

MEMO

MATERIALS AND PROCESSES LABORATORY

**POWER TRANSFORMER AND CIRCUIT BREAKER DIVISION
CANADIAN WESTINGHOUSE COMPANY LIMITED**

SUBJECT AND DESCRIPTION Polychlorinated Biphenyls (PCB's)

WORK REQUESTED Investigate the present ecological problems with PCB's.

REQUESTED BY J. Herbell **DEPT.** PT & CB Division **DATE** Apr. 17/70

CHARGE NO. _____

COPIES TO V.V. Mason, J. Herbell, M. Bryson, R.E. Devine, A. Tanton, D.M. Smith,

E.G. Ford

FILE 1

INTRODUCTION

A meeting was held at Monsanto, St. Louis, Missouri to investigate the ecological problems of PCB's and how these problems would affect the electrical industry.

Personnel in attendance were:

Westinghouse

Dr. T.K. Slocet, Manager of Materials, Sharon Pennsylvania

Mr. G. Wilburn, Manager of Manufacturing, South Boston, Virginia

Mr. E. Sillett, Chemist, M & P Laboratory, Hamilton, Ontario

Monsanto

H.S. Bergen, Director of Fluids Business

D.A. Olson, Director of Sales Fluids Business

Dr. W.R. Richard, Director of Research Fluids Business

J. Savage, Director of Manufacture Fluids Business

P.C. Benignus, Market Manager Dielectric Fluids

Dr. R.H. Munch, Senior Scientist, Dielectric Fluids

(J.G. Bryant, Product Specialist, Dielectric Fluids.)

→ Hercules ?

DATE COMPLETED April 27/70

Earl Sillett **PHONE** 2429

APPROVED BY SA

MATERIALS & PROCESSES NO. 70-25

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PLAINTIFF'S
EXHIBIT

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E.G. Wheeler, Director Industrial Hygiene
W. Papageorge, Coordinator of Environmental Problems
Dr. S. Tucker, Analytical Research
Dr. R.E. Keller, Group Leader Analytical Research
Dr. C. Thompson, Group Leader Organic Research
Dr. R.E. Kelly, Medical Director

PCB
Polychlorinated biphenyls have been found in various river systems, the fatty tissues of fish, birds, eggs, milk of cows and humans. There is some evidence that the higher chlorinated biphenyls such as Aroclor 1254 and 1260 contribute to the formation of very thin egg shells which is easily crushed and to the mating characteristics of birds which means that eggs are laid too late in the season. Some investigators claim that chlorinated biphenyls alter the glucose metabolism and inhibit an enzyme (adenosine triphosphatase) that plays a vital role in the energy balance of the human body.

American politicians have used the potential harmful effects of PCB's as part of their platform speeches and are quite effective even if they may be missing the facts. Students are also making use of this information and this worries Monsanto sufficiently to place guards around their research centre and inspect all visitors.

Mr. Phoenix of the Ontario Water Resources held a meeting with Mr. W. Papageorge on PCB's pollution problems on April 22, 1970.

Monsanto has decided as a result to pull all the Aroclors 1254 and 1260 from all the market except the electrical industry. They feel that they can present valid arguments for the continued use of these products in this area.

Aroclor 1242, trichlorobenzene and tritetrachlorobenzene have not been detected to date and appear to be somewhat biodegradable. Some areas of investigations indicate that aroclor 1242 may also be questioned.

The continued use of Aroclors in the electrical industry will depend on that industry's ability to contain these fluids.

Conclusions and Recommendations

1. The use of polychlorinated biphenyls must be tightly controlled in order to protect the electrical industry from law suits and to ensure the supply of an essential product.
2. Instructions on our equipment and in information leaflets must be sent to our customers. (Mr. E. Reab of G.E. has already published such a letter. We are attempting to obtain a copy.)

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3. The controls are mainly for the protection of wild life. Sensible precautions, if practised, ~~could~~ not appear to present any dangers to man.

4. The method of disposal of polychlorinated biphenyls, insulations systems that contain PCB's, absorbents such as fuller's earth and saw dust will have to be studied and strictly controlled.

Some problem areas to investigate are:

- (a) Ballast capacitors purchased by Canadian Westinghouse.
- (b) The eroclor in transformers sent to the service shop for repair and the eroclor discarded.
- (c) Capacitors that have failed in the field or shop.
- (d) Aroclor saturated fuller's earth from filters and reclaiming units. (London, Plant No. 3 and Service Dept.)
- (e) Sawdust and floor absorbents used to soak up eroclor.
- (f) Aroclors from failed transformers on test that are not reclaimed. (London and Plant No. 3)
- (g) Personnel working in test areas exposed to spillage and spray such as the capacitor test area. (London)
- (h) Diffusion and back up pumps. Aroclor 1254 is used in diffusion pumps and often contaminates the petroleum oil used in the back up pumps. (London and West Plant)
- (i) Gas and steam turbines that may be lubricated with products containing PCB's.
5. Potential methods of disposal are:
- (a) Return products to Monsanto (cost 3¢ a pound plus freight) for disposal by incineration and effluent gas scrubbing.
- (b) Removal of eroclor from fuller's earth with solvent before discarding the earth.
- (c) Possible use of U.V. light and energy transfer agents such as anthraquinone. (Monsanto have been requested to look at this for us)

Also, water from washing machine, even exhaust

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Continued....

Churchill Bros, 17h

who is to call meeting?

4. Dr. Dakin of R&D Centre, representatives of Plants 3 and 11, WEC Bloomington, Sharon, Muncie and South Boston should meet on this subject and clear to some general agreement.

FUTURE WORK

Curious?

1. Monsanto have developed analytical procedures which we possess and will attempt to incorporate in our present chromatograph analytical program.
2. Monsanto are examining a modified aroclor 1242 formulation where the higher chlorinated products are greatly reduced.
3. Monsanto are investigating incineration of the chlorinated products. A furnace operating 1600°F appears to be successful. The gases must be scrubbed to remove hydrogen chloride. (The reclamation of hydrogen chloride may be a way of off-setting some of our expenses if we do this ourselves)
4. Solid insulation and capacitors can be chopped up into small pieces by commercial equipment. These materials as well as other PCB saturated materials such as fuller's earth are then heated between 400°C and 500°C. The PCB is distilled into the gas furnace where it is destroyed.
5. Monsanto are looking at bacteria that might be used to destroy PCB's.
6. PCB's in water are processed through coalescers and absorption media such as clay, carbon or calcium carbonate. (PCB's tend to cling to solids)
7. Combustion Engineering, Barnia are interested in supplying equipment for PCB disposal. (Communications, Mr. A. Tanton of Plant No. 11)

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APPENDIX

TABLE 1.

Lethal dose of polychlorinated materials

	Lethal dose (ppm)	
	Rats	Rabbits
DDT	400	300 to 500
Aroclor 1242	3000	750 to 1000
Aroclor 1254	5000	

*How administered?
Quantity = ?
Antericals = ?*

TABLE 11.

Chronic dose levels on Rats and Dogs

	Aroclor 1242	Aroclor 1254	Aroclor 1260	DDT
No effect level for rats (3)	100	<100	—	5
Elevated liver weight of rats	—	100	10,000	—
No effect level for dogs	100	(1)	(2)	300

- Notes: (1) Lower weight gain in Females at 1, 10 and 100 ppm. In males it was 100 ppm. Their blood and urine was negative.
 (2) Lower weight gain in females was at 10 and 100 ppm. In males it was 100 ppm.
 (3) A two generation reproduction cycle in rats showed no effects at 10 ppm for Aroclors 1254 and 1260. Some possible effects may be occurring at 100 ppm with aroclor 1242. This study is still in progress.

TABLE 111.

Solubility of PCB's in water

Aroclor	PPM by Weight
1242	200
1254	50
1260	50

(at 25°C)

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