

Interoffice Correspondence **3M**

*Env. Pollution  
assessment*

*Env. Aspects - Corresp.  
Chem Division*

Subject: Ecological Aspects  
of Fluorocarbons -

August 31, 1971

cc: D. Benforado - 42-2W  
C. Kiester - 42-2W  
S. Yunis - 42-2W

TO: HUGH G. BRYCE - CHEMICAL DIVISION - 236-1

FROM: J. T. LING - ENVIRONMENTAL ENGRG. & POLLUTION CONTROL - 42-2W

Thank you for giving us the opportunity to comment on your draft of a report on "The Ecological Aspects of Fluorocarbon".

You have put together a good overview of the problems associated with the final disposition of man-made fluorocarbons.

We hope you will find the following comments based on our experiences with 3M fluorocarbons helpful as background in your evaluation of the overall problem:

General Comments

We would like to note that there are many unknowns regarding the environmental impact of fluorocarbons. We are continually striving to better understand these unknowns and solve the problems that these unknowns create as more knowledge is accumulated. For example:

1. Active intermediates formed during the manufacture of stable fluorocarbons present a significant disposal problem. We are continually working to reduce the amounts of these intermediates by better processing. In addition, we are trying to find improved disposal techniques.
2. The data substantiating the nonbiodegradability of fluorocarbons is very limited. Professor D. Wang of MIT, a 3M consultant, is of the opinion that some of our fluorocarbons are susceptible to biological degradation to intermediate products. Additional work in this area is needed.
3. While it is true that inert plastics would remain unchanged for years and years when landfilled, this presents no special problem. In fact, in some cases, these materials are beneficial in adding stability to the landfill as do sand, broken concrete, bricks, and similar materials.
4. The BOD test is an aerobic process. Biological degradation in a landfill is an anaerobic process. Additional data is required before extending results of the BOD test to what might be expected to occur in a landfill.

Exhibit  
2649

State of Minnesota v. 3M Co.,  
Court File No. 27-CV-10-28862

3MA02496585

2649.0001

Specific Comments

I Definition of a Fluorocarbon

(in your first paragraph)

Certain partially fluorinated hydrocarbons are reactive and are not stable. For this reason, we suggest you add to the definition the words "stable or inert" fluorocarbons.

IV Fluorocarbon plastics, elastomers

(in your second paragraph)

It is possible that fluorocarbons may not be easily burned. The 3M liquid waste incinerators are designed to operate at 1600° F., minimum. For these reasons we suggest you modify the middle of the second paragraph as follows: On the other hand if a piece of the above material is burned in oxygen or air at temperatures in excess of 900° C. the decomposition would theoretically occur as follows:

V Fluorochemical Fiber Treatments and Surfactants

(in your second paragraph)

We have conducted only limited tests on the degradability of various organic materials. For this reason we suggest the middle of the paragraph be modified as follows: From BOD and COD determinations of some of the 3M fluorocarbons, it is known that the hydrocarbon portions of these compounds are decomposed biologically (omit "in a landfill"). The undecomposed portion will be a perfluoro alkyl derivative such as a carboxylic or sulfonic acid. These products would be expected to be washed into the soil, where they would be expected to be adsorbed by the soil in an ion exchange type equilibrium mechanism.

We suggest you add at the end of this second paragraph: However, it is noted that the soil has a limited capacity for adsorbing these nonbiodegradable sulfonic acids.

(in your last paragraph)

While it is true that the leaching of dilute concentrations of fluorocarbon acid salts into ground water might not be a matter of concern, we believe that the leaching of any non-degraded liquid fluorocarbons into potable water supplies would be cause for concern.

You might consider adding a sentence along these lines; at the end of your last paragraph: However any non-degradable liquid hydrocarbons would not be landfilled, but rather would be properly burned.

We are sorry for the delay encountered in answering your request, however, if you would like to further discuss these comments, please do not hesitate to call.

*JTB/jb* P.S. This is our thoughts, pls feel free to "use" or "not use" any part of it.  
*gms*

