FUNCTIONAL FLUIDS

April, 1970

ENVIRONMENTAL AROCLOR PROJECT

It appears that disposal of PCB's can be accomplished successfully by thermal oxidation. This conclusion was made after analysis of gas samples from John Zink Company. They were analyzed for PCB, chloride, chlorine, and total organic chlorine. Data were sent to CED and a report is being issued. Additionally, heats of combustion of the PCB's were estimated for CED evaluations.

Water and sediment samples from 6 Pydraul customers were analyzed for PCB's. It is concluded that PCB's are finding their way to sewers, streams and lakes inasmuch as amounts ranging from low ppb to high ppm were determined.

EC/GC determinations for PCB's showed low levels of materials in muriatic acid from Monsanto's central drumming facility. These contaminants appear to be lower chlorinated biphenyls. Confirmation studies are underway.

Paint scrapings from silos and raw milk extracts showed presence of PCB by GC/Mass and EC/GC analysis. The paint scrapings contained 2.87% Aroclor 1254. The raw milk contained an estimated 0.6-0.7 ppm PCB, probably originally Aroclor 1254 but with an altered isomer distribution.

Analytical methods and data collected to date were discussed with Westinghouse in an informational meeting on the PCB problem.

A preliminary report on biodegradation of Aroclor was written. Tentatively, Aroclor 1221 degrades in river die-away experiments. Higher Aroclor products may not. More conclusive experiments are underway. A current study involves removal of certain fractions from Aroclor products which might be intractable to biodegradation. Electron-capture chromatograms suggest that most refractory materials can be separated by distillation.

We are continuing to assist the WGK Plant in monitoring bromine content of chlorine they use to make Aroclor products. Seven samples, collected in the past month, were shown by XRF to contain 250-400 ppm bromine.

We are preparing to determine the presence of dioxins in the presence of other chlorinated materials. GC studies show that octachlorodibenzo-p-dioxin can be determined but that the tetrachloro isomer will have interference from the components in Aroclor 1260.

A better method to determine percentages of various components in undistilled Aroclor is necessary. A suitable GC method appears to have been developed as a consequence of studies made on 60 distillation cuts from 4 Aroclor samples.

SKYDROL 500

Flight tests are currently being performed on Skydrol 500C by various airlines. Only tests involving at least 80% Skydrol 500C will be

Monsanto

FROM (NAME & LOCATION): R. E. Keller - R&D Laboratories - South Second Street

DATE: April 28, 1970

SUBJECT: AROCLOR ANALYTICAL PROGRAM

REFERENCE:

TO : W. B. Papageorge
General Offices

cc R. E. Kelly - GO
E. P. Wheeler - GO
J. T. Garrett - GO
J. Mason - GO
C. W. Roos - Res. 1
T. M. Patrick - Res. 1
H. S. Bergen - GO
W. R. Richard - GO
J. E. Springgate - GO
M. W. Farrar - Res. 1
R. H. Munch - Res. 2
O. E. Thompson - GO

This memo will confirm recent action we have taken to speed up Aroclor analytical projects. Effective April 27, two teams will be working concurrently, backed up by a third team for mass characterization work and dioxin studies.

| Team | Projects | Personnel |
|---|---|---|
| I | Environmental Residue Analyses | Tucker* |
| | Biological/Toxicity Studies | Litschgi |
| | Customer and Outside Service | Westenberger |
| | Waste Disposal Studies | |
| II | Biodegradability Studies | Emery* |
| | Product Composition | Saeger |
| | | Kinast |
| | | Gasser |
| III | Characterization Studies | Dietrich* |
| | Regulatory Agency Work (Dioxin) | Mieure |

Actions relative to the division objectives have been assigned to these teams as shown on the attached. New projects will be assigned when possible to the team responsible for that type of work. Communications should be made through the team coordinator denoted by an asterisk. Please copy me in on all communications.

R. E. Keller

db
Attachment

MONS 201207

IN 10 REV 11 69

# ANALYTICAL PROGRAM (4/70)

## FOR

## POLYCHLORINATED BIPHENYL ENVIRONMENTAL PROBLEM

The Applied Sciences program for the 3/31/70 Aroclor Environmental Management Plan is outlined by actions shown below. The projects indicated are supportive to the objectives given in the Management Plan. The actions represent work currently in hand. It is expected that this program will be revised continuously on a priority basis consistent with the changing needs of the Management Plan.

| | | Man Weeks | Target Date |
|---|---|---|---|
| Objective 1 - | Reduce and effectively control the PCB content of all effluent from Monsanto plants. | | 9/1/70 |
| TEAM I Action 1) | Monitor WGK Mississippi River water, sediment and plant effluent for PCB. | 8 | |
| I 2) | Transfer GC methodology to WGK. | 1 | |
| I 3) | Determine PCB residues in fish from Choccolocco Creek at Anniston. | 4 | |
| | | 13 | |
| Objective 2 - | Inform customers of the PCB problem and the importance of preventing environmental pollution both at their plants or by their products. | | 5/1/70 |

| TEAM | | | Man Weeks | Target Date |
|---|---|---|---|---|
| | Objective 3 - | Develop products to replace Aroclors for those uses in which Aroclors have been demonstrated to be harmful to the environment and cannot be prevented from escaping into the environment. | | 12/1/70 |
| II | Action 1) | Develop techniques needed for purity or composition measurements and for biodegradation studies of replacement candidates. | 6 | |
| | | - More accurate method for isomers in distilled Aroclor 1130 and 1142. | 2 | |
| | | | 8 | |
| | Objective 4 - | Develop reliable analytical procedures for determining PCB content of liquids, gases, or solids. | | 7/1/70 |
| I | Action 1) | Develop improved isolation and GC techniques for more specific and accurate measurement of PCB's. | 4+ | |

MONS 201209

| TEAM | | | Man Weeks | Target Date |
|---|---|---|---|---|
| I | Action 2) | Develop and issue method for PCB's in air. | 3 | |
| II | 3) | Produce PCB reference materials by preparative gas chromatography. | 6 | |
| II | 4) | Show if there is Aroclor product composition change over 40 year manufacturing period. | 1 | |
| — | 5) | Estimate analytical methodology and program needed for chlorined terphenyls - 5425 and 5460. | - | |
| | | | 14 | |

Objective 5 - Develop methods for effective disposal of wastes containing PCB without contaminating the environment. — 10/1/70

| | | | |
|---|---|---|---|
| I | Action 1) | Examine gas samples from John Zink Co. incineration study. | 2 |

| | | | Man Weeks | Target Date |
|---|---|---|---|---|
| TEAM II | Action 2) | Evaluate Vapo-Coupled sand and glass wool for absorption of PCB from water. | 3 | |
| II | 3) | Set up biodegradability laboratory for semi-continuous activated sludge treatments. | 2 | |
| II | 4) | Carry out biodegradability studies of Aroclor products per se, HB-40, monoisopropyl biphenyl and potential substitution products. | 18 | |
| | | | 25 | |
| | Objective 6 - | Develop methods for reclaiming and reusing off-grade fluids containing PCB. | | 9/1/70 |
| | Objective 7 - | Determine effects of PCB's on birds, aquatic life, animals and humans. | | 6/71 |

MONS 201211

| TEAM | | | Man Weeks | Target Date |
|---|---|---|---|---|
| I | Action 1) | Correlate PCB residues in tissues with Bio-Test toxicity data - | | |
| | | - Rat, chicken and dog feeding studies. | 30 | |
| | | - Fish studies. | 8 | |
| I | 2) | Confirm type and amount of PCB in wildlife (fish and birds) from different geographical sources. | 6 | |
| | | | 44 | |
| | Objective 8 - | Establish and maintain favorable relationships with customers, the press, governmental agencies, the public and the universities. | | Continuous |
| I | Action 1) | Appleton Paper Co. - PCB in scrubber solutions from air samples from NCR coating operations. | 2 | |
| I | 2) | GMC Foundry, Bedford, Indiana - PCB in water settling ponds. | 2 | |

| | | | Man Weeks | Target Date |
|---|---|---|---|---|
| TEAM I | Action 3) | N. Johnson - Major Industrial Fluids Users (Johnson Motors, Wisconsin, Lester Casting) - Water samples for PCB levels discharged. | 4 | |
| I | 4) | Wisconsin Alumni Research Foundation - PCB in Lake Michigan fish from Lake Michigan pesticide investigations. | 1 | |
| I | 5) | Ohio FDA - PCB in milk from dairy herds. | 1 | |
| I | 6) | Inorganic Division - PCB in detergents and components thereof. | 5 | |
| II | 7) | Determine if commercial DDT, et al, contains trace PCB as contaminant. | 3 | |
| III | 8) | Determine presence of dioxin and/or related toxic materials in PCB products. | 2 | |
| | | | 20 | |
| | | 4/1/70 Grand Total = | 124 | |

124 X $600/Week = $74,400

R. E. Keller

db

MONS 201213