Tucker Dep. Exhibit 22

The handwritten notes and underlining in this exhibit were made by OMC's counsel.

For a clean copy of the exhibit, see the produced documents.

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M2-17

4/70

Analytical Chemistry
Special Study 70-11
Job No. 1630346

# DETERMINATION OF PCB RESIDUES IN FISH FROM LAKE MICHIGAN

## INTRODUCTION

Upon ammendment of the WARF Institue Lake Michigan pesticide investigation to include analysis of selected samples for apparent polychlorinated biphenyls (PCB's), Monsanto as an industrial sponsor agreed to carry out collaborative analysis of a limited number of selected samples for PCB's. The results of our analysis of sample extracts supplied by WARF are reported.

## SUMMARY

Four fish extracts and one human biopsy extract were analyzed by EC/GC and GC/mass techniques. The presence of all chlorinated hydrocarbons as reported by WARF in two of the samples were confirmed with the exception of BHC which was not analyzed for. Additionally a sample (#9070652) contained lower levels of two unidentified chlorinated compounds observed by GC/mass. PCB's typical of Aroclor 1254 were found in all of the above samples.

MONSANTO COMPANY
Organic Chemicals Division
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4-70 - E. S. Tucker, J. Litschgi, R. E. Keller

DEFENDANT'S EXHIBIT
22 or 23
MBR 4/15/82



WATER_PCB-SD0000041554

| NRF number lb. | Sample Type & Location | Sample wt (g) | PPM DDE Wife | PPM DDE Husband | PPM DDD Wife | PPM DDD Husband | PPM DDT Wife | PPM DDT Husband | PPM Dieldrin Wife | PPM Dieldrin Max | PPM BHC Wife | PPM BHC Husband | PPM PCB Estimated Wife | PPM PCB Estimated Max | PCB GC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 070876 | Lake Herring Eggs Extracts Manistique R., Mich., Sample Point No. 52 | 12.0 | 2.90 | 2.54 | 1.17 | —* | 1.31 | —* | 0.13 | 0.08 | 0.034 | —** | 4.37 | 3.31 | ? |
| 070770 | Alewife, Perch Extracts Burns Ditch, L. Mich., Sample Point No. 37 | 12.0 | 1.56 | 1.28 | 1.64 | —* | 0.13 | —* | 0.14 | 0.16 | 0.030 | —** | 2.33 | 2.73 | + |
| 070652 | Chub Extracts Manitowoc R., Wis, Sample Point No. 18 | 12.0 | 2.34 | 3.46 | 0.52 | —* | 1.31 | —* | 0.17 | 0.34 | 0.021 | —** | 0.87 | 1.56 | + |
| 070639 | Chub Extracts Kewaunee R., Sample Point No. 15 | 12.0 | 2.08 | 3.05 | 0.35 | —* | 1.07 | —* | 0.12 | 0.17 | 0.021 | —** | 1.35 | 0.75 | ? |
| 3120924 | Human biopsy Fat Extracts | 0.13 | 2.93 | 5.48 | <0.01 | —* | 0.21 | —* | 0.21 | —*** | 0.31 | —** | 10.1 | 7.69 | ? |

* Observed by EC/GC Not Analyzed for.
** Not Analyzed For
*** 2nd Elution not sent

TLC TABLE I

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WATER_PCB-SD0000041555

TABLE II Relative Gas Chromatographic Retention Times, Rx (DDE = 1.21)

| Aroclor 248 | Aroclor 1254 | Aroclor 1260 | # 9070 876 1st Elution | # 9070 876 2nd Elution | 9070 770 | # 9070 770 2nd Elution | 9070 652 1st Elution | #9070 652 2nd Elution | 9070 639 1st Elution | #9070 639 2nd Elution | 9120 924 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.21 | 0.43 | 0.69 | 0.27 | ~~0.79~~ 1.21* | 0.27 | 1.21* | 0.27 | 0.79 | 0.27 | 0.78 | 0.26 |
| 0.27 | 0.52 | 0.75 | 0.35 | | 0.35 | | 0.35 | 1.21* | 0.35 | 0.98 | 0.34 |
| 0.31 | 0.54 | 1.00 | 0.43 | | 0.43 | | 0.43 | | 0.43 | 1.06 | 0.42 |
| 0.32 | 0.60 | 1.12 | 0.53 | | 0.53 | | 0.53 | | 0.53 | 1.21* | 0.49 |
| 0.35 | 0.66 | 1.29 | 0.54 | | 0.55 | | 0.54 | | 0.56 | | 0.52 |
| 0.40 | 0.70 | 1.51 | 0.60 | | 0.61 | | 0.62 | | 0.62 | | 0.55 |
| 0.41 | 0.79 | 1.66 | 0.68 | | 0.68 | | 0.68 | | 0.69 | | 0.62 |
| 0.52 | 0.85 | 1.72 | 0.72 | | 0.71 | | 0.71 | | 0.72 | | 0.67 |
| 0.54 | 0.94 | 1.93 | 0.82 | | 0.81 | | 0.81 | | 0.82 | | 0.71 |
| 0.60 | 1.03 | 2.13 | 0.88 | | 0.89 | | 0.88 | | 0.88 | | 0.82 |
| 0.68 | 1.19 | 2.22 | 1.00 | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| 0.72 | 1.41 | 2.43 | 1.12 | | 1.14 | | 1.12 | | 1.13 | | 1.12 |
| 0.82 | 1.60 | 2.66 | 1.22 | | 1.24 | | 1.24 | | 1.24 | | 1.14 |
| 0.87 | 2.03 | 3.00 | 1.31 | | 1.48 | | 1.32 | | 1.34 | | 1.23 |
| 0.94 | 2.18 | 3.54 | 1.46 | | 1.53 | | 1.46 | | 1.47 | | 1.45 |
| 1.04 | 2.51 | 4.31 | 1.50 | | 1.64 | | 1.65 | | 1.66 | | 1.66 |
| 1.21 | 3.34 | 5.50 | 1.63 | | 2.24 | | 2.26 | | 2.26 | | 2.26 |
| 1.59 | — | | 2.25 | | 2.48 | | 2.46 | | 2.47 | | 2.65 |
| | | | 2.46 | | | | | | | | |

*Dieldrin

FM-402 Biomedical G.C./Ni$^{63}$ ECD
6mm x 6' Glass Column, 4% XE-60 on
80/100 mesh Chromosorb W, HP, AW-DMC
Inj. Port – 205°C Column – 190°C Detector – 300°C

0001565

## II GC/Mass Results

Sample No 9070876 — Sample lost due to punctured septum.

Sample No. 9070770 — tetra- and penta-chlorobiphenyl homologs detected.

Sample No. 9070652 — DDE, tri-, tetra, penta, and hexa-, chlorobiphenyl homologs detected. Two un-identified chlorinated hydrocarbons with molecular weights of 370 and 404 respectively contain 7 and 8 chlorines per molecule detected.

Sample No. 9070639 — Ion beam of mass spectrometer de-focused during GC/mass run due to large amount of extraneous material present in the sample extract.

Sample No. 9120924 — amount of chlorinated hydrocarbons below the present detection capabilities of our GC/Mass system.



WATER_PCB-SD0000041557