Feb
PCB - Chicago Conference

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PCB AD HOC COMMITTEE

In accordance with the request of the Chairman, the following is a summary of the proceedings of the National Conference on Polychlorinated Biphenyl Compounds held in Chicago from November 19, 1975 through November 21, 1975.

Mr. Russell Train, Administrator, U.S. Environmental Protection Agency, opened the proceedings by acknowledging the various groups represented and with a hope that the conference would raise the level of understanding of the problems associated with Polychlorinated Biphenyl Compounds rather than provoking more arguments. He recounted the history of the previous conference on PCB Compounds and the results that were recommended. However, he stated that 3 years later, PCB Compounds are found at higher levels than before and that drinking water is now being contaminated. Although he indicated that the EPA will continue to address the PCB problem under the FWPCA, he called for the rapid enactment of a toxic substance control act to deal with the problems before the fact and not on a case by case basis.

Dr. David Rall opened the health effects and human exposure section with the call that the Toxic Substance Control Bill is a key element in the preventative medicine approach to toxic substances. He alleged that the key causes of heart attacks, strokes, etc. are environmental problems and that, as we obtain more sensitive monitoring devices, we find more problems. As far as economics are concerned, he alleged that the society was already bearing the costs and that control would merely shift the burden from society to the polluter. However, he acknowledged that the consumer would eventually pay the costs of control. Dr. Rall then used the history of PCB usage as a classic example beginning in 1926 and indicated that the Department of Health, Education and Welfare Subcommittee intended to review the information and suggest what future studies are necessary.

Dr. Masanori Kuratsune described the Yuso incident and the long-term effects. Dr. Kuratsune indicated that there are presently 1,200 patients suffering from the effects and that most of the concentration of PCB is retained and they are still suffering. The information he presented indicated that the victims had ingested significant amounts of dibenzofurans along with polychlorinated biphyenls. The dibenzofurans seemed to concentrate more in the liver.

Dr. Renate Kimbrough presented her pathological findings associated with the chronic experimental exposure of polychlorinated biphenyl compounds to female white rats. On an acute basis, she found that PCBs were not toxic to rats. However, for chronic exposures of eleven months of Aroclor 1254 at the level of 300 ppm, lesions were produced in mice called neoplastic modules. Aroclor 1260 at the level of 100 ppm produced lesions in female Shermann Strain rats within 21-26 days. An analysis of the residual PCBs in the rats fed Aroclor 1254 for six months at the end of 10-16 months indicated that only the penta and higher isomers were retained in the flesh. Although she called for workers in the transformer and capacitor industry to be studied for the effects on them, she indicated that at least 300 days of chronic exposure was necessary to produce lesions in the rats she studied at the 5 ppm level.

Dr. J. C. Calandra presented a summary of toxicology studies performed on commercial PCBs. These studies included Aroclor 1242, 1254, and 1260, although Aroclor 1260 is no longer produced in this country. Dr. Calandra indicated that his work began in 1969 and is still continuing. As a result of his chronic studies, he found that at the 100 ppm level, female rats indicated some tendency for lesions. However, there is a problem in reading the slides and pathologists must resolve the discrepancies. On dogs, Aroclor 1242 had no effect while Aroclors 1254 and 1260 produced a slight decrease in weight. There was some increase in liver weight at the 100 ppm level. He finally indicated that Aroclor 1242 at 8 ppm had an effect on leghorn chickens.

Dr. James R. Allen discussed the reproductive dysfunction in monkeys to low level PCBs. Dr. Allen began by stating that Albino rats were not a good test animal, apparently referring to the study of Dr. Calandra. Dr. Allen found that at the level of 25 ppm of Aroclor 1248 facial lesions were observed and after 2-1/2 years the monkeys still contained the higher isomers although they were originally fed PCBs for only two months. At the levels of 2.5 and 5.0 ppm of Aroclor 1248, all monkeys after six months indicated PCB intoxication. (It should be noted that the Aroclor 1248 Dr. Allen used was obtained from an adhesive manufacturer and the analysis of his material reflects two peaks that are not normally present in typical Aroclor 1248. This factor was not brought out clearly in his discussion).

Dr. H. B. Matthews discussed PCB chlorination versus PCB distribution and excretion. Dr. Matthews studied individual PCB isomers to avoid the problems of mixtures in commercially available materials. Furthermore, he injected the material directly into the test animals as opposed to feeding it to them. His work indicated that PCBs are metabolized except when chlorination precludes two adjacent unsubstituted carbon atoms. Dr. Matthews recommended prevention of environmental contamination of any type of PCBs until studies are done to see which isomers are dangerous.

Dr. James P. Mieure discussed the nature of PCBs, their properties and the mixtures which Monsanto sells. A copy of his presentation was made available by Monsanto.

Dr. Stephen Safe presented an overview of the analytical identification and spectroscopic properties of PCBs. I did not note any new information in his presentation.

Dr. Robert L. Durfee represented Versar Incorporated who is under contract with EPA to determine the production and usage of PCBs in the United States. Dr. Durfee indicated that presently 40,000,000 pounds of PCBs are produced in the United States, of which 15% are exported. He estimated that 70% of the usage in the United States was for the capacitor manufacturing with 55% of this market for small capacitors. The remaining 30% of PCBs manufactured in the United States are used in the transformer industry with 10% being used to refill older units and the remaining 90% as new fill for new units. Dr. Durfee also indicated that a 1/2 million pounds of PCBs are imported. He estimated that 15% of this amount was being used as heat transfer fluids, (an Aroclor 1242 type of mixture) and 85% being used in the investment wax industry. He finally estimated that approximately 5% of the transformers manufactured in the United States contained PCBs while 95% of the capacitors contained PCBs with the usage dropping off.

Mr. Thomas E. Kopp of the U.S. Environmental Protection Agency presented very summary information over the PCB disposal reclaiming and treatment in the United States as they have learned from the requests to 84 facilities in the United States. He indicated that EPA was proposing an ambient water concentration of 1 ppt and that secondary treatment contracts had been given to Versar and another consulting group.

Dr. Ian Nisbet introduced the section on Environmental Fate and Occurrence of PCBs. He reviewed the information that was presented at the last PCB conference and three major routes of release into the environment. He compared his estimates to what has been reportedly found and indicated

1. Most discards are still in landfills.

2. PCBs were accumulating in the sediments.



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3. Pentachloro and higher isomers are only being found (thus lower chlorinated isomers are being rapidly degraded).

4. Ocean levels are higher than just from air transports (concluded this excess must be from hydraulic fluids used in ships).

5. Higher levels are being found in birds (terrestrial).

He then presented six questions in reference to PCBs based upon his previous model of dispersion with a view to see if current information would answer them. These questions were:

1. What do we know about tetrahydrofuran?

2. Are PCBs and dumps going to stay in place or will they leach out?

3. Will PCBs in the sediments be covered over or recycled in the environment?

4. Do the lower chlorinated isomers really degrade?

5. What is the human exposure?

6. What is the effect of Monsanto's ban on certain usages of PCBs?

After twelve speakers, Dr. Nisbet concluded the session with his conclusion that most of the data presented corresponded to his model with the exception of the numbers on concentration and air and air transport. He concluded that the numbers were higher than anticipated from the model and that there are approximately 1,000 tons over the entire globe. Since the Aroclor 1254 type is predominant, he indicated that there was a need to know where this was coming from (i.e., vapor releases from sealed transformers?) He also proceeded to answer his previously proposed six questions:

1. Nothing substantially new on tetrahydrofurans.

2. Apparently PCBs in the dumps are not being leached out and therefore they are not a significant source.

3. There are significant hints that PCBs in the sediments are going to be recycled.

4. There is adequate evidence that the tetra chlorinated isomers and lower are being degraded but not as rapidly as he would like. However, the trichloro isomer is rapidly degraded and thus while humans may be exposed, they do not retain the isomer.

5. There is widespread human exposure as far as fish is concerned. However, he could not define an average exposure.

6. The effect of Monsanto's ban has produced decreases in some parts of the environment, although the amount in the rivers and lake systems was not decreasing as fast as they had expected. He indicated that they probably should not have expected such an immediate decrease because

   a) Not all closed systems are really closed;

   b) There was a large backlog of products containing PCB which are still being discarded, and

   c) The significant environmental inertia of some lake systems such as Lake Michigan because it is essentially a closed system itself.

Dr. Frederick W. Kutz, U. S. EPA, presented data from the pesticide monitoring program and indicated that they could not identify which route to man is most significant. His data indicated that from 1972 through 1974 there was no significant change in the levels found in the environment. However, the pentachlorinated isomers along with the hexa and hepta are the most commonly found while tetrachlorinated isomers are very rarely found. He indicated that the gas chromatograph analysis indicated that the residues being found most closely resembled the Aroclors 1254 and 1260 types. He also indicated that human milk samples in 1973 indicated the presence of PCBs.

Dr. Donald Grant presented Canadian findings of residues of polychlorinated biphenyls in the general population of Canada. He indicated that the national average was 30% with 1 ppm and that males had higher residues than females. He then presented studies for the years '69 through '74 which did not show a significant increase or decrease in the mean amounts found, although Ontario was the highest of the regions in Canada.

Dr. Charles F. Jelinik, FDA, presented information on the levels of PCBs in the U.S. food supply. He indicated the basis of the temporary tolerance levels and that fish are the only ones listed which obtain PCBs from the environment. The FDA has found that now fewer foods are contaminated with PCBs. He then presented information on the findings of PCB in fish for the fiscal years 1973 through 1975. These studies indicated that the trend is down in total fish found with PCBs but with respect to those fish which do contain PCBs over 5 ppm there is an increase. He thus concluded that fresh water fish are the only major source of PCBs to humans and there should be a halt of entry of PCBs into the aquatic environment.



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Dr. Graham spoke in place of Dr. Ches M. Blackwood, Fisheries and Marine Services, Department of Environment, Ottawa, Canada. Dr. Graham presented information on the levels of PCBs found in various regions in Canada in fish. Eels contained a high concentration (2-30 ppm) of PCBs and likewise coho salmon were also high.

Mr. Charles R. Walker reported the occurrence of PCBs in the national fish and wildlife monitoring program. Mr. Walker indicated with respect to fish at the level of 0.5 ppm or more the levels of PCB are steady, however, the number of fish being found with PCBs is decreasing. The type of PCB being found is the Aroclor 1254 with some Aroclors 1238, 1248, and 1260. With respect to starlings, Mr. Walker indicated that all have PCB residues but that these residues are decreasing.

Dr. Wayne A. Wilford presented trends of PCBs in Lake Michigan fishes. Dr. Wilford indicated that their sampling was based on whole fish samples and analysis and not merely edible portions. These studies indicated that the types of PCBs being found were the Aroclors 1248, 1254, and 1260 and that there had been no trend of a change for three years ('72-'74) in the lake trout. For coho salmon there was no trend of a change but the number being found in 1974 containing PCBs was less than that found in 1973. He then compared the effects of the ban as compared to the ban on DDT and showed that the levels of DDT between 1972-1974 had decreased very significantly.

Dr. Frederick W. Kutz then presented some information on PCBs in air. He indicated that in all air samples taken PCBs were being found and they resembled the Aroclor 1254 type. The results of 5 additional stations will be available in the near future.

Dr. D. Steve Dennis, EPA, presented information on PCBs in U.S. soils and waters. He indicated that there was a lack of sufficient data to determine a trend in this area. However, he indicated that all sampling stations did not find PCBs. He indicated that the highest levels of PCBs were east of the Mississippi River in the .25-217 ppb range. He also indicated that PCBs were rarely found in farming areas and that the PCBs found in the urban areas were of the Aroclor 1254 and 1260 types.

Ms. Didre J. McDermott, Southern California Coastal Water Research Project, indicated that PCBs of the Aroclor 1242 and 1254 types were being found. She apparently made an extemporaneous assertion that Aroclor 1016 was included in the Aroclor 1242 amounts. She indicated that municipal systems were the principal discharges of the Aroclor 1242 type but there had been a significant decrease between 1972 and 1975. She estimated that aerial amounts approached 1800 kg/per year. She then presented information on aquatic life:



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1. In dover sole, they found no significant decrease in the 0-2 ppm range.

2. There was a significant decrease in the content in muscles from the studies from 1971 with the higher values being found in the harbors where there is more activity and historically paints were used which contained PCBs.

3. She estimated the concentration factor to be 100,000.

Dr. Thomas O. Munson, Westinghouse, presented a summary of the information conducted under contract with the Maryland State Department of Natural Resources on the upper Chesapeake Bay. He indicated that PCBs were found in shell fish, bottom sediments, suspended sediments, and zooplankton. He indicated that Aroclor 1254 or a blend of Aroclor 1254 and 1262 were the types primarily found although some Aroclor 1248 types were found. He indicated that the major transport is from the suspended sediments and that the major source of this was the influx from a local river.

Dr. Robert W. Risebrough, University of California, presented the results of recent studies of transport of PCBs to the Marine environments. Dr. Risebrough's studies indicated as he stated that we should characterize the contaminants as types of PCB mixtures rather than just PCBs and "thus uses of Aroclor 1016 should not be covered by comments relating to Aroclors 1254 and 1260".

Mr. David J. Hansen and Dr. Allen B. Nebeker, EPA, presented a summary of "recent information regarding effects of PCBs" on marine and freshwater organisms. Although this information was presented very quickly, it became clear that the information presented related to studies done from 1970 through 1973 and which were presented during the Toxic Pollutant Effluent Hearings. No new additional work has been done by EPA in this area.

Dr. Warren Muir, CEQ, opened the session on Economics and Substitutes indicating that there is no federal authority to control these toxic substances and

1. Can't predict economics easily, and

2. The longer the substance has been manufactured and used then the greater problem.

Thus there is a need to change our approach to toxic pollutants by identifying the problems with a substance before it is marketed.



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Mr. Richard Rawlings presented the EIA statement which has already been distributed.

Mr. Duncan MacArthur presented the work of Foster D. Snell on the Economic Impact of the Total Ban of PCBs. They assumed that this would be accomplished within 76 months. In accordance with the proposed Toxic Substance Act, it would take 36 months for rules and testing to be accomplished and then 38 months for a phaseout. The summary of their study indicated that there would be a one-time cost of 13.7 million dollars with annual additional expenditures of 110 million dollars. The ban would also effect regulatory codes, public safety and other intangible areas. The net result would be an increase in consumer costs.

Dr. Dean Branson, Dow Chemical Company, presented information on their replacement fluid based upon 4 years of research with McGraw-Edison. He indicated that this material could be used for high voltage capacitors with good health and environmental properties. He indicated that this material had as low as 1016 a dielectric loss at normal temperatures and that the systems would not have to be redesigned. He stated that there was a low risk of fire and that it was more reliable than a 1016 system. He indicated that the economics would be reasonable and that there would be a million pounds available by the first quarter of 1976. With respect to environmental effects, he indicated that the substitute was more biodegreeable (45 times). That bioconcentration in fish was low relative to Aroclor 1016, that it was not toxic to animals and only moderately toxic to fish.

Mr. Richard Montgomery, Dow Corning, Incorporated, presented information on their substitute fluid based upon previous work with silicone compounds. He indicated that environmental effects would be minimal and that the technology to manufacture superior silicone materials is available. This material would be available in 1976 on a commercial basis and that Dow Corning has the capability of manufacturing this for the transformer industry. He indicated that the material had been field tested for four years and that Dow Corning was requiring all of their transformers to be replaced with new silicone filled transformers. This material or type of material has been used for twenty years in the military and for two years in Japan. He indicated that while silicone transformers will burn they are self-extinquishing and that major insurance companies have given permission to use silicone filled transformers indoors on an individual evaluation. He stated that it would take three to five years to phase in these new transformers and that while it would cost more than Aroclor 1242, the total cost of equipment should not increase by more than 6%. He finally stated that although PCB filled transformers could be converted to silicone filled transformers without major modification, he would not recommend that because immediate removal would cause more environmental problems.



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Mr. David Wood, Monsanto, presented information on their new material and information of a general nature on all substitutes. Mr. Wood made a complete copy of his statement available.

Mr. Bruno Rey-Coquais presented information on a substitute of Prodelec, S.A. This substitute was used in conjunction with a PCB.

Dr. Albert Murray, MIT, presented information on their study for CEQ/EPA. Dr. Murray indicated how PCBs had been substituted in other systems such as heat exchangers, carbonless paper and paint systems. He indicated that these substitutions had in some cases resulted in increased costs but in the area of paint the chlorinated paraffins were resulting in a having of costs. He indicated also that the potential impact of PCBs on sport fishing must be considered as a gain if PCBs were banned.

Dr. E. J. Inchalik, Exxon Chemical Company, presented information on their substitute fluid, Di-iso-octyl phtalate. This material has limited use in commercial capacitors but it is available. He did not mention its fire characteristics.

On Thursday evening, approximately 20-25 individuals presented brief statements on their concerns or opinions on PCBs. The fish industry of Lake Michigan was fully represented and the paper industry in that area also made a presentation. Westinghouse Electric Corporation also presented a statement at this proceeding. Finally, there were several speakers who directed their comments to the Hudson River situation.

Dr. A. Karim Ahmed, NRDC, presented his comments on a review of federal and state government rules and controlling impacts of PCBs on the environment. Dr. Ahmed indicated that PCBs are increasing in Lake Michigan fish and that Wisconsin Fish Department officials show no decrease in levels found since Monsanto's ban. He indicated further that now Lake Superior trout are being contaminated. He further made statements relating to East Coast problems, i.e., the discharges on the Hudson and the analysis of fish in that area.

As to Governmental rules, he indicated that Monsanto had started reduction before the inter-departmental study and thus a recent statement of federal officials to the contrary are not correct. He indicated that notwithstanding the requirements of the FWPCA there still are not effluent guidelines for PCBs and that if the timetable of 307(a) had been followed, we might not have the problems we see today. He indicated that EPA had filed statements in the NRDC suit against EPA which stated that the record of the Toxic Pollutant Hearings would not support EPA's standards proposed or any new standards and that EPA could not rebutt industry's arguments on economics.

He indicated that Michigan, Wisconsin, Minnesota and New York are taking some action and that New York has ordered GE to cease this discharge by September 30, 1976. With respect to actions of the NRDC, Dr. Ahmed indicated that NRDC requested Section 504 action and had petitioned the Corp of Engineering to hold hearings before there are any further dredging actions on the Hudson River.

He then recommended a complete phase out of the use of PCBs, a ban on imports and exports of PCBs, the development of a list of users and point sources of PCBs, an extensive monitoring program of these point sources and a moratorium on all further dredging of river bottoms where PCBs are found.

Mr. John R. Wessel presented the FDA position on its role and the rationale for the FDA limit. He further indicated that the FDA was re-evaluating their limit to see if it must be changed.

Mr. Walter C. Barber presented the views of the Environmental Protection Agency and began with the excuse that there was too much to do with not enough people. Thus in resource allocations, they had to direct their attention to major point sources and that because of the San Francisco information, it is clear that the control of point sources may not be the solution to the problem. He then recounted the provisions of the FWPCA and the provisions of the Clean Air Act. He indicated that the increasing public awareness of the problem would improve a joint industry government program on disposal although it should be more mandatory than what we have at this point.

The Honorable Daniel P. Reed, Department of the Interior, presented an emotional statement on PCBs as a national problem and that we, as a country, are in trouble. He alleged that PCBs may destroy our endangered species and called for a total ban on PCBs.

Dr. Morris F. Millson presented information on Canadian regulatory measures and Dr. Joseph Highland, EDF, presented information on PCBs foods and the federal responsibilities.

The conference closed with speakers summarizing each of the sessions and with Mr. Richard A. Carpenter presenting conference highlights.

Roger E. Wills, Jr.

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