At Monsanto's highest dosage (100 μg/kg/day), which corresponded to the low level in the Allen study, we find that AROCLOR 1254 has similar effects to those reported earlier for AROCLOR 1248. The results at the lower levels are not completely evaluated.

Potential Carcinogenicity—Animal Studies

In 1975, Dr. Renate Kimbrough reported the induction of liver carcinomas in female rats fed AROCLOR 1260 for two years[17]. The same lot of AROCLOR 1260 was used in her study as in Monsanto's earlier test. Monsanto's study showed that AROCLOR 1260 as well as AROCLOR 1242 and AROCLOR 1254, produced liver injury, but no cancers. Therefore, an extensive reevaluation was made of the original liver slides from the Monsanto studies as well as additional liver sections from all rats in the Monsanto two-year feeding studies. These slides were examined independently by Dr. D. Gordon of Industrial BIO-TEST Laboratories, by Professor W. Richter of the University of Chicago and by Professor Parvis Pour of the Eppley Institute for Research in Cancer. In addition, Dr. Pour evaluated sections of liver from rats in Dr. Kimbrough's study. No carcinomas were seen in the livers of rats from the Monsanto studies, and Dr. Pour did not concur with Dr. Kimbrough's diagnosis of liver cancer in rats from her study[18]. The different criteria by which pathologists diagnose cancer, and the reported findings of cancer induced by polychlorinated biphenyls in various animal species, have been discussed by Dr. J. C. Calandra[19].

In 1977, the National Cancer Institute reported results of a bioassay for possible carcinogenicity of AROCLOR 1254. That report stated that AROCLOR 1254 was not carcinogenic under the test conditions[20].

Human Epidemiology Studies

The toxicity testing described above has provided a foundation for understanding the potential effects of chlorinated biphenyls. However, firm conclusions cannot be drawn without human epidemiological data drawn from exposed populations.

"The view that human health risks resulting from exposure to chemicals may be determined experimentally by testing laboratory animals is one that is widely accepted in the scientific community and has been adopted by EPA. Because experimentation on human beings raises ethical questions and because epidemiological studies often provide incomplete information, toxicology studies on laboratory animals are often necessary. However, because the extrapolation from animals to man is subject to some uncertainty, corroboration of laboratory test data with sound epidemiological information is desirable." (U.S. EPA, Support Document/Draft Voluntary Environmental Impact Statement for Polychlorinated Biphenyls, 1978). Such epidemiological data on PCBs is now becoming available.

Monsanto is aware of seven epidemiological studies done in the U.S. of persons exposed to PCBs. They include persons with occupational as well as community exposure, and the effects studied range from deviations in biological parameters, through reported symptoms and illnesses, to the occurrence of death from various causes.

Selikoff and colleagues studied 326 volunteers who were occupationally exposed to PCBs. They report the percentage of those workers with various dermatological, gastrointestinal, neurological and other symptoms, as well as the percentage with abnormal values of clinical chemistry parameters and of pulmonary function. They concluded that reported symptoms and abnormal findings in

expanded in scope. Chicken studies to determine the effects of chlorinated biphenyls on avian species were completed in 1970 and 1971. Results of all these studies have been distributed to the FOA and other regulatory agencies. During this time period, Monsanto expanded the warnings on its product labels to include cautions against allowing escape to the environment.

When, in 1976, reproductive disorders were reported in monkeys fed chlorinated biphenyls[13], Monsanto undertook a study to determine the validity of those findings. The Monsanto study is being conducted with AROCLOR 1254, a large volume material, instead of the relatively low value AROCLOR 1248 used by the earlier investigators.

Potential Carcinogenicity

In 1975, after Dr. Kimbrough reported that AROCLOR 1260 produced liver cancer in rats[14], Monsanto undertook a review of liver sections from its earlier studies on AROCLOR 1242, AROCLOR 1254, and AROCLOR 1260. In addition, it retained Dr. Pour of the Eppley Institute for Research in Cancer to review all liver sections from all of the AROCLOR studies, i.e., Monsanto's and Dr. Kimbrough's[15]. That review showed no occurrence of liver cancers. Finally, Dr. Calandra was retained to review and comment on available literature dealing with carcinogenicity of polychlorinated biphenyls[16]. Results of those evaluations have been made available to regulatory agencies.