December 15, 1969

MS
Arochlor
Toxicity

Mr. Newton E. Whitman
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Dear Newt:

A full and detailed answer to your telephone inquiry about Monsanto hydraulic fluids would require a great deal of time and a great deal of data. Briefly, however, the situation is this: in recent years European scientists have found that certain unidentified interferences in the chromatographic analysis of DDT were polychlorinated biphenyls. Swedish scientists working with mass spectrometry attachments to the gas chromatographic equipment specifically identified polychlorinated biphenyls of five chlorine atoms and above in certain specific samples. Since the Swedish work, work in England, the Netherlands and the United States has indicated that the higher chlorinated biphenyls are probably in fact long term contaminants in certain ecological systems. None of the European data nor United States data nor any of the thousands of samples that we have analyzed show any residues of chlorinated biphenyl compounds in this series of less than five chlorine atoms per biphenyl molecule. These data indicate that the tetrachlorobiphonyl and the lower chlorinated homologs in this series degrade in the natural environment. Actually, some work done at the University of Utrecht shows that certain bird species metabolize the trichlorobiphenyl completely.

It is our contention that our Aroclor compounds of 48% chlorination and less are not long term environmental contaminants. We are studying in a limited way the degradation of these compounds in the

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laboratory. An interpretation of all the present data available indicates that these lower chlorinated biphenyls are not present in the general environment as a contaminant.

When you discuss the immediate toxic effect of components of hydraulic fluids you get involved in a discussion of the physical and chemical characteristics of these compounds. For example, the solubilities of the PCB's increase as the percent of chlorination decreases. These compounds are soluble in the range of 50-150 ppb in water at room temperature. When these materials are tested on aquatic organisms such as fish, the toxicity effect has much to do with whether the material is emulsified and many other factors. In the natural environment, since these materials are quite a bit heavier than water, they will sink to the bottom and can become a threat to bottom feeders and benthic plankton. On the other hand if a more soluble hydraulic fluid component were released to a natural water environment (in sufficient concentration) it could pose a toxic threat to the larger organisms occupying this environment such as sport fish. It is also possible that soluble hydraulic fluids which are readily degradable biologically can pose a similar threat through oxygen imbalance in the receiving stream.

This discussion points out the fact that any hydraulic fluid component can in sufficient concentration if discharged to a receiving water course be a threat to the biological stability of that water course. We recommend to our customers that they make sure that hydraulic fluids do not enter receiving water courses in concentration sufficient to cause harm. Since most hydraulic fluids including our own are blended fluids made up of several components, an intelligent approach to pollution abatement is needed where it is possible for these fluids to be discharged. Where fluid components are lost to the receiving stream, it is necessary to install equipment on the waste stream to remove them. In most cases a settling basin or trap which is periodically cleaned will suffice. Such a device makes it possible to collect and reprocess these fluids. Such equipment should be capable of collecting the materials that fall to the bottom as well as skimming the components that float on the top. Some fluids for example are mixtures of Aroclor

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type fluids and phosphate ester type fluids. In this case it is entirely possible one of these immiscible components would sink to the bottom of such a control device and the other would float to the top.

The type of fluid that Monsanto sells to Bethlehem is a blended material of several components--the PCB portion of which is degradable. We feel that this fluid is no greater threat to the ecology of a receiving stream than any other type of hydraulic fluid. We also feel that because of the cost of these fluids control of their discharge is essential. We further believe that pollution regulatory agencies are going to require even tighter control on effluents containing materials of this type in the future. If we can be of any further help, please let us know.

Sincerely,

Jack T. Garrett
Manager, Industrial Hygiene

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c.c. H. S. Bergen
N. T. Johnson