The University of Dayton

May 10, 1984

Dr. Fred D. Hileman
Senior Research Chemist
Monsanto Research Corporation
1515 Nicholas Road
Dayton, OH 45418

Dear Fred:

I have enclosed a preliminary cost estimate for the work we discussed on the phone concerning the determination of the thermal degradation properties of 1,2,4-trichlorobenzene (1,2,4-TCBz). I have outlined a fairly comprehensive program which may be broken down into three experimental tasks.

Task 1 is designed to determine the thermal properties of 1,2,4-TCBz under conditions that could be encountered in a transformer fire. We would determine the degree of destruction of the parent compound and the identity of combustion products at a minimum of six temperatures. This work would be performed at a mean gas phase residence time ($\bar{t}_r$) of 1.0 seconds in three possible reaction atmospheres (pyrolysis, oxygen starved, and oxidation). We feel this residence time is representative of that encountered in the high-temperature zone of a transformer fire; however, the three reaction atmospheres are necessary to identify all possible formation products.

The determination of possible dibenzodioxins and dibenzofurans is clearly of interest. We would propose that Monsanto furnish the standards for these analyses. We would also propose to trap a few samples of the thermal reactor effluent and deliver them to you for confirmatory analysis. We may want to trap additional samples for your analysis if our initial research findings indicate further analysis to be desirable.

Tasks 2 and 3 represent a detailed study of the pyrolysis and oxidation reaction kinetics of 1,2,4-TCBz. A minimum of six gas-phase residence times ($\bar{t}_r$ ranging from 0.25 to 2.0 seconds) and

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six temperatures will be necessary for each task. The kinetic data should be sufficient to predict the rate of destruction of 1,2,4-TCBz under the range of conditions experienced in a transformer fire.

As I am not aware of your budget for this program, I have attempted to provide something of a "shopping list" for your inspection. We feel a detailed complete kinetics and mechanistic study, which would be the result of this proposed total program, will be of immense value. The kinetics studies outlined under tasks 2 and 3 in combination with product identification should clarify many questions concerning the mechanism of formation of dibenzodioxins and dibenzofurans from chlorobenzenes (if indeed they are formed).

We are most interested in performing this work and are willing to be as flexible as possible in arriving at final arrangements. If you decide to proceed with the program, I would point out that we can also accept grants or possibly an equipment donation as full or partial payment for our research. Such options may be more practical or economically advantageous to Monsanto.

We would be in position to initiate this program by no later than September of this year. Allowing for other scheduled activities, I would estimate the full program would be completed 8 to 10 months following program initiation.

I have also included some literature which describes the equipment and facilities which would be used to perform this work. Please do not hesitate to contact me if you have additionsl questions or identify some points in need of clarification.

Sincerely,

Barry Dellinger

Barry Dellinger, Ph.D.
Group Leader
Environmental Sciences

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Enclosures