Monsanto

MAY 21 1971

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

DATE: May 20, 1971

cc: H. S. Bergen
C. J. Smith

SUBJECT: PCB ENVIRONMENTAL PROBLEM
APRIL STATUS REPORT

REFERENCE:

TO:

P.J.A. Marsh - Brussels
W. S. Clark
J. R. Durland - Tokyo
E. V. John
R. E. Keller - 2nd Street
R. M. Kountz
T. L. Gossage
J. S. Park
W. R. Richard
J. R. Savage
E. P. Wheeler

MARKETING:

The plasticizer Aroclor replacement program is proceeding very well, being about twenty percent over forecast for April based on pounds sold. Several major accounts, including W. R. Grace, Chrysler, Nashua, and DuPont are now purchasing the replacement products.

E. G. Wright from Anniston Plant will visit Westinghouse, S. Boston, Virginia, on May 4, 1971 to assist in resolving PCB containment, collection and disposal so as to avoid environmental pollution.

Jeno's, Inc., Duluth, Minnesota, and Interstate Brands, Chicago, Illinois, converted small FR systems to Therminol 66. Both are food cooking applications.

Jiffy Fry, Inc. (Div. Foremost-McKesson), Crookston, Minnesota, had FR leakage through cooling gland in pump, resulting in french-fried potatoes contaminated with FR-1. Will be able to convert system to Therminol 66 in July. Approximately 5,000 gallons of fluid involved.

ENGINEERING:

CEA-2415 Waste Incinerator

Construction is complete and water bridging scheduled to start May 16. Curing of the oxidizer refractory scheduled to start May 18 and chemical feed will be started later in the week.

CEA-2417 MCS 1016 Distillation

Construction on all elements was continued; however, a further restriction of plant manpower has caused a further slippage in the estimated mechanical completion to August 1, 1971. Design is continuing on the necessary additions required to produce orthomonochlorobiphenyl.

CEA-2451 NC-Phosphates

Basic design is complete and detailed mechanical design has been started. A few items needed for the June run are currently being installed. Limited plant construction manpower has caused slippage in total project mechanical completion to mid-1972.

JAPAN:

In advance of any action by the government, the manufacturers of pressure-sensitive copy paper, including NCR Japan, have all discontinued the use of chlorinated biphenyl. Thus, NCR Japan has stopped using both MMK's Aroclor and the competitive product, Kaneclor, and has returned stocks to the manufacturer. So, as of this moment, no new encapsulated PCB's are being processed. It will take some while for the inventory of copy paper to be replaced. In spite of some deficiencies, a by-product, KA Oil, is being used as a replacement; this is a refined hi-boiler bottoms from a petroleum cracking operation in which Kaneka cracks naphtha to mixed ethylene and acetylene--the bottoms are a great mixture of all kinds of aromatics. Odor is a problem, but the price is right and apparently some kerosene can be utilized as diluent.

EUROPE:

1. UK press comment arising from "New Scientist" article on Monsanto's response to the PCB problem has generally been very favorable. Publication of this article coincided with the release of the NERC report on the Irish Sea Bird Wreck and press comment has generally linked both items. We have also agreed to an interview for Independent Television's "News at Ten", one of the major UK television news programs.

2. Contract proposals for the Purle Waste agreement are to be reviewed in St. Louis at month end.

3. The Swedish National Environment Protection Board has recommended the Government to control the use of PCB's and ban its use for some applications. It is expected that legislation will come into force next January. We expect to meet the Director of Research for the Board next month. It is reported that similar action may follow in Finland.

MEDICAL:

Through arrangements made by Sam Pickard, Messrs. Papageorge, Wheeler and Pickard visited Dr. William M. Upholt who at the time was Staff Director of the Pesticides Advisory Committee of the Environmental Protection Agency (the following week Mr. Ruckelshaus reorganized EPA and appointed Dr. Upholt Deputy Assistant Administrator and Director of the Office of Pesticide Programs in EPA). Monsanto's involvement in the PCB problem was discussed in detail in a chronological fashion including the efforts to define the problem, the development of a business plan to prevent escape to the environment and the development of the chronic and other toxicity data.

The visit was timely in that a meeting of a "blue ribbon" Pesticides Advisory Committee to EPA chaired by Dr. Emil Mrak was scheduled for the following two days during which the overall environmental aspects of PCB's was to be discussed. Subsequent to that meeting, Dr. Upholt requested that we provide copies of all of the material we had left with him to be sent to Dr. Mrak, Chancellor Emeritus of the University of California, Dr. Gordon Guyer, Chairman of the Dept. of Entomology of Michigan State University and Mr. James Terrill, Jr. of Westinghouse Electric Corporation. These gentlemen plus Dr. Norton Nelson of NYU, who is a personal friend of Mr. Wheeler, and two other scientists whom we know through our association with the Food Protection Committee make up the Pesticides Advisory Committee.

Dr. Upholt indicated to Sam Pickard following the committee meeting that he did not expect any recommendations for precipitous action (such as banning PCB's) to develop from the committee.

PUBLIC RELATIONS:

A two-page article appeared in Chemical Week on Monsanto's PCB environmental program. This feature, plus the New Scientist and Science Journal article from the U.K., will

be sent to science editors and other writers who have done PCB stories in the past.

A correspondent for the National Observer, doing a story on PCB, requested information on our program. Material was furnished by phone and follow-up letter. Background information was also sent to the Seattle Times following their first PCB article.

RESEARCH:

Bio-Test Tissue Analysis

An inventory of all Bio-Test tissues held by Monsanto for PCB analysis has been prepared as well as an estimate of those retained by Bio-Test Laboratories. Analysis of all tissues (muscle, fat, liver and kidney) from the first sacrifice (3 month exposure) of the two year chronic rat toxicity study have been completed.

Customer and Plant Support Analysis

No. of Samples	Sample Source	Sample Description	Status of Analysis
1	NCR (Dayton)	Plant effluent composite	Completed
3	Ameripol	Plant effluent composite	Completed
2	J. F. Queeny	Plant effluent composite (Feb. & Mar.)	Completed
1	Rogansky Feed Co.	R-83	Completed
1	C. F. Mueller Co.	Vermicelli	Completed
14	R. A. Kimerle/ CRD	Coagulated Anniston plant effluents	Completed
2	Goodyear Point Pleasant, West Virginia	Plant effluents	Completed
1	Kimberly Clark (Moraine Mill)	Plant effluent	Completed
25	Central Soya	Products associated with commercial chicken raising	8/25 Completed
8	Westinghouse Aquatechnics	Treated Plant effluents	Scheduled for Completion

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Polychlorinated Terphenyls (PCT)

Hexane extraction of effluent water spiked with Aroclor 5460 demonstrated that it is not a suitable solvent for quantitative extraction of PCTs from plant effluent samples. The recovery (50+1%) on duplicate samples was reproducible but much too low to be used for isolation of PCTs from water. Quantitative extractions of PCTs were obtained with either benzene or dichloromethane. The extraction recoveries using dichloromethane (99.0%) were calculated from UV absorption data. For benzene, total organic chlorine was determined using a sodium biphenyl-silver nitrate titration procedure.

MCS 1043, MCS 1016, Aroclor 1221, Aroclor 1242, Aroclor 1254, and Arobromochlor 1232

The present SCAS tests on MCS 1043, MCS 1016, Aroclor 1221, Aroclor 1242, and Aroclor 1254, and Arobromochlor 1232 have been halted and the total residues from each unit isolated for detailed GC analysis.

Two new test units were started on MCS 1016 and the Aroclor 1142 distillation residue, at a 5 mg feed level and a 5 day time cycle, in hopes of demonstrating differences between these materials. In the 1st cycle, 58% of the MCS 1016 was lost and 53% of the distillation residue. EC/GC analysis of samples from both units did not show any isomeric alteration indicating that the initial losses are due to a physical phenomenon, i.e., adsorption on the glass, etc.

Aroclor 5460, Aroclor 5432, ARobrom 5465, and Hexabromobiphenyl

Current scheduling should allow sampling and analysis of these four SCAS units to start in the first or second week of May.

Environmental Studies-Ruabon

An informal meeting of the Pesticide Chemicals Group was attended at Unilever, Welwyn, Hertfordshire. At this meeting we obtained very useful information on the identification of GLC peaks using capillary columns with Apiezon L as stationary phase. Results of feeding trials on pigeons and quail using Aroclors 1242 and 1254 and some pure isomers were reported by Ministry of Agriculture workers, with particular reference to degradation residues.

Koeman and Vos from Utrecht reported on the distribution of PCBs in the Rhine Estuary and on relative toxicities of commercial PCB products.

Other papers included one from the Fisheries Laboratory on the distribution of PCBs in fish in U.K. coastal waters. This was interesting in that it showed very low levels in fish taken from the Bristol Channel (Newport Plant!), but very high levels in the Clyde Estuary. Explanations for this distribution do not seem very conclusive.

Biodegradation-Ruabon

Improvement in analytical techniques using capillary column GLC has yielded further results on degradation residues which suggest that MCS 1016 may be a bigger improvement over Aroclor 1242 than we had previously estimated. We have also had access to other workers' results which have enabled better identification of chromatogram peaks to be made. We also have some results of feeding trials which show that degradation of many isomers in animal organs is different from that induced by micro-organism of the types we have so far studied. On the basis of these results we conclude that residues from MCS 1016 would be very small and our present view is that MCS 1016 does provide a very significant improvement over Aroclor 1242 from the environmental viewpoint. Further work is planned to substantiate these views during the next few weeks.

Aroclor Pollution Study-Anniston

Carbon Adsorption Study

PR&D Report No. 2 covering the evaluation of Aroclor removal from waste streams by carbon adsorption was issued under Job #446-514.

Pilot Clarification Study

The pilot clarification unit has been operating since March 15 with minimum mechanical difficulties. Initial test runs were made with optimum coagulant concentrations -- 15 ppm of bentonite clay and 1.5 Betz polyelectrolyte 1170 (determined in lab by jar test) -- at a 5 gpm flow to the clarifier. Results (Table I) indicate that the floc is not consistent in reducing the Aroclor level to 10 ppb, although the expected solids level is realized. Of interest here is the fact that solids in the plant effluent averaged approximately 50 ppm during the test period. These levels are considerably lower than the 100 to 1000 ppm values recorded when this study was initiated. As a result, more bentonite clay is being added to provide more surface area for Aroclor to be adsorbed.

Table II contains the results of the study in which the clay concentration in the feed was increased to 30 ppm without a significant reduction in the Aroclor levels.

At this point it was felt that a close approximation of the optimum clay concentration could be realized in a less time-consuming, batch type adsorption operation in the premix tanks (i.e., whose walls were believed to be saturated with Aroclor from continuous exposure). This effort proved fruitless except there were some indications that clay would reduce the Aroclor level to the desired value.

Table III shows the results of increasing the clay concentration to 120 ppm after resorting again to the original treatment approach. The last few samples show promise; however, more data is being collected at this point to verify previous results.

Upon the completion of this phase of the work, a revised work plan will be issued.

TABLE I

AROCLOR REMOVAL BY FLOCCULATION CLARIFICATION

Test Conditions:

Clay conc. in feed - 15 ppm
Polymer conc. in feed - 1.5 ppm
Flow through clarifier - 5 gpm

	Avg. Influent Concentration				Avg. Effluent Concentration			
Volume Treated (gal.)	Suspended Solids	A-1221	A-1242	A-1260 or A-1254	Suspended Solids (ppm)	A-1221	A-1242	A-1254
9,600		446	240	70		31	11	6
16,800		22	16	--		15	23	--
25,800		210	60	--		NDA	1	--
		--	--					
		--	--					
41,600	29	100	14	--	18	72	8	--
48,800		196	38	--		100	10	--
52,400	52	146	30	--	2	110	12	--
57,600	40	560	.7	--	11	66	6	--
64,800	14	105	28	--	2	58	9	--

TABLE II

AROCLOR REMOVAL BY ADSORPTION-FLOCCULATION

Test Conditions:

Avg. flow - 5 gpm
Bentonite clay concentration in feed - 30 ppm
Betz polymer 1170 in feed - 1.5 ppm

	Avg. Influent Concentration				Avg. Effluent Concentration			
Volume Treated (gal.)	Suspended Solids (ppm)	A-1221	A-1242	A-1254	Suspended Solids (ppm)	A-1221	A-1242	A-1254
1,500	24	86	18	--	50	41	7	--
13,200	46	320	40	--	7	64	5	--
20,400	314	236	117	--	8	19	15	--
27,600	65	146	54	--	10	63	7	--
34,800	13	290	160	--	3	88	7	--
42,000	9	154	10	--	5	17	4	--
49,200	38	73	25	--	22	25	4	--

TABLE III

AROCLOR REMOVAL BY ADSORPTION-FLOCCULATION

Test Conditions:

Clay concentration in feed - 120 ppm
Polymer concentration in feed - 1.5 ppm

	Avg. Influent Concentration				Avg. Effluent Concentration			
Volume Treated (gal.)	Suspended Solids (ppm)	A-1221	A-1242	A-1254	Suspended Solids (ppm)	A-1221	A-1242	A-1254
1,650		480	380	--		80	30	--
8,850		210	13	--		6	2	--
16,050		52	42	--		11	9	--

MANUFACTURING:

W. G. Krummrich Plant

I. PCB Level In Sewer

Aroclor losses for April averaged 1#/day and waste treatment plant effluent averaged 24#/day. Losses from Dept. 246 appear higher than previously reported due to rerouting of several department flows including some that contain Therminol units. The Pollution Group will try to find a new sample location which will isolate the Aroclor Department losses.

II. Program To Eliminate Sewered PCB's From Using Departments

A. Therminol Unit Change-Outs

Dept.	Status
255	Complete
222 - ONA	Complete
222 - PNA	Drained in April
244	Complete
243 (4 units)	3 units complete. 4th unit will be changed out by 5/7.
270	Completed in April.
275	Completed in April
258	Completed in April
275	Department down and unit drained. Will complete project work for operation with T-66 by end of May.
245	Scheduled to be changd out by 5/15.
239	Scheduled for mechanical completion by May 15.

B. All units using Pydraul A-200 in Dept. 251 changed out to Pydraul A-200B.

C. Continuing to drum liquid caught at catch tank at Dept. 218. Drumming of liquid caught at catch tanks at Dept. 217 started about mid-April. Program begun to determine PCB sewer losses resulting from Aroclor carried out as vapor in the HCl off-gas from the Aroclor Department. Drowning jet at Dept. 218 and CS acid scrubbers at Dept. 217 are potential points of entry to the sewer.

Anniston Plant

PCB Levels In Sewer

Current level Aroclor losses during April 1971 averaged 0.65#/day (71 ppb).

Project Evaluations

1. #1 HCl pit will not be used until PR&D solids removal work is completed.

   #2 HCl pit is performing well enough to permit this delay.

2. Samples from 36 storm sewers recently repaired to avoid infiltration show definite decrease in PCB. Further analytical work required to determine magnitude.

3. Engineering work resumed on collection and disposal of spent carbon from HCl Department. Premise target is 6/1.

Spills

There were no known spills of Aroclor during the month.

W. B. PAPAGEORGE

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TABLE II

AROCLOR REMOVAL BY ADSORPTION-FLOCCULATION

Test Conditions:

Avg. flow - 5 gpm
Bentonite clay concentration in feed - 30 ppm
Betz polymer 1170 in feed - 1.5 ppm

	Avg. Influent Concentration				Avg. Effluent Concentration			
Volume Treated (gal.)	Suspended Solids (ppm)	A-1221	A-1242	A-1254	Suspended Solids (ppm)	A-1221	A-1242	A-1254
1,500	24	86	18	--	50	41	7	--
13,200	46	320	40	--	7	64	5	--
20,400	314	236	117	--	8	19	15	--
27,600	65	146	54	--	10	63	7	--
34,800	13	290	160	--	3	88	7	--
42,000	9	154	10	--	5	17	4	--
49,200	38	73	25	--	22	25	4	--