bcc: E. S. Bergen - MBLMC
W. R. Richard - WRICH
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C. Paten - CPATO
W. F. Wayehoff/W. E. Schalk/
J. E. Springate
E. S. Tucker - ETUCK

March 19, 1969

Mr. Robert Rock
FWPCA
620 Central Avenue
Building 2 0
Alameda, California 94501

Dear Mr. Rock:

In accordance with our Dr. Robert Keller's conversation with you last week I have been asked to reply to the following questions which I understand you raised:

1. Would polychlorinated biphenyl type materials such as those in our Aroclors be expected to be found in domestic wastes (household)?

   We do not know of any use of our Aroclors which would lead to their presence in domestic or household wastes.

2. Would polychlorinated biphenyl type materials such as those found in our Aroclors be expected to be found in industrial wastes?

   One of the principal markets for our PCB (polychlorinated biphenyl) materials is in electrical applications where they are used as fire resistant insulating fluids for transformers and capacitors. In this use the material is completely sealed in metal containers. Transformer use is for equipment in sizes above 15,000 volts rather than the familiar sizes of transformer seen along power lines for distribution to households.

   It is my impression that the transformer and capacitor manufacturers do not have a lot of spillage or waste of the fluids which might end up in industrial wastes. Secondly, the industry has for some time practiced reclamation and reuse of these fluids from old equipment which needs repair.

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Another industrial use of the liquid PCBs is in heat transfer applications where the fluid functions in a closed system. Again the fire resistance characteristics of the PCBs leads to this use as a substitute for other flammable oils. For economic reasons the heat transfer systems should be maintained in good repair with a minimum of leakage which might conceivably be washed to plant sewers. In the functional fluid uses we have carried out a program for several years for the reclamation of used PCBs.

PCBs are also used in several "plastic-type" applications. Such uses include specialty adhesives, elastomers and specialty surface coatings. In these cases the PCB becomes an integral part of the solid material and spillage or wastage of the PCBs would also, I believe, be held to a minimum.

3. If the PCBs might be found in industrial wastes, would this be a result of a breakdown of a marketed product following use or as a waste from a manufacturing process in which PCBs are used?

The PCBs are stable materials which would not be expected to "breakdown" or degrade to any extent in recommended uses.

4. Would chlorinated biphenyls be found in oil/gasoline refinery effluents?

I am not aware of any uses in the petroleum industry which should result in PCBs in refinery effluents.

5. Do we have toxicity data - especially for fish?

We have acute animal screening toxicity data on all of the members of our Aroclor series. I have enclosed a Xerox copy of tables showing the general physical properties of our Aroclors. At the bottom of the table I have added to the printed data information relative to the oral lethal dose in rats and the skin minimum lethal dose in rabbits. These data indicate that the Aroclors cannot be considered seriously toxic from a standpoint of acute exposures. You will note that the samples were administered in various concentrations depending on the viscosity of the samples and their solubilities in corn oil.

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I have enclosed also a reprint which describes the chronic vapor toxicity of two of the Arcolors, Arocler 1242 and Arcolor 1254. The work described in this publication has lead to the establishment of a threshold limit value for industrial environment for these two members of the Arcolor series of 1.0 mg per cubic meter of air and 0.5 mg respectively. You will note that the authors of the publication suggested TLVs of twice the values established by the American Conference of Governmental Industrial Hygienists.

We have recently contracted with a consulting laboratory to run fish toxicity studies. I doubt that we will be able to find 96-hour TL_m's because of the low solubility of the Arcolors. Our analysts have recently determined for example the following solubilities in tap water at room temperature.

Arcolor	Sol. in ppb
1242	203 ± 10
1248	106 ± 14
1252	50 ± 2

We haven't completed our work on the full series of compounds but we have found that, as might be expected, solubility decreases markedly with increase in chlorine content.

Perhaps I should mention at this point that the numerical designation of the Arcolors has meaning. Specifically the 1200 series indicates biphenyl. The two subsequent numbers indicate percentage chlorination. Thus, Arcolor 1242 is biphenyl chlorinated to the extent of 42%. The 5400 series are terphenyls and again the last two numbers indicate the degree of chlorination. Thus, Arcolor 5460 is terphenyl chlorinated to 60%. The 4400 and 2500 series are mixtures of biphenyls and terphenyls chlorinated to 65%.

6. Can we provide chemical/physical property data for our Arcolor products - especially solubility in water?

I believe I have answered this question in the discussion above.

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In connection with the recent publication in the San Francisco Chronicle concerning the PCBs Monsanto has made available the enclosed comments.

If I can be of any further assistance, please do not hesitate to let me know.

Sincerely,

Elmer P. Wheeler
Manager, Environmental Health

EPW:ejs

Enclosures 3 - 1. Table on general physical properties of the Aroclor chlorinated compounds

2. Monsanto March 3 statement concerning article in S. F. Chronicle

3. AIHA hygienic guide chlorodiphenyls and reprint "The toxicity of the Vapors of Aroclor 1242 and Aroclor 1254

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