serious problem? Will Inerteen in the soles and leather of shoes, over a long period of time, have an effect on the feet and skin since the shoe is the only protective equipment we wear on our feet and the Inerteen penetrates through the leather.

There should not be polychlorinated biphenyl on the floor for workmen to contaminate their shoes to carry home. The plasticizer or solvent action will destroy or shorten the life of the shoes. More importantly, the wearing of contaminated shoes could lead to absorption of the liquid through the soles of the feet as through any other unbroken skin surface.

6. Question: There is one employee in our plant who had no problem whatsoever with Inerteen years ago. After six years of using, now when he works in Inerteen (which is a part of his job) he develops a swelling on the inner bicep of his left arm, only in one location. Could this be from Inerteen or not? It goes away as soon as he gets out of the Inerteen. It is similar to the swelling after taking an injection.

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We do not believe there can be any association between "a swelling on the inner bicep" of the arm and exposure to polychlorinated biphenyls.

7. Question: Are there hand cleaning solvent materials that we should be using when working in Inerteen to coat our skin before working in it and to wash it off after we finish working in it? Please give your recommendation. Our employees working in Inerteen are not able to use gloves since it is an assembly area. Even if they could, the Inerteen would destroy the protective glove.

We assume the question refers to the use of "Barrier Creams" rather than a "hand cleaning solvent".

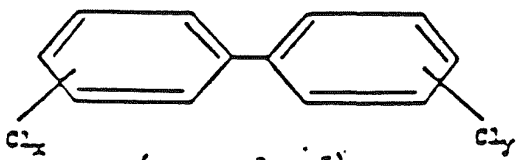
There are a number of barrier creams available to protect workers against water insoluble solvents. Probably the most effective include silicone "to provide an impenetrable shield". A problem with such creams is that they may offer a false sense of security.

Proper use includes a discipline which requires liberal application at the beginning of a work shift and after each washing of the hands during the work day.

HYGIENIC GUIDE SERIES

Chlorodiphenyls

(Containing 42% and 54% Chlorine)



$(x + y = 3 \text{ or } 5)$

Significant Physical Properties[1]

The chlorodiphenyls are light straw-colored mobile (42% chlorinated) and viscous (54% chlorinated) liquids with typical chlorinated aromatic odors. These compounds are chlorinated to specific weights of chlorine. Chlorodiphenyl (42%) contains 42.0 ± 0.5 chlorine, an amount corresponding to three chlorine atoms in unassigned positions. Chlorodiphenyl (54%) contains 54.3% chlorine corresponding to five chlorine atoms in unassigned positions. Both compounds are insoluble in water, but soluble in benzene, kerosene, acetone, amyl alcohol, ether and chloroform.

	Chlorodiphenyl (42%)	*Chlorodiphenyl (54%)*
Molecular weight:	247.53	326.45
Flash point (Cleveland O. C.):	176°-180°C (349°-356°F)	None
Distillation range:	325°-366°C	365°-390°C
Specific gravity:	1.381-1.392 (25°/15.5°C)	1.495-1.505 (65°/15.5°C)
Vapor pressure:		
0°C	0.001 mm	0.00006 mm
25°C	0.006 mm (est)	0.00054 mm (est)
150°C	4.3 mm	1.4 mm
200°C	29.0 mm	9.0 mm
At 25°C and 760 mm Hg:		
Saturated air contains	0.080 mg/liter	0.009 mg/liter
1 mg/liter =	98.8 ppm	74.9 ppm
1 ppm =	0.010 mg/liter	0.013 mg/liter

1. Hygienic Standards

A. Recommended maximal atmospheric concentrations (8 hours): One milligram chlorodiphenyl (42%) per cubic meter of air and 0.5 milligram chlorodiphenyl (54%) per cubic meter of air.[2] This is based on the results of chronic animal inhalation studies.[3]

B. Short exposure tolerance: Ten mg of a diphenyl of unspecified chlorine content per cubic meter of air has been reported as unbearably irritating.[4]

C. Atmospheric concentration immediately hazardous to life: Not known for man. Irritation of the eyes, nose and throat at levels which have not caused acute illness preclude the likelihood of voluntary exposure to immediately hazardous concentrations.

The Committee wishes to acknowledge the preparation of the [illegible] information section of this Guide by the Industrial Hygiene and Clinical Toxicology Committee of I. M. A., and to acknowledge also the assistance of Elmer P. Wheeler and Jack T. Garrett in the writing of this Guide.

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II. Toxic Properties

A. Inhalation: Experiments with chlorodiphenyl (42% chlorine) were run at concentrations of 8.6 μg/liter and at 6.83 μg/liter of air. Cats, mice, rabbits and rats were unaffected by the higher level while guinea pigs showed poor growth after seventeen 7-hour/day exposures over 24 days. Eighty-four 7-hour/day exposures at the lower concentration had essentially no effect on similar species of animals.[1]

In the case of chlorodiphenyl (54% chlorine) eighty-three 7-hour/day exposures over 121 days to a concentration of 5.4 μg/liter resulted in injury to liver cells and increased liver weights in rats. At a concentration of 1.5 μg/liter for one hundred and fifty 7-hour/day exposures over 213 days, the rats showed distinct microscopic changes in the liver.[2]

The literature contains many references to the potential toxic effects of chlorinated diphenyls in man and animals. The early work included investigations of chlorinated naphthalenes, chlorinated diphenyls, chlorinated diphenyl oxide and various mixtures of these. An early report indicated serious toxic effects from chlorodiphenyl chlorinated to the extent of 65%.[3] A later report by the principal author properly identified the earlier sample as a mixture of chlorinated diphenyl and chlorinated diphenyl benzene.[4] However, only a few authors of subsequent papers, bulletins or textbooks have noted this correction and the original data are cited repeatedly as relating to chlorinated diphenyl alone.

B. Skin contact: Both compounds are readily absorbed through the clipped, intact skin of rabbits. The minimum lethal dose when the undiluted materials were applied to the covered clipped, intact skin of rabbits for 24 hours was approximately 1.0 cm/kg for the 42% chlorinated and 1.5 gm/kg for the 54% chlorinated.[5]

Local action on the skin is similar to that of common organic solvents where contact leads to removal of natural fats and oils with subsequent drying and cracking of the skin.

Human cases of chloracne have not been reported from the use of these two specific chlorodiphenyls. The potential undoubtedly exists because of cases which were reported from the use of chlorodiphenyls with a higher chlorine content and from mixtures with other chlorinated aromatic compounds.[1,6,8]

C. Eye contact: The liquid products and their vapors are moderately irritating to eye tissues.

D. Ingestion: The acute oral toxicities of the undiluted compounds are not great as evidenced by oral LD_{50}'s in rats of approximately 8.65 gm (7.61 to 9.78 gm) per kilogram for the 42% chlorinated and 11.9 gm (10.48 to 13.45 gm) per kilogram for the 54% chlorinated.[7] Central atrophy of the liver appears to be the chief toxic effect.

III. Industrial Hygiene Practice

A. Industrial uses: The chlorodiphenyls are used as dielectrics for condensers, capacitors and transformers, plasticizers in synthetic resins, in emulsion adhesives, as nonflammable hydraulic fluids and as transfer media.

B. Evaluation of exposures:

1. *Air sampling and analysis:*
   a. Direct field methods: None
   b. Laboratory methods:
      (1) Collect in secondary butyl alcohol in fritted bubbler or two large impingers in series; concentrate sample and complete analysis by one of various methods for chlorinated hydrocarbons.[4]
      (2) Sample air through combustion furnace, collect chloride ion from decomposed chlorodiphenyl in suitable alkaline solution and determine chloride ion concentration.[9]

C. Hazards and their recommended control:

1. *Inhalation:* Absorption is chiefly by inhalation. Concentrations in the workroom atmosphere should be maintained below the recommended levels. Where the chlorinated diphenyls are used at room tempera-

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tures the hazard of inhalation is considered slight or absent. When these materials are subjected to elevated temperatures, the process either should be completely enclosed or other adequate mechanical exhaust ventilation must be provided to reduce concentrations to safe levels. In heat transfer media applications, the system must be designed and constructed so that it is leakproof. Special gasket materials and pump seals are available to prevent leakage. The reservoir tank should be airtight except for a vent to the outdoors. In the event of spills or leaks of hot fluids, use chemical cartridge respirators or gas masks approved by the U. S. Bureau of Mines for protection against organic vapors. These will provide good protection up to the concentrations shown on the approval labels and the odor will give ample warning if it comes through the device.

2. *Skin contact:* Operations and handling procedures should be such as to avoid the possibility of prolonged or repeated skin contact. Contaminated clothing must be laundered before reuse.
3. *Eye contact:* Eye protection should be used where there is a possibility of liquid splashes.
4. *Ingestion:* Ingestion of these materials is not a problem in industry.
5. *Fire and explosion:* The chlorodiphenyls are fire-resistant or essentially nonflammable liquids. When exposed to flame or hot surfaces they may decompose to form CO, CO_2, HCl, phenolics and aldehydes depending on the temperature, availability of oxygen, area of the heated surface, rate of application of the liquid to the surface and other variables.

IV. Medical Information

A. Emergency treatment: Skin surfaces exposed to chlorodiphenyls should be thoroughly washed with soap and water at once. If clothing has been contaminated it should be removed promptly.

If exposure to a high vapor concentration occurs, as in the case of spills at elevated temperatures, the patient should be moved from exposure and kept at rest until seen by a physician. Oxygen should be administered if breathing is difficult.

Eyes contaminated with chlorodiphenyl should be irrigated with water for at least 15 minutes and the patient should be seen by a physician. Depending on the amount of inflammation and pain present, drugs like Cortisporin® ointment and topical Pontocaine® may be indicated.

B. Special procedures: Persons who are regularly or repeatedly exposed to chlorodiphenyls should be examined periodically to detect early evidence of skin irritation and/or liver damage. Persons with known liver disease should not be exposed to repeated contact with the chlorodiphenyls.

V. References

1. Monsanto Company, Organic Chemicals Division: *Tech. Bulletin #PL-306, Aroclor Plasticizers* (Dec. 1960).
2. American Conference of Governmental Industrial Hygienists: Threshold Limit Values for 1964. *AMA Arch. Environ. Health 9:* 545 (1964).
3. Treon, J. F., F. P. Cleveland, J. Cappel, and R. W. Atchley: The Toxicity of the Vapors of Aroclor 1242 and Aroclor 1254. *Amer. Ind. Hyg. Assoc. Quart. 17:* 204 (1956).
4. Elkins, H. B.: *The Chemistry of Industrial Toxicology.* John Wiley and Sons, Inc., New York (1959).
5. Drinker, C. K., M. F. Warren, and G. A. Bennett: The Problem of Possible Systemic Effects from Certain Chlorinated Hydrocarbons. *J. Ind. Hyg. Toxicol. 19:* 283 (1937).
6. Drinker, C. K.: Further Observations on the Possible Systemic Toxicity of Certain of the Chlorinated Hydrocarbons. *J. Ind. Hyg. Toxicol. 21:* 155 (1939).
7. Wheeler, E. P.: Personal Communication, Monsanto Company, St. Louis, Missouri 63166.
8. Greenburg, L., M. R. Mayers, and A. R. Smith: The Systemic Effects Resulting from Exposure to Certain Chlorinated Hydrocarbons. *J. Ind. Hyg. Toxicol. 21:* 29 (1939).

GERN 00107

WATER_PCB-SD0000068641

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Hygienic Guide sheets may be obtained from the American Industrial Hygiene Association, 14123 Prevost, Detroit 27, Michigan, at 25 cents each for two-page reprints; 30 cents each for four-page reprints. All orders for less than $2.00 must be prepaid. Discount of 20% on orders of five or more Guides, 40% discount on orders of 100 or more Guides. Special looseleaf binders for the Guides may also be ordered from the Association office for $1.25 each.

GORN CC1040

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Elmer P. Wheeler, Medical Department

January 29, 1970

J. S. Barrett, London
~~H. S. Bergen, HSBRU~~
W. B. Papageorge, WPAPA

Status of Aroclor Toxicological Studies

D. S. Cameron
Brussels

Enclosed is a copy of the reports from our consulting laboratory indicating the status of the animal toxicity studies. I have summarized the pertinent findings separately and as indicated in the table.

We have given copies of these data to one U. S. customer, the U. S. FDA and one or two other state agencies. I don't see why this information cannot be released with discretion in Britain or Europe.

Our interpretation is that the PCB's are exhibiting a greater degree of toxicity in this chronic study than we had anticipated. Secondly, although there are variations depending on species of animals, the PCB's are about the same as DDT in mammals.

We have additional interim data which will perhaps be more discouraging. We are repeating some of the experiments to confirm or deny the earlier findings and are not distributing the early results at this time.

Elmer P. Wheeler

EPW:ju

Enclosure

PENGAD-Bayonne, N.J.
PLAINTIFF'S EXHIBIT
60
5-21-98



MONS 098480

Monsanto

FROM : G. W. Miller - Anniston, Alabama

DATE : May 7, 1970

SUBJECT : AROCLOR POLLUTION
AWIC CONTACT

REFERENCE :

TO : C. L. Jessee

cc J. C. Landwehr
H. L. Williams
P. B. Hodges - G.O.
W. B. Papageorge - G.O.
F. J. Holzapfel - G.O.
J. R. Savage - G.O.
E. V. John - G.O.
J. H. Crowe - Decatur
E. G. Wright

On May 6, Messers. J. C. Landwehr, E. G. Wright and I visited Mr. J. L. Crockett, Technical Director of the Alabama Water Improvement Commission, in Montgomery. The purpose of the contact was twofold; first, to familiarize Mr. Crockett with the situation regarding Aroclor wastes and their reported pollution potential and, secondly, to build confidence that Monsanto intends to cooperate with governmental agencies to define the effects of Aroclor on the environment.

Mr. Crockett and the AWIC staff were totally unaware of the published information concerning Aroclors. Copies of the most pertinent articles describing the situation along with Mr. Hinckler's statements were provided for his use. Additional information supplied covered the following facts: 1) Monsanto is currently investigating independently and in cooperation with governmental agencies the potential ecological effects of Aroclors. 2) Investigation and research programs are underway at Anniston to identify, quantify and develop techniques which would control product losses to the environment. 3) Any Aroclors reaching the watershed from the Anniston plant were entering Snow Creek. 4) The production process was described in general detail to point out that water was not essential to production of Aroclors, and waste water was produced only by auxiliary equipment such as steam jets, etc.

Mr. Crockett was most appreciative of Monsanto's approach to the problem and the fact that Monsanto came to him. He alluded that our action would produce a situation that was beneficial to the protection of both the Monsanto and AWIC positions. His recommendations were as follows:

1. Supply the AWIC with a general process description detailing potential loss sources.

2. Continue to develop information and as major items develop inform the AWIC.

3. Give no statements or publications which would bring the situation to the public's attention.

4. If approached by news media, either the AWIC or Monsanto is free to state that the situation is under study by the staff of AWIC at the direction of the Technical Director, Mr. Crockett.

5. If in the future, information is developed indicating that Aroclors are detrimental to watersheds, Monsanto will be required to secure a permit from AWIC to allow certain maximum quantities of chlorinated biphenyl to enter Snow Creek.

MONS 099533

PLAINTIFF'S EXHIBIT 61 5-21-98
PENGAD-Bayonne,N.J.

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In summary, Mr. Crockett was noticeably unexcited at our disclosure and all his remarks were directed toward a careful evaluation followed by actions as required by data. The full cooperation of the AWIC to reach the above objective on a confidential basis can be anticipated.

It must be remembered, however, that all AWIC actions are subject to state political pressure and federal control.

G. W. Miller

/bs

MONS 099534

WATER_PCB-SD0000068645

Monsanto

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

July 27, 1970

Mr. Fred R. Viland
Senior Buyer
Westinghouse Electric Corporation
469 Sharpsville Avenue
Sharon, Pennsylvania 16146

Dear Fred:

As we discussed last Friday, the disposal of solid material contaminated with Askarel is a technological and economic challenge.

We are actively pursuing and have high hopes that pyrolysis of these materials in a rotary kiln followed by incineration of the resulting gases at appropriate temperatures will provide us with an acceptable solution. I estimate that the testing, design and construction of such a facility will take about 18 months. Even when installed, the practicality of shipping these wastes hundreds of miles for disposal seems questionable.

In the interim, the only practical recommendation we can offer our plants and customers regarding the disposal of these materials is the use of properly operated sanitary land fills.

These land fills must not be located near water systems, both surface and underground. Monitoring of rivers, creeks, lakes, etc. surrounding the fill, especially after heavy rainfall, will aid in assuring that PCB's are not escaping into the environment.

It is my considered opinion that with proper cover by clay, sand or soil the Askarels, which cling to solids tenaciously, will not migrate and therefore should not harm the environment.

PENGAD-Bayonne,N.J.
PLAINTIFF'S EXHIBIT
608
5-21-98

I hope this information is helpful and if I can be of further service, please let me know.

Sincerely,

W. B. Papageorge
Manager
Environmental Control

ms

WATER_PCB-SD0000068647

(5)

W. B. PAPAGEORGE - ST. LOUIS

MARCH 6, 1970

AROCLOR ENVIRONMENTAL PROGRAM

D. DANNA
H. S. BERGEN
J. E. SPRINGGATE

J. R. DURLAND - TOKYO

I apologize for the delay regarding comments on the questions in your memo dated December 29, 1969. The PCB "learning process", although not completed, has taken longer than I had anticipated.

Waste Handling - U. S. Plants

Both the Anniston and W. G. Krummrich plants have become more aware of the need to reduce the amount of Aroclors in the plant effluents to essentially zero. Lacking any positive guidelines, we have tentatively selected a target of 10 ppb. Both plants have monitored their streams to determine current levels of PCB presence and have active programs to reduce leaks, spills and deliberate dumping. No major capital expenditures are planned at this time. The Anniston plant plans to install a sump in their sewer system to trap Aroclors. All waste containing PCB's is at present hauled to the dumps the plants have been using for other plant waste. We recognize this is not the ultimate, since PCB's could eventually enter the environment, but we will continue this practice until better methods of disposal are available. I have arranged with the plants to send reports of the status of these activities to you through Don Danna. A copy of the analytical procedure we are using is attached.

Aroclor 5460

We do not know what happens to Aroclor 5460. No one has reported its presence in samples of water or wildlife. We are assuming that its low solubility may preclude its free movement in the environment. Some questions have been raised concerning the ability of current analytical techniques to discern its presence.

MCNS 099591

PLAINTIFF'S EXHIBIT 70 5-21-98
PENGAD-Bayonne, N.J.

WATER_PCB-SD0000068648

Aroclor 1254 and Aroclor 1260

Our original plans to move toward discontinuance of 1254 and 1260 were primarily based on the information available which indicated the chlorinated biphenyls with 5 and 6 chlorines were the type consistently found in the environment and considered to be harmful. During a recent meeting with representatives of General Electric, this decision to discontinue 1254 and 1260 was challenged. The G.E. representatives believe that the benefits of these Aroclors in transformers far outweighs the yet questionable threat to the environment. It appears that in those situations where control is practical, such as transformer usage, we could continue to supply Aroclor 1254 and 1260. We plan to take this position in our next review with the Corporate Management Committee.

NCR Paper

The presence of PCB in NCR paper poses a particular challenge. The ultimate destination of this product is difficult to control. Normal incineration vaporizes the Aroclor which eventually is found somewhere in the environment. The NCR people, both in the U.S. and U.K. have been looking for a substitute for Aroclor 1242 for several reasons. The PCB threat has accelerated this desire to convert. In the U.K. arrangements have been made to test HB-40 as an alternate. At this time, there appears to be some optimism that the tests will be successful. In the U.S., with a slightly different process, the HB-40 is not considered an adequate substitute. NCR-U.S. is evaluating alkylated biphenyls as possible substitutes.

Aroclor Toxicity - Anniston Plant

Your question as to why the toxicity of Aroclors has not turned up downstream of the Anniston Plant after 40 years of manufacture is difficult to answer. We just don't know. Aroclors have been found in Snow Creek near the plant. There is no record of any water life observed in this creek for many years. We've assumed other plant wastes were to blame; e.g. muriatic acid. Aroclors could be involved also.

MONS 099592

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Biodegradability

Tests on the biodegradability of Aroclors are being conducted both in St. Louis Research and at Ruabon. At present, Aroclor 1221 appears biodegradable in river water and activated sludge. Aroclor 1242 undergoes slight degradation in sludge containing microorganisms acclimated to biphenyl. All other Aroclors have resisted biological degradation, to date. There is some indication that isomer structure determines ease of degradation.

Incineration

Aroclors will decompose at temperatures exceeding 800°F. Bayer and Prodelec in Europe claim they are incinerating PCB's. We have been promised data on the stack gases formed. The Rollins-Purle, Inc. people in New Jersey claim that they incinerated some Aroclor 1254. We have some doubts about the degree of destruction achieved and we plan to pursue further. We have made arrangements for testing at the John Zink Company: Tulsa, Oklahoma for the week of March 9. Our objective is to get incineration data which we can use to 1) evaluate commercial incinerators, 2) design plant incineration systems or, 3) provide to our customers to help them with their disposal problems.

Toxicity

Studies are being conducted for Monsanto by the Industrial Bio-Test Laboratories outside of Chicago. The effects of Aroclor 1221, 1242 and 1260 on rats, dogs and chickens are being observed. The results, so far, have been inconclusive.

We are retesting and extending some tests to confirm the initial results.

Waste Treatment

Studies on the removal of Aroclors in solution or emulsified in water are being conducted. Anniston is studying the removal by carbon. MRC, Dayton, is studying the removal on acid clays. Once we have successfully removed the PCB from solution, we plan to develop means for complete destruction of the PCB on the carbon or clay.

MONS 099593

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As you can see, there are many areas with unanswered questions. Much of our effort at this time is being expended on activities aimed at providing us with more information. As the results become available, we will forward them to you.

W. B. PAPAGEORGE

ms

Attachments

MONS 099594

WATER_PCB-SD0000068651

PROGRESS REPORT
ORGANIC CHEMICALS DIVISION
TECHNOLOGY DEPARTMENT

RECORDED BY	FOR	DETAILS	REPORT NO	DATE
W. M. Mees W. J. Litschgi E. S. Tucker	October 1971	YES	3	10-29-71

LOCATION	JOB NOS
St. Louis - South Second Street	2-21-760.01-13480, 85010, 16300

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*E. P. Wheeler/G. J. Levinskas

PROJECT TITLE

ENVIRONMENTAL ANALYTICAL STUDIES -
RESEARCH AND DEVELOPMENT, MANUFACTURING AND OUTSIDE SUPPORT STUDIES

PROJECT OBJECTIVE

Identify, locate and assess the magnitude of Aroclor pollution problems, help determine what needs to be done to control pollution sources, verify the effectiveness of proposed pollution control procedures, guide development of recycle and/or disposal methods, and provide collaborative data or legal and regulatory purposes.

SUMMARY

PCB's typical of our Aroclor products have been found at levels below and above recommended guidelines in:

- Coated paper and paper coatings
- Machine oils and plant effluents from one customer manufacturing site
- Fourteen Monsanto Industrial Chemical Company products from four manufacturing sites
- Chicken Chow used as feed by Industrial Bio-Test Laboratories
- Sewer effluents from one Monsanto Plant site
- Tissue turkey extracts from the U.S.D.A.
- Two competitive products.

PLAINTIFF'S EXHIBIT 73 5-21-98
PENGAD Bayonne, N.J.

MAR-30-1998 12:55 KBTF P.26/43

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PCT's typical of Aroclor 3432 were found in:

- Plant effluent samples from one customer manufacturing site.

A table showing the sample sources, types, and the level and type of Aroclor found as well as the support objective is presented in the details section.

Additional external and internal support has been provided in the form of:

- An on site methodology review for F. B. Chamberlin (Director of Research and Development) and R. M. Wilkinson (Senior Project Manager) representatives of the Alton Packaging Division, Alton Box Board Co.
- PCB Seminar presentation on analytical methodology for the Research Council of Poultry and Egg Institute of America in Chicago, Ill.
- PCB problem and progress review for T. Katayama (Marketing Manager) and S. Uneno (Product Director) from Mitsubishi Monsanto Chemical Co.
- Preliminary write up of methods for the determination of PCB's in Santoquin and CaMHA.
- Evaluation of PCB perchlorination for quantitation of altered PCB residues.
- Analysis of Monsanto and Competitor Aroclor products for polychlorinated dibenzofurans.
- General internal and external analytical consultation.
- Distribution of Aroclor methodology and reference standards.

FUTURE PLANS

PCB Analysis

1. Three to four J. F. Queeny monthly composite sewer effluent samples.
2. Forty-six machine oil and plant effluent samples from Saginaw Grey Iron Casting Plant, Chevrolet Motor Division.
3. Two oil samples skimmed off trade waste settling tanks from Buick Motor Div., General Motors Corp., Flint, Mich. (2 samples).
4. Four coated paper samples from Champion Papers, Hamilton Mill, Hamilton, Ohio (4 samples).
5. Four fluid samples from an imported VW automobile.
6. Five ACL-59 samples from the W.G. Krummrich Plant.
7. Three raw material samples from P.P.G. Industries.
8. Twelve film and paper extracts from St. Regis Paper Co.
9. One fish from a stream associated with a General Electric Plant.
10. Five intra-lab method check samples from a General Electric Plant Laboratory.

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PCT Analysis

1. Ten plant effluent samples from Monsanto's Anniston plant.
2. Saginaw Foundries, Chev. Motor Div. plant effluent samples.

W. J. Litschgi

E. S. Tucker

MONS 202099

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DETAILS

TABLE I

CUSTOMER SERVICE

Sample Source	Sample Matrix	No. of Samples	Level Found	Associated Aroclor	Support Objective
General Motors Corp., Buick Div.	Machine oils	11	Per Cent	A-1242	Pollution Control
	Drainage streams around plant	2	PPB	A-1242	Pollution Control
Champion Paper Company	Paper (writing)	3	PPM Per Cent	A-1242 A-5432	Pollution Control
	Paper Coatings (Micron II)	3	PPM Per Cent	A-1242 A-5432	

MANUFACTURING SUPPORT

J. F. Queeny	Sewer effluent composites	5	PPB	A-1242	Pollution Control
	HCl	1	PPB	A-1242	
J. F. Queeny, W. G. Krummrich, Del. River, and Everett	Finished Products	28	N.D.* to PPB	A-1242	

COMPETITIVE PRODUCTS

Ag. Division, Nitro	Santoquin	6	PPB	A-1242	Determination of level and sources of contamination of competitive animal feed additives
	CaMHA	3	PPB	A-1242	

*None Detected

(Cont'd on next page)

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DETAILS (Cont'd)

RESEARCH AND DEVELOPMENT

Sample Source	Sample Matrix	No. of Samples	Level Found	Associated Aroclor	Support Objective
Inter-Laboratory Round Robin (WGK, JFQ and Anniston)	Distilled water spiked with known quantitites of Aroclor	7	PPB to PPM	A-1242 A-1254 A-1260	Insure the maintenance of precision and accuracy in Monsanto labs analyzing for PCB's
Bio-Test Laboratories, Chicago, Ill.	Ralston-Purina Chicken Chow	2	PPB	A-1242	Determination of PCB background in feed used in the toxicity studies being performed at Bio-Test
USDA	Turkey Extract	1	-	A-1248	Determination of type of PCB and how the PCB contamination occurred

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DETAILS (Cont'd)

Customer Service

General Motors Corporation - Buick Division

Due to increased pressure from the Michigan State Regulatory Agency concerning PCB releases into the environment, Monsanto was requested to analyze samples of Buick's plant effluent and nearby drainage stream. At the same time, samples of oil used in their presses and machines were submitted to determine residual PCB levels remaining after Buick switched from Pydraul 312 to Pydraul 312A.

Sample Description	Level Found	Aroclor
Water from trade waste prior to Hickory stream	8 PPB 15 PPB	A-1242 A-5432
Water from Hickory rain stream prior to river	13 PPB <5 PPB	A-1242 A-5432
Machine #1	14.8%	A-1242
Machine #2	2.5%	A-1242
Machine #3	13.8%	A-1242
Machine #4	8.9%	A-1242
Machine #5	3.9%	A-1242
Machine #8	4.4%	A-1242
Machine #9	24.3%	A-1242
Trim Press #1	11.0%	A-1242
Trim Press #2	0.9%	A-1242
Trim Press #8	0.8%	A-1242
Trim Press #9	16.8%	A-1242

Champion Paper Company

Coated paper and the used coating (Micron II) samples submitted by Champion Paper Company were analyzed to determine the level of residual PCB's in the PCT's used in the paper coating fluid.

Sample Description	Level Found	Aroclor
Paper - 3866F	203 PPM 0.29%	A-1242 A-5432
Paper - 3878F	140 PPM 0.25%	A-1242 A-5432
Paper - 3758M	217 PPM 0.28%	A-1242 A-5432
Micron II - Sample #1	242 PPM 0.48%	A-1242 A-5432
Micron II - Sample #2	331 PPM 0.75%	A-1242 A-5432
Micron II - Sample #3	211 PPM 0.56%	A-1242 A-5432

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DETAILS (Cont'd)

Manufacturing Support

J. F. Queeny Plant

Sample Description	Level Found	Aroclor
Clean Acid Sewer (August)	19 PPB	A-1242
DA Sewer (August)	29 PPB	A-1242
MSD Gatewell (August)	77 PPB	A-1242
Clean Acid Sewer (September)	3 PPB	A-1242
MSD Gatewell (September)	31 PPB	A-1242

The DA sewer (August) was supposed to be the Clean Acid Sewer (August) spiked with ~20 PPB A-1242. As can be seen, our results reflect only a 50% recovery. Discussion with the J. F. Queeny pollution group is planned in an effort to resolve this problem.

Monsanto Industrial Chemicals Company

The following Monsanto Industrial Chemicals Company products have been analyzed for PCB's to determine if any of them were significantly contaminated with PCB's.

Sample Description	Level Found	Aroclor
Aspirin QA-1187 9-13-71	N.D.	
Aspirin QA-1213 10-4-71	N.D.	
Maleic Anhydride QA-1295 9-16-71	N.D.	
Maleic Anhydride QA-1333 10-6-71	N.D.	
Sodium Saccharin QA-153 8-31-71	N.D.	
Sodium Saccharin QA-168 9-11-71	N.D.	
Saccharin QA-209 5-5-71	0.03 PPM	A-1242
Saccharin QA-1012 6-23-71	0.02 PPM	A-1242
Vanillin USP Ba#1025	0.20 PPM	A-1242
Vanillin USP Ba#1027	0.18 PPM	A-1242
Tall Oil Rosin Rec'd 1-25-71	N.D.	
Tall Oil Rosin Rec'd 5-25-71	N.D.	
CDP-OR175000 #4	0.17 PPM	A-1242
CDP-04175000 #3 KA-79	0.12 PPM	A-1242
S-334F EUT #A-134 10-4-71	0.26 PPM	A-1242
S-334F EUT #A-135 10-4-71	0.21 PPM	A-1242
S-711 "A" Line 10-6-71	0.27 PPM	A-1242
S-711 "B" Line 10-6-71	0.36 PPM	A-1242
S-160 DA-614	0.36 PPM	A-1242
S-160 DA-803 D.R.	0.35 PPM	A-1242
HB-40 #1 Stg Tk 10-7-71	N.D.	
HB-40 #3 Stg Tk 10-6-71 AA-275C	N.D.	
Biphenyl AA-194 9-27-71	0.67 PPM	A-1242
Biphenyl #2 Stg Tk 10-6-71	0.15 PPM	A-1242
Santowax R 10-6-71	N.D.	
Santowax R Rec'd 9186 10-7-71	N.D.	

MONS 202103

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DETAILS (Cont'd)

Competitive Products

Sample Origin	Sample Description	Level Found	Aroclor
Thompson-Hayward Chemical Co.	Ethoxyquin (66.7%)	749 PPB	A-1242
HIC 7-21-71	Neoquin	184 PPB	A-1242
Traveler's Rest	Santoquin Emulsion	151 PPB	A-1242
Traveler's Rest	Santoquin Mix 6	570 PPB	A-1242
Rexolin Chemical	Ethoxyquin (100%)	155 PPB	A-1242
SNS 8-30-71	Abiquin	133 PPB	A-1242

Our detection limit based upon observed background and sample was .50 PPB.

Roche Ag Lot 2-4-71 Mfgd by Degussa	DL-Methionine	2.5 PPB	A-1242
Upland, Calif. A3NG, SNS	DL-Methionine	21.4 PPB	A-1242
Thompson-Hayward Chemical Co.	DL-Methionine	45 PPB	A-1242

These samples were analyzed to determine if products in competition with Monsanto's Santoquin and CaMHA were also contaminated with PCB's. In all cases, they were found to contain an equal or greater level than the corresponding Monsanto products.

Methods for the determination of polychlorinated biphenyls in Santoquin (Organic Research Method 71-26) and CaMHA (Organic Research Method 71-27) have been written and will be sent to the Nitro plant where they will be used to monitor their Santoquin and CaMHA production.

Research and Development

Analysis of Chicken Feed from Bio-Test

The chicken feed used in the Bio-Test toxicity studies was purchased from the Ralston-Purina Company. In the past months, attention has focused upon the fact that Ralston's feed has, in some instances, become contaminated with PCB's. For this reason, two samples of the feed used in the chicken feeding studies were analyzed for PCB's.

Sample Origin	Sample Description	Level Found	Aroclor
WCRF-1	Chicken Feed	240 PPB	A-1242
WCRF-II	Chicken Feed	263 PPB	A-1242

MAR-30-1998 12:56 KBTF P.33/43
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DETAILS (Cont'd)

USDA Turkey Extracts

A USDA extract of a PCB contaminated (Swift) turkey tissue sample was submitted to our laboratory to see if we could establish what original Aroclor product caused the contamination and possibly the type of exposure. Using EC/GC and GC/Mass, we were able to determine that (1) PCB's were really present, (2) Aroclor 1248 was most probably the product involved, and (3) the birds either received a large single dose early in their lives or more probably a lower dose over an extended period of time.

PCT Methodology Status

A method has been developed and presently is being written (Analytical Method #71-37) for analysis of water and SCAS sludge samples for PCT's. Recovery data obtained from samples spiked with A-5432 and 5460 were essentially quantitative at a concentration level of >2 PPM.

This method is currently being used to analyze samples from the biodegradation studies and is at the same time being adapted for use on customer service and tissue samples.

Inter-Plant Round Robin

In order to establish the accuracy and precision of the PCB analysis being carried out in Monsanto laboratories, duplicate sets of spiked water samples have been analyzed by Anniston, WGK and Applied Sciences. The results were as follows:

	PPM PCB (Spiked)			Applied Sciences			WGK		
	A-1242	A-1254	A-1260	A-1242	A-1254	A-1260	A-1242	A-1254	A-1260
1W	-	-	-	-	-	-	-	-	-
2W	0.57	1.04	-	0.74	0.92	-	1.04	1.05	-
3W	0.57	0.10	-	0.86	0.07	-	0.57	0.15	-
4W	5.68	1.04	1.27	1.07			6.70	-	2.84
5W	5.68	0.52	-	5.25	0.52	-	6.55	1.20	-
6W	-	0.10	-	-	0.06	-	-	0.07	-
7W*				0.92	0.06	-	-	-	-
8W*							8.80	-	4.16

	Anniston		
	A-1242	A-1254	A-1260
1W	-	-	-
2W	0.78	0.75	-
3W	0.45	-	-
4W	5.4	2.95	2.18
5W	9.9	-	-
6W	-	0.03	-
7W*	0.4	0.2	-
8W*	8.4	-	-

*Applied Sciences
7W = 3W

WGK
7W = 1W
8W = 4W

Anniston
7W = 2W
8W = 5W

MONS 202105

The data have been submitted for statistical analyses.

WATER_PCB-SD0000068660

DETAILS (Cont'd)

National Broiler Council Intra-Laboratory PCB Methodology Check

Ten sets of soybean oil and chicken fat were prepared by Monsanto and distributed by Ralston-Purina to government and industrial laboratories analyzing samples for PCB's. The objective of this intra-laboratory check is to establish the validity of the different PCB methods currently being employed.

Listed below are the labs responding, however the individual laboratories were not identified.

	Results PPM					
	1S	2S	3S	4C	5C	6C
Spike Level	0	5.0	2.5	5.0	5.0	2.0
Lab A	0.25	5.31	2.56	4.00	5.06	3.86
Lab B	0.61	3.7	3.0	1.8	4.2	2.1
Lab C (Applied Sciences)	0.78	5.78	3.64	4.13	4.08	3.26
Lab D #1	0.10	4.17	1.81	2.05	2.05	1.53
Lab D #2	0.10	3.58	1.83	2.18	2.09	1.55
Lab E	0.73	4.40	2.24	2.42	2.68	2.14
Lab F	0.32	5.10	2.91	2.62	2.66	2.22
Lab G	<0.10	2.9	2.0	3.0	3.6	2.9
Lab H	1.10	1.5	<0.6	<0.6	5.5	5.0
Lab I			No Report	Received		
Lab J			No Report	Received		
WGK			No Report	Received		
Anniston	0.38	1.54	0.61	0.57	0.14	-

The results of this inter and intra sample exchange will be submitted for statistical analysis as soon as all laboratories have reported.

Chlorodibenzofurans in PCB's and PCT's

Chlorodibenzofurans Found

Sample Description	<4Cl/Mol.	4Cl/Mol.	5Cl/Mol.
Prodelec Phenoclor DP6	ND(<2 PPM)	Detected	Detected(15-30PPM
Prodelec Phenoclor DP6	ND(<2 PPM)	Detected	Detected(15-30PPM
Bayer Clophen A60,Lot 931134	ND(<2 PPM)	Detected	Detected
Kaneclor KC-300 Shizuki, July 1970 (Composition similar to A-1242)	ND(<2 PPM)	ND(<2 PPM)	ND(<2 PPM)
Monsanto A-1242,Lot AK-255	ND(<2 PPM)	ND(<2 PPM)	ND(<2 PPM)
Monsanto A-1254,Lot AK-38	ND(<2 PPM)	ND(<2 PPM)	ND(<2 PPM)
Monsanto A-1260,Lot AK-3	ND(<2 PPM)	ND(<2 PPM)	ND(<2 PPM)
Monsanto MCS-1016,Drum B	ND(<2 PPM)	ND(<2 PPM)	ND(<2 PPM)
Monsanto MCS-1016,KA-708	ND(<2 PPM)	ND(<2 PPM)	ND(<2 PPM)
Monsanto A-5442,Lot AI-9	ND(<5 PPM)	ND(<5 PPM)	ND(<5 PPM)

WATER_PCB-SD0000068661

REPORT FILE

Industrial BIO-TEST Laboratories, Inc.
1810 FRONTAGE ROAD
NORTHBROOK, ILLINOIS 60062

REPORT TO

IBT RESEARCH

TOXICITY AND REPRODUCTION STUDY WITH AROCLOR 1242 IN WHITE LEGHORN CHICKENS

C 293363

JUNE 7, 1973

IBT NO. J1291

BTL-73-70

EXHIBIT
Levinskas 7

WATER_PCB-SD0000068662

Industrial BIO-TEST Laboratories, Inc.
1810 FRONTAGE ROAD
NORTHBROOK, ILLINOIS 60062

June 7, 1973

Mr. Elmer P. Wheeler
Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166

Dear Mr. Wheeler:

Re: IBT No. J1291 - Toxicity and Reproduction Study
with Aroclor 1242 in White Leghorn Chickens

We are submitting herewith our laboratory report dated June 7, 1973, prepared in connection with the above study.

Very truly yours,

J. C. Calandra
President

JCC/kjl

OSH 036366

WATER_PCB-SD0000068663

REPORT TO

IBT RESEARCH

TOXICITY AND REPRODUCTION STUDY WITH AROCLOR 1242 IN WHITE LEGHORN CHICKENS

JUNE 7, 1973

IBT NO. J1291

I. Introduction

A toxicity and reproduction study with Aroclor 1242 in white Leghorn chickens was initiated. This report presents the results of the investigation conducted at Wedge's Creek Research Farm, Industrial BIO-TEST Laboratories, Inc.

CSA 036309

WATER_PCB-SD0000068664

II. Summary

A toxicity and reproduction study was conducted in white Leghorn chickens fed Aroclor 1242 at dietary levels of 1.0, 3.0, and 10.0 ppm. The results of this study were as follows:

A. Toxicity Phase

No effects upon weight gain, food consumption, survival, egg production, egg weight, egg shell thickness or egg specific gravity were observed.

A slight increase in the number of defective eggs and a severe decrease in the hatchability of eggs were recorded for the group fed 10 ppm. Data obtained from the 1 and 3 ppm groups were essentially normal.

A gross pathological examination of all chickens revealed no significant abnormalities.

B. Reproduction Phase

Chick survival was not influenced by the ingestion of Aroclor 1242.

A slight decrease in chick weight gain was recorded for the 10 ppm group. Weight gain for the 1 and 3 ppm groups was considered normal.

WATER_PCB-SD0000068665

Monsanto

S. Pell

FROM (NAME & LOCATION): E. G. Wright - Anniston, Alabama

DATE: November 14, 1969

SUBJECT: AROCLOR SPILL ON MARCH 6, 1969

REFERENCE:

cc: J. C. Landwehr
W. F. Taffee
H. L. Williams
R. A. Haydel/T. E. Lackey

TO: W. B. Papageorge

On Thursday (November 6, 1969) the line on the bottom of the #3 Aroclor still receiver failed which resulted in the loss of approximately 1,500 gallons of Aroclor 1242 to the acid sewer. To date, we have only been able to recover approximately 350 gallons of this material. The remainder of the material is probably lying in the sewer and has been mixed with the dirt and sand at the head of the acid neutralization pit. Small quantities of this material can be seen leaking through the limestone at the effluent end of the limestone pit. It appears highly unlikely that we will be able to recover any more of this material. However, we will attempt to pump some more of this material to drums.

I have checked Snow Creek on two occasions since the spill and can find no two phase flow in the stream itself. I collected two samples from Snow Creek at points which were sampled when our last set of samples were collected and these samples will be sent to Organic Research in St. Louis to be analyzed for P.C.B.

I would recommend that the plant begin to look into installing a catch basin or some other device (located between the Aroclor department and the acid neutralization pit) which would prevent a recurrence of this type incident.

I would also like to express appreciation to the Organic Production Group and the Maintenance Department for the prompt action which they took in trying to minimize losses of this material to Snow Creek.

E. G. Wright

EGW:kd

PENGAD-Bayonne, N.J.
PLAINTIFF'S EXHIBIT 5
3-31-98

DSW 014093

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