PROGRESS REPORT
ORGANIC CHEMICALS DIVISION
TECHNOLOGY DEPARTMENT

REPORTED BY	FOR	DETAILS	REPORT NO	DATE
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LOCATION	JOB NOS
St. Louis - South Second Street	2-21-760.01-13480, 85010, 16300

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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 for legal and regulatory purposes.

SUMMARY

During the period covered by this report (January 1972), ~48 environmental and research samples have been analyzed for polychlorinated biphenyls (PCB's) by electron capture gas chromatography (EC/GC). Analysis of these samples represents a minimum manpower expenditure of ~168 hours.

A table showing the sample sources, types, and the level and Aroclor found as well as the support objective is presented in the details section. PCB's typical of our Aroclor products have been found at levels above and below recommended guidelines in:

- General Electric, Frigidaire, and Buick plant waste water effluents.
- J. F. Queeny plant sewer effluents.
- General Motors Corporation hydraulic fluids.
- Process water, pulp, and paperboard samples from Alton Box Board Company.
- Vanillin and Vanillin Black Liquor from the Monsanto Seattle plant.
- Commercial dishwasher detergents manufactured by Economics Laboratory, Inc.

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

- General internal and external analytical consultation.
- Distribution of Aroclor methodology and reference standards.
- Determination of the soil migration characteristics of Aroclor 1016.
- Discussion of the PCB environmental problem with representatives of the "academic" community and the Office of Science and Technology.

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FUTURE PLANS

PCB Analysis

1. Seven grab samples from J. F. Queeny sewers.
2. Two J. F. Queeny monthly sewer effluent composite samples.
3. Ten PCB fortified water samples for General Electric, Pittsfield, Massachusetts/Monsanto intra-laboratory methodology check.
4. Twenty-three fortified water samples for inter-laboratory (A/S, WGK, Anniston) methodology check.
5. Four paper samples from Champion Paper Company.
6. Complete Aroclor 1016 soil migration study.
7. Analysis of Kanechlor 400 for furans.
8. Three clove oil samples from Monsanto Flavor/Essence, Inc.

W. J. Litschgi

E. S. Tucker

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DETAILS (Cont'd)

TABLE I
CUSTOMER SERVICE

Sample Source	Sample Matrix	# of Samples	Level Found	Associated Aroclor	Support Objective
Alton Box Board Co. Alton, Illinois	Paperboard, water and pulp	5	ND* to PPM	1242	Pollution Control
GMC Frigidaire Div.	Plant Effluents	2	PPB	1242	Pollution Control
General Electric Pittsfield, Mass.	Plant Effluents	5	PPB	1242	Method Check
GM, Buick Division Flint, Michigan	Settling Pond - Water, oil and sludge and hydraulic fluids	20	PPB to %	1242	Pollution Control
	MANUFACTURING SUPPORT				
J. F. Queeny	Sewer effluent composites	3	PPB to PPM PPM	1242 5432	Pollution Control
Monsanto Seattle	Vanillin and Black Liquor	2	ND	-	Pollution Control
	RESEARCH DEVELOPMENT				
Electro Sol and Finish	Commercial dishwashing detergents	4	PPB to PPM	1242 1254	Determine if detergents are still contaminated

*ND - None detected

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DETAILS (Cont'd)

Customer Service

Alton Box Board Company, Alton, Illinois

Duplicate samples of process water, pulp, and paper were sent to Monsanto and three independent laboratories (WARF, Industrial Testing Laboratories, Inc., and Hazelton Laboratories) for comparative PCB analysis. The results were as follows.

Sample No.	Sample Description	Estimated Total PCB Level (PPM) Monsanto	WARF	ITL	Hazelton
1	Machine white water	0.008	0.00_4	ND	>0.01
2	Primary Head Box #38 WB water	>0.01	0.00_8	ND	>0.01
3	Pulp after Deckels	0.03	0.06	0.83	>0.01
4	69# Kraft JAX 10-20-71	0.30	0.30	4.32	0.50
5	62# I.P. Kraft JAX 10-20-71	0.20	0.20	7.07	0.50

The total estimated PCB levels reported by Monsanto, WARF, and Hazelton are in excellent agreement with each other. The results reported by Industrial Testing Laboratories, Inc. are of by a factor of ∿15X-35X.

General Motors Corporation, Frigidaire Division, Dayton, Ohio

In the past, Frigidaire has submitted each month two monthly composite samples for PCB analysis. The PCB levels found in the recent samples were considered low enough to be insignificant. A last set of composite samples were analyzed to confirm that the plant effluent had no significant level of PCB's.

Sample Description	Estimated PCB Level (As Aroclor 1242)
Plant 2 (10/13-11/9)	0.004 PPM
Plant 3 (10/13-11/9)	0.000_8 PPM

General Electric, Pittsfield, Massachusetts

The G.E. analytical laboratories at this site have been analyzing their plant effluents for PCB's for several months now. In an attempt to establish that the PCB levels they were finding were correct, they took five duplicate grab samples for analysis by both laboratories. The levels found by each laboratory are shown in the following table.

Sample Description	Estimated Total PCB Level (PPM) Monsanto	General Electric	Aroclor
B	0.005	0.002	1260
F	0.004	0.008	1260
G	0.003	0.000_8	1242
I	0.000_6	0.000_5	1242
K	0.001	0.001	1242

DETAILS (Cont'd)

For all practical purposes the agreement between the two laboratories is really quite good. Especially when you consider the low level of PCB's present in these samples and the general problems associated with obtaining duplicate grab samples. At their request, a set of 10 duplicate water samples fortified with Aroclor 1260 were prepared and sent to GE Pittsfield for analysis. The results from the analysis should establish that the minor variations observed in samples B, F, and G are due to sample problems and not the analytical procedure

General Motors Corporation, Buick Motor Division, Flint, Michigan

Due to continued pressure from Michigan State Regulatory agencies concerning PCB releases into the environment Monsanto has been analyzing a number of plant effluent and hydraulic fluid samples for them. The results of our most recent analyses are as follows.

Buick Sample No. or Description	Estimated Total PCB Level as Aroclor 1242 (PPM except as noted)
1	0.008
2	0.001
3	0.005
4	0.000$_4$
5	0.001
7	0.002
8	0.002
9	0.003
10 (Sta. 5)	0.010
11	1.3
12	0.60%
13	8.4
A	3.3
B	3.1
C	3.1
Pydraul 312A - Die Cast Machine #5	2.99%
Pydraul 312A - Die Cast Machine #9	2.63%
No. Blow Down Holding Tank 11-24-71	0.69%
So. Blow Down Holding Tank 11-24-71	0.01%

Manufacturing Support

J. F. Queeny Plant

Sample Description	Estimated PCB Level as Aroclor 1242 (PPM)
MSD (November)	0.006
CA (November)	0.042
*CD (12/6-12/17)	5.4

*Sample also contained ~19 PPM Aroclor 5432.

DETAILS (Cont'd)

Since all the estimated PCB levels, with the exception of the MSD sample, exceed the Monsanto internal discharge limit of 10 PPB a number of grab samples will be taken to attempt to determine if the higher levels being observed are real and if so, where the PCB's might be coming from.

Monsanto, Seattle

A sample of vanillin and vanillin black liquor were submitted for PCB and PCT analysis to establish that these materials were not being contaminated with Pydraul ACA. The Pydraul ACA is apparently used in air compressors associated with the process. Neither Aroclor 1242 nor Aroclor 5432 were detected in either sample. The detection limits were 3 PPB and 1 PPM, respectively.

Research and Development

Dishwasher Detergents

Four samples of dishwasher detergents manufactured by Economics Laboratory, Inc. were purchased from two supermarkets and analyzed for PCB's. PCB's were found in all samples at the levels shown in the following table.

Sample Description	Estimated PCB Level PPM	Aroclor
Electro-Sol, CO9141 3991-0520-0471 Purchased at Schnuck's, Creve Coeur	0.60	1242
Electro-Sol, CO2501 3391-0518-1270, Purchased at Kroger's, St. Louis	0.09	1242
Finish, ?10051 6266-0500-0771 Purchased at Schnuck's, Creve Coeur	0.19	1242
Finish, "Special Formula for Water in This Area", CO8081, 1035-0502-0565 Purchased at Kroger's, St. Louis	1.17	1254

Soil Migration Study

Experiments are currently in progress to measure the relative ease with which PCB's can be leached from three types of soil (Drummer Silt Loam, Ray Silt Loam, and Norfolk Silt Loam) by percolating ground water. The data will be used to determine if the entry of PCB's to

the general environment from land fill disposal of Aroclor capacitors could be significant. The procedure being employed involves gravity percolation of distilled water through a 3" X 9" column of each soil. The middle 3" of soil being impregnated with 2.5% (w/w) Aroclor 1016. The eluant is then collected and periodically monitored by EC/GC after extraction with hexane.

At the present time, only the eluant from the most porous soil, Norfolk Sandy Loam, is beginning to show traces of PCB's (~6 % total eluant volume).

Inter-Laboratory PCB Method Check

Analysis of all PCB fortified water samples have been completed by both W. G. Krummrich and the Applied Sciences Section. Statistical analysis of the data awaits analysis of these samples by the Anniston plant laboratory. They currently estimate that because of samples with higher priority they will not be able to complete the analysis until about 3-1-72.

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