

10/29/69

EXECUTIVE SUMMARY

PCB POLLUTION

**COMPANY
CONFIDENTIAL**

PROBLEM:

Contamination of the environment with polychlorinated biphenyls (PCB) (Aroclor products).

PROBLEM DEFINITION AND TIMING:

Professors Widmark and Jensen of the Institute of Analytical Chemistry at Stockholm, Sweden, in November 1966, announced and confirmed finding PCB in fish, birds, and eggs. Subsequent findings were made in 1967 in Great Britain. Problem was first presented in the U.S. by Professor Risebrough of the University of California in a published article in the San Francisco Chronicle in February, 1969. Monsanto confirmed the presence of PCB's in mid-1969 and confirmed the adequacy of work by Widmark and Jensen and others — a worldwide ecological problem.

CONFIRMATION OF FINDINGS:

Analysis indicates environmental presence of 5 and higher chlorinated biphenyls (similar to Aroclors 1254 and 1260). Other Aroclors may contribute, but have not been identified yet. In the last six months, PCB's have been reported present in waters in Lake Michigan, fish in Connecticut, seafood along the Gulf Coast, and waters outside Monsanto plants.

SERIOUSNESS OF PROBLEM:

1. Fish - Marine or aquatic species concentrate PCB in the fatty tissue. Toxic in small quantities (down to 5 ppb) to sensitive marine life such as shrimp.
2. Birds - Predatory species feeding on the marine or aquatic life can further concentrate PCB to possible harmful effects. Specifically in birds, PCB can effect the calcium metabolism leading to egg shell imperfections which prevents proper hatch of the young.

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3. Man - There is no harmful effect known to man or other mammals after 40-years of production. Studies are underway by various sources.
4. Political and Public Emotion - PCB's linked to DDT because PCB's show up in analyses for DDT. Linked with other permanent chlorinated hydrocarbon pesticides.

EFFECT ON MONSANTO:

1. Business potential at stake on a worldwide basis:

<u>Fluids</u>	<u>Plasticizers</u>	<u>Total/Year</u>
70 M Lbs.	34 M Lbs.	104 M Lbs.
\$16 M	\$6 M	\$22 M
\$6-8 M GP	\$2-3 M GP	\$8-11 M Gross Profit
2. Legal responsibility.
3. Public image.
4. Effect on other product areas.

EFFECT ON CUSTOMERS AND ULTIMATE CONSUMERS:

1. Affects entire electrical industry - capacitors and transformers.
2. Affects food processing.
3. Affects die casters and other "hot metal" working industries.
4. Affects wide range of plastics and adhesive applications.
5. Affects wide range of paints and coatings.

EFFECT ON OTHER PRODUCERS:

There are at least six other producers of PCB's in the USA. Monsanto has discussed problem with two in Europe. No great concern there yet.

MAIN SOURCES OF POLLUTION:

Difficult to define, but Aroclor 1254 and 1260 are used in electrical devices, heat transfer, plastics, adhesives, coatings, and industrial fluids. Other Aroclors contain minor percentages of 5 and 6 chlorine ring structures. Manufacturing plants also a vulnerable contributing factor, but less significant in quantity than customer or end user losses.

POSSIBLE CONTROL OF CONTAMINATION:

- Electrical and heat transfer - possible to control with effort and reclamation.
- Industrial fluids, plastics, coatings and adhesives - very difficult, if not impossible to control. Substitute products needed.

MONSANTO OUTSIDE STATEMENTS:

- Letter sent to electrical customers regarding problem.
- Monsanto Public Relations statement attached.

MONSANTO FUTURE ACTION:

Presentation to CDC reviewing subject and future plan of action by November 17, 1969. This will define a program to determine what is necessary in various product areas to meet the problem.

- 1 Research and Engineering needed and cost.
2. Plant and customer "clean-up and control" required and cost.
3. Biodegradability of Aroclors.

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4. Toxicity studies.
5. Alternative routes.
6. Recommended approach.
7. Appropriation request to cover capital and expenses required.

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STATEMENT FROM:
MONSANTO COMPANY
ST. LOUIS, MO.

Oct. 27, 1969

Late in February, 1969, a West Coast newspaper carried a major feature about "a menacing new pollutant" found in the San Francisco Bay area. The article was based on marine life research carried out by Dr. Robert Risebrough of the University of California. The article stated that residues of pesticides (DDT and DDE) and polychlorinated biphenyl (PCB) were threatening the welfare of certain birds and posed a long-term threat to humans.

Monsanto manufactures polychlorinated biphenyl and markets it under our Aroclor trade name. (There are other manufacturers in Europe and Japan.) We, therefore, would like to present some additional facts.

The work done by Dr. Risebrough dates back to earlier research by other scientists who, while analyzing pesticide residues in wildlife, soil and water, encountered unknown or "interfering" substances in the parts-per-million range.

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Several years ago, two Swedish scientists at Stockholm University's Institution of Analytical Chemistry, Professor Gunnar Widmark and Soren Jensen, reported they had identified these other substances. They said some of the materials were polychlorinated biphenyl or PCB. Since PCBs are not "broadcast" or spread around the land as are pesticides, the scientists theorized that the source must be the industrial wastes of PCB users.

In addition to the work of Dr. Risebrough and the Swedish scientists, there have been other studies which indicate the presence of PCBs in the environment. Monsanto is concerned over the situation and is cooperating fully with these studies.

The common uses of commercial PCB would not normally lead to its release into the natural environment.

A principal market for PCB is in electrical applications where they are used as insulating fluids for transformers and capacitors. In this use, the chemical is completely sealed in metal containers. Another market is for heat-transfer applications where the PCB fluid functions in a closed system.

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PCBs are also used in several applications where the chemical is incorporated into a polymer as an integral part of the solid material. Such polymers are used in highly special applications as an adhesive, elastomer or surface coating.

Polychlorinated biphenyls are not sprayed or dusted on crops, woodlands or any other areas, as are pesticides. To our knowledge, they are not used in tires, house paints, household products, epoxy resins or major vinyl plastics, as has been charged.

Therefore, conclusions as to the source of PCB found in the environment are difficult to make. Some qualified scientists, using the latest laboratory equipment, have correctly identified the substances as being PCB. However, most scientists are not yet willing to indict commercially produced PCB as a pollutant.

It has also been implied that polychlorinated biphenyls are "highly toxic" chemicals. This is not true. Just like other industrial chemicals and home products now in widespread use, PCBs are not hazardous when properly handled and used. During more than 30 years of U.S. production and use, cases of any toxic effect have been extremely rare -- and then only where the simple precautions recommended for use were not followed.

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Monsanto has research programs under way to identify the compounds, reported to be PCB, and locate their source. The programs involve precise analysis of environmental samples of water and soil. Also under way are studies to determine the biological effects of deliberate dosage of PCBs on fish, birds and mammalian animals. Special emphasis is being paid to endocrinological effects, mineral metabolism and reproduction physiology.

Some preliminary biodegradability studies are under way. Further studies to clearly demonstrate this phenomenon are contemplated.

Very early results of chronic toxicity studies confirm that PCBs are not highly toxic. In 90-day studies on rats and other normal laboratory species, there have been no adverse effects when feedings of up to 100 parts-per-million were administered.

Monsanto has always cooperated on a regular basis with federal, state and university laboratories in their analysis of chlorinated hydrocarbon residues. We will continue to do so. Additionally, Monsanto will continue to exercise the highest degree of control in its manufacturing, shipping and storing of PCB -- as we do with all products. In the functional fluids market, we have carried out a program for several years for the reclamation of used PCBs to reuse these valuable materials.

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The source of the marine life residue identified as PCB is not yet known. It will take extensive research on a worldwide basis, to confirm or deny these initial scientific conclusions.

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