NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

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PCB SYMPOSIUM

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Research Panel and Monitoring Panel

of the Working Group

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This Symposium was conducted by and for government employees and constituted an effort to bring together as much information as possible on aroclor compounds (poly chlorinated biphenols). Very little is actually known concerning the analytical chemistry of, toxicology, mode of action, etc. of these compounds.

PCB's are rather unusual chemical compounds possessing some unusual characteristics which make them desirable for a wide application of uses. They have unusual flow characteristics - are fire retardant - have very low solubility in water - they repress vaporization - have long stability characteristics. They are used in asphalt, tiles, paints, plasticizers, printing inks, encapsulation, transformer oils, heat exchangers, and many other ways. Monsanto is the only producer in the United States.

Some of the earliest reported work done on these compounds was in 1944 by Soren Jensen of Sweden.

Following is a very brief resume' of the remarks made by the Panel members:

Dr. Thomas Duke

They have been reported from many parts of the world and some of the more widely publicized work is by Risebrough of California. They have been reported from fish in North Carolina, crabs in South Carolina, oysters from Georgia and mullet from Texas. There were 22 fish kills reported last year with aroclors being pointed out as the causative agents.

One of the most publicized was the one in Escambia Bay, Alabama affecting oysters, shrimp and fish. This was identified by Fish and Wildlife and FDA as being aroclor 1254 (12 indicates carbons and 54 represents the percentage of chlorine).

This particular fish kill came about as a result of PCB being used in a heat exchanger in the Monsanto plant up river and it was detected in the amount of 470ppb which came about as a result of a leak in the system which had not been detected. Monitoring tests following the correction of the leak indicates that oysters lose about one-half the PCB in seven weeks and white shrimp lose one-half in three weeks. Crabs were found to contain as high as 185ppm± 97.

Dr. Granville Lipscomb

PCB's discovered in food samples, with the exception of two, were of animal origin and most of the detections were from fish. It was found in catfish feed at 0.3ppm and 0.4ppm. Following is a summary of the number of samples taken along with the number which were positive PCB:

	Samples	Positive
Coho	38	32
Chub	32	31
Lake Trout	29	28
White Fish	14	9
Perch	12	4
Sheepshead	4	3
Herring	14	6
Catfish	4	4
Carp	4	3
Bass	4	1
Eel	1	1

It was found in bass, salmon, and bullhead from the Detroit River and in Coho salmon from Lake Huron in rates up to 15.7ppm. Some crabs from a trace to 0.3ppm. In fish meal from a trace to 0.45 to 0.8ppm.

Some was found in milk in Ohio at 0.8 to 1.5ppm (fat basis) which came about as a result of PCB's in paint with which the inside of a silo had been painted.

In milk in the Baltimore area as a result of transformer oil being used for another purpose.

One sample of eggs containing 1.26ppm.

Quite a number of the chromatograms developed from the FDA "Total Diet Studies" which were sent in to Washington from field offices for study did not show any PCB's. During the discussion following this presentation a chemist affiliated with the Patuxant Laboratory stated aroclor 1254 probably contains about 20 different compounds.

Mr. Reo Duggán

MONS 035846

Mr. Duggan reported that FDA at the moment considers 0.2ppm as being the actionable level - that this was not a tolerance - that it was subject to change and was only a "speed limit" at the present time.

Dr. Harold A. Price

Dr. Price indicated that 3,000 humans had been involved in some of his studies in Michigan and that there were problems separating PCB from Op' DDT, P'P'-DDT and tri P'DDT and that there was obvious interference with the electron capture detection between aroclors and P'P'-DDT in the analyses of Coho salmon from fresh and canned samples. Two human fat samples have shown positive at the Perrine Laboratory. One cadaver who dies of a pulmonary disease proved positive with aroclor 4465 which is evidently a combination of biphenyl and tri phenyl and they have not been able, at this date, to isolate the source.

Dr. Lucille Stickel

Dr. Stickel reported that PCB's were found in eagle feathers in 1944 and in the London air and Hamburg air that same year. It was reported in 1967 in Great Britain in marine birds, cows, sheep, and in man and this was reported in "Nature" that same year. It was reported from Scotland in 1967 as being in seals and porpoises. Risebrough reported it in 1968 in birds of prey and fish-eating birds as well as in peregrene falcons at 98ppm wet weight. He further reported that the incidence of the occurrence of PCB's in the environment was heavier in the industrial areas and that PCB's were present to a much greater extent than was DDT. It was reported in the Netherlands in 1969 in birds and mussels and in Sweden in 1969 in herons to the extent of 9,400ppm of PCB in the lipids and DDT at the rate of 14,000ppm in the lipids. Eagles 14,000ppm PCB, 25,000ppm DDT and 250ppm in the brain of one blue herring.

Mr. George Bagley

Mr. Bagley reports that gas cromotography is the best method ..nown for analyzing and even then "....a great deal of judgment seems to be necessary".

Dr. David Stalling

Dr. Stalling reported that a great deal of care should be taken in the temperature approach to separation in using the electron capture cell in working with 1248, 1254, 1260, 1262, and 1268. The lower the percentage of chlorine the more is the tendancy to peak with chlorinated hydrocarbons and it is very difficult to determine peaks for correct reading. He also reported that 1248, 1254, 1260 were found in fish near Stuttgart, Arkansas with 50ppm in one fish sample. There was an industrial involvement in this instance. 1242 apparently is the more common one used in hydraulic fluids. Fish containing PCB's below power dams almost always contain 1254. Seems to be little difficulty in reading 1260 though 1254 seems to hang up longer.

Dr. Street

Dr. Street in Utah reported that rats seem to be able to metabolize 1254 and probably others. Very little is known about the tri-chlors such as 5460 and 5442.

Dr. Garth Fitzhugh

There is no information available on primates. Work in Japan with mice indicates 1254 to be relatively safe.

Monsanto is conducting a two-year dog study and this is in its 11th month. The dogs' growth seems to be retarded at three months and at 10 months. These are being fed at the rate of 100ppm and the animals do not like to eat even at 10ppm. In normal diets, 1260 appears at this time slightly more toxic than 1254 and 1248. They anticipate three generations of reproduction at one, ten and 100ppm.

Rats are having some difficulty in breeding.

Mr. Robert G. Heath

With birds there seems to be no marked repellancy even at very high food levels. Bobwhite quail showed no effects with the feeding levels tested and mallards seem to be more sensitive with less sensitivity to pheasant and coturnix quail. The toxicity tends to increase as the chlorine increases. With fish the reverse appears to rule. There appeared to be no eggshell effects on bobwhite in the first year of feeding with either PCB or DDT. They are having to repeat this particular test because they lost their birds due to an accident.

Mr. Charles Walker

On tests with cut-throat trout 1221 was the most toxic, 1260 least toxic.

Practically nothing is known about micro-biodegradation.

Some fish studies with PCB's in water but no feeding studies.