July 15, 1969

Mr. John Teasley
National Water Quality Laboratory
United States Department of Interior
6201 Congdon Blvd.
Duluth, Minnesota 55804

Dear Mr. Teasley:

Confirming our Mr. Garrett's conversation with Don Mount, I have enclosed several items which I hope will help supply the information requested in your telephone call. Enclosure one is a copy of a table showing the general physical properties of our polychlorinated biphenyls known as Aroclors. The numerical designation of the compounds indicates the chemical structure. The 1200 series are biphenyls chlorinated to the extent indicated by the last two numerals. For example, Aroclor 1242 is biphenyl chlorinated to 42%; Aroclor 1254 is biphenyl chlorinated to 54%.

The 5400 series are terphenyls chlorinated to the extent of the last two numerals. Thus Aroclor 5460 is terphenyl chlorinated to 60%. The 5460 and 5400 materials are mixtures of biphenyls and terphenyls chlorinated to 65%.

We have typed on the bottom of the table the results of acute toxicity studies. These indicate the approximate lethal dose in rats when administered orally and the minimum lethal dose when the samples were applied to the unbroken skin of rabbits. You will note that the samples were administered undiluted or as various concentrations in corn oil depending on the physical form of the sample.

MONS 089219

The second enclosure describes the results of chronic inhalation studies to Aroclors 1242 and 1254. The results of these studies led to the preparation of the third enclosure--Hygiene Guide prepared by a committee of the American Industrial Hygiene Association.

The acute and chronic inhalation data have led us to the conclusion that the Aroclors are not seriously toxic materials. The industrial use and manufacturing experience for over 30 years confirms the low degree of hazard. We have never indicated that the polychlorinated biphenyls are "non toxic". We do recognize that there can be systemic effects if there is prolonged and repeated inhalation of vapors when the materials are used at elevated temperatures. We have also warned about prevention of repeated and prolonged skin contact, also because of the possibility of systemic injury.

We currently have two year feeding studies underway in both rats and dogs. We also are investigating the possible effects on reproduction in rats. Another study will determine the effect on chickens, egg production, hatchability, egg shell thickness, and other parameters. We plan to duplicate this study in quail.

Using the recently developed analytical techniques, we have determined the water solubility of the 42%, 48% and 54% chlorinated biphenyls. At ambient temperature Aroclor 1242 is soluble to the extent of 203 (plus or minus 10) ppm; Aroclor 1248--105 (plus or minus 14) ppb; Arcolor 1254--50 (plus or minus 2) ppb.

In preliminary fish toxicity studies, the results from our consulting laboratory indicate that rainbow trout survived 96 hours in water concentrations greater than 100 ppm of Aroclor 1242, 1254 and 1260. The 96 hour TLm for bluegill was 0.56 ppm for Aroclor 1242 and 1254 and greater than 100 ppm for Aroclor 1260. These fish toxicity data are confusing to us if one considers the ppb range of solubility. We are currently trying to confirm the results for additional analysis.

The only published data on fish toxicity of which we are aware is a March, 1957 report from the Fish and Wildlife Service. This report resulted from a study of the toxicity of more than 4,000 chemicals to larval lampreys, and fishes. The enclosed Xerox copy of the title page of the report, the explanation of the table and the tabulated results indicate that the four Aroclor compound investigated showed no effect at 5 ppm in this abbreviated experiment of 24 hours.

I have also enclosed a copy of the method of analysis developed in Sweden. This is currently being used, I believe, by the nations involved in OECD committee work on pesticide residues. Professor Widmark at the Institute of Analytical Chemistry, University of Stockholm, provided us with this copy. He may be told us that as with many gas chromatographic methods, it has been difficult to reproduce results in various laboratories using this technique. There is underway at the present time, I believe, a very extensive program of exchanging samples among a number of laboratories in Europe to determine if the procedure will produce the same results (within reasonable limits of experimental error) from the several laboratories.

We have not as yet scheduled a program of preparing in considerable quantities the individual Aroclors. We will be happy to provide, of course, samples of the materials as we manufacture and sell them. These are actually what we are using in our analytical laboratory for reference materials. If you would like such samples, please let me know.

My associate, Jack Garrett, will be at Duluth the week of July 28 and I am sure he will try to see you also at that time. Also, Mr. Scott Secker, who has been responsible for setting up our analytical facilities, will be very happy to discuss any details concerning the analytical technique. If we can help you in this respect, please let me know.

Very truly yours,

Elmer P. Wheeler
Manager, Environmental Health

EPW:ju