TO: R. L. BOHON - ENVIRONMENTAL LAB (EE&PC) - 21-2W-05
M. T. CASE - RIKER SAFETY EVALUATION - 218-3S-03
R. J. DAVIS - OFFICE OF GENERAL COUNSEL - 220-12E-02
J. D. JOHNSON - RIKER DRUG METABOLISM - 270-3S-05
W. C. MCCORMICK - TOXICOLOGY SERVICES - 220-2E-02
A. M. NORBERG - I&CS R&D REGULATORY AFFAIRS - 223-5N-06
W. H. PEARLSON - COMMERCIAL CHEMICALS DIV. - 223-6S-04
P. F. RIEHLE - CHEMOLITE FACTORY ADMINISTRATION - 41-1
D. E. ROACH - MEDICAL DEPARTMENT - 220-2E-02
T. J. SCHEUERMAN - OFFICE OF GENERAL COUNSEL - 220-12E-02
W. F. SCOWN - COMMERCIAL CHEMICALS DIV. MARKETING - 223-5S-04
S. D. SORENSON - INDUSTRIAL HYGIENE - 220-2E-02
J. K. SUGG - INDUSTRIAL HYGIENE ADM. - 220-2E-02
A. C. WEST - COMMERCIAL CHEMICALS LAB - 236-2B-01

c: F. D. Griffith - Toxicology Services - 220-2E-02
D. F. Hagen - Gen. Res. Analytical Services - 201-1W-29
L. C. Krogh - Executive - 220-14W-03
J. D. LaZerte - Commercial Chemicsl Lab - 236-1B-21
S. M. Leahy - Executive - 220-13E-33
J. J. McKeown - I&CS R&D Administration - 220-4E-01
R. E. Ober - Riker Drug Metabolism - 270-3S-05
F. A. Ubel - Medical Department - 220-2E-02

Fluorochemicals in Blood

To: TO LIST

From: A. M. NORBERG - I&CS R&D REGULATORY AFFAIRS - 223-5N-06
W. H. PEARLSON - COMMERCIAL CHEMICALS DIV. - 223-6S-04

Subject: Minutes of Fluorochemical Study Committee Meeting, March 16, 1983

Date: April 8, 1983

The Fluorochemical Study Committee met on March 16, 1983 with the following members and invited participants in attendance:

R. L. BOHON - ENVIRONMENTAL LAB (EE&PC) - 21-2W-05
* M. T. CASE - RIKER SAFETY EVALUATION - 218-3S-03
R. J. DAVIS - OFFICE OF GENERAL COUNSEL - 220-12E-02
J. D. JOHNSON - RIKER DRUG METABOLISM - 270-3S-05
* W. C. MCCORMICK - TOXICOLOGY SERVICES - 220-2E-02
* A. M. NORBERG - I&CS R&D REGULATORY AFFAIRS - 223-5N-06
* W. H. PEARLSON - COMMERCIAL CHEMICALS DIV. - 223-6S-04
* P. F. RIEHLE - CHEMOLITE FACTORY ADMINISTRATION - 41-1
* D. E. ROACH - MEDICAL DEPARTMENT - 220-2E-02
T. J. SCHEUERMAN - OFFICE OF GENERAL COUNSEL - 220-12E-02
W. F. SCOWN - COMMERCIAL CHEMICALS DIV. MARKETING - 223-5S-04
* S. D. SORENSON - INDUSTRIAL HYGIENE - 220-2E-02
J. K. SUGG - INDUSTRIAL HYGIENE ADM. - 220-2E-02
* A. C. WEST - COMMERCIAL CHEMICALS LAB - 236-2B-01

- - - - -
*Members of Fluorochemical Study Committee
- - - - -

The Committee met to review the current status of "fluorochemicals (FC)-in-blood" and discuss future FC worker monitoring and laboratory research directions.

Bill McCormick (Toxicology Services) reviewed toxicity studies completed and on-going. He summarized the FC toxicity standing today as:

- Building a stronger data base to describe the results of toxicity testing of FC.
- The results from teratogenicity studies are not cause for concern.
- Fluorochemicals are not mutagenic and to date not carcinogenic.

In follow-up discussions he suggested those areas for potential animal in vitro research with highest priority given to:

First: platelet aggregation effects
Second: immunosuppressive effects
Third: male reproductive effects **or** Third: hemopoetic system.

- Jim Johnson (Riker Drug Metabolism) reviewed FC metabolism studies and stressed the significant increased experience 3M has gained with methods that will greatly facilitate future research activities.

  Summarizing his research, Johnson stated radiometric data from small numbers of rats indicate:

  - FC-807 absorption after oral administration is due mostly to absorption of the monoester.
  - FC-95, FC-143, and N-ethyl FOSE are well absorbed after oral administration.
  - The anions of FC-95 and FC-143 and metabolites of N-ethyl FOSE are slowly excreted.
  - Cholestyramine treatment for several days enhances fecal elimination of radioactivity and decreases plasma and liver radioactivity after administration of labeled FC-95 or FC-143. In addition, probenecid appears to enhance urinary elimination of the anion of FC-143.

- Don Roach (Medical Department) presented a summary of the clinical work and future planned medical activities.

  Clinical Work:

  - Epidemiology mortality study results revealed no adverse deaths, slightly decreased incidence of coronary heart disease (CHD), and the healthy worker syndrome.
  - Clinical Health Evaluation continues with 80-90% voluntary participation.
  - Decatur Control Study results were presented.
  - Blood fluorine testing using Dr. V's biphenyl system. Generally the worker's blood fluorine levels are falling. In some specific areas where opportunities for higher exposure exist, the workers' fluorine blood levels have dropped at a slower rate and in a few incidences leveled.

Future Planning Includes:

- Phase II Health Evaluations changed to every two year basis, from more frequent intervals.
- Epidemiology to be brought up-to-date using records accumulated during last five years. Leonard M. Schuman did original FC study. 3M would contract with him for update.
- Assessment in higher exposure areas of ways to reduce further exposure, for example through personal hygiene and engineering modifications.

Roach will continue to monitor the health of 3M workers through the clinical Health Evaluations (every two years) and the FC levels of workers with 5-10 ppm in blood (every six months).

He expressed concern that the FC in worker's blood is not falling to the extent anticipated, and he asked if further reduction in worker exposure could be accomplished.

GENERAL RECOMMENDATIONS EMERGING:

- Continue to monitor workers' health and FC blood levels by Health Evaluations--that is, physical examinations every two years.
- Measure FC in blood every six months in workers with FC levels greater than 5 ppm.
- Advise workers through meetings to continue reducing FC exposure by different handling procedures and through altered personal hygiene.
- Eliminate dried FC materials in plant environment, if possible.
- Schuman should update epidemiology study.
- Investigate engineering modifications in higher exposure areas.
- In workers with higher FC blood levels (e.g., 15 ppm and greater), specific organic fluorine compounds in blood should be identified.

RESEARCH QUESTION POSED:

- What are the specific organic fluorine compounds in blood of workers?

  This involves working with Don Hagen (CRL) to see if it is feasible to adapt Hagen's gas chromatographic/Helium Microwave plasma detector (GC/MPD) system to worker blood samples. It is crucial to initiate this **soon** since larger volumes of blood will need to be drawn during the current and on-going Health Evaluations to accommodate these further studies.

SPECIFIC RECOMMENDATIONS:

- Once we know the specific organic fluorine compounds in workers' blood, efforts to relate human metabolism of FC to animal metabolism of FC should continue.

  Although a data base on metabolism and toxicity of FC in rats has been started, further toxicity studies might be suggested from identification of specific compounds in human blood and urine samples if these compounds have not been previously studied in toxicity tests. In addition, specific questions as to protein binding, body burden and the possibility of affecting the rate of elimination may be further addressed by experiments in the metabolism laboratory.

  It was agreed that we need to continue the Health Evaluation monitoring program **and** laboratory research programs to try to elucidate the effects 3M's FC have on our workers and potentially on consumers using our products.

A. M. Norberg
Secretary
Fluorochemical Study Committee

W. H. Pearlson
Chair
Fluorochemical Study Committee