Complainant's
Exhibit No. 17

AR226 - 1470

HH

CC: R. J. Burger
C. R. Campbell
J. R. Broadway
J. L. Granquist
R. J. Zipfel
P. Thistleton
G. H. Stoltz
C. A. Robinson
K. G. Kronberg
J. F. Doughty

# C-8 COMMUNICATIONS MEETING

## OUTLINE, TALK & CHARTS

C. E. STEINER
7/31/80

PERSONAL & CONFIDENTIAL

AJP002334

EID079399

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# C-8 COMMUNICATIONS MEETING OUTLINE

C. E. Steiner

## INTRODUCTION

- C-8's desirable process qualities
- Short C-8 history in TFE & FEP Manufacture

## TOXICITY

- Oral toxicity - slightly toxic
  - Compare to other compounds
- Skin contact - slightly to moderately toxic
- Inhalation toxicity - highly toxic
  - Compare to other compounds
  - Concentrations found in area are lower

## INITIAL BLOOD TESTS

- 3M Data
- Our Results

## RECOGNIZING EXPECTED OPERATOR QUESTIONS - A transition

- Some disbelieve based on past experience
- Short history of chemicals in industry showing why we are careful

## MEDICAL RECORD STUDIES

- No evidence of health problem
- Studies thorough

## PROVISIONAL AEL

- AEL committee has set provisional AEL of 0.55 mpb
- Not yet firm AEL
- This very low number is to protect people who work with C-8 every day
- The low provisional AEL and goal to reduce blood fluorine is the reason we are making changes in equipment and procedures.

## EQUIPMENT IMPROVEMENTS

- Goal to reduce exposure to solid C-8, airborn C-8 and C-8 solutions
- Ingredients addition hood and stack
- Eliminate Weighing Citric Acid in C-8 hood
- Raising Dryer Air supply Inlets
- Seal Dryer Leaks
- Additional Dryer Windows
- Increase Ventillation During Outages
- Removing C-8 from Dryer Exhausts

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## PROTECTIVE EQUIPMENT

### Clothing and Gloves

- Needs to be disposable to prevent secondary contamination.
- An EOD is being prepared to evaluate clothing.
- Different protection levels for 3 exposure classes

### Breathing

- Equipment improvements will reduce airborne C-8 but high C-8 concentrations will still remain in some areas.
- Breathing air will be installed - ultimate solution.
- Comfo II air respirator with GMAH cartridge acceptable.

## TESTING

### Personal Air Samples

- Will Resample.

### Blood Samples

- Blood sampling will be resumed.
- Frequent sampling is not necessary.

### Area Air Samples

- Will continue to define progress.
- Often exceed provisional AEL before improvements.

## SUMMARY

- C-8 is toxic but can be handled safely.
- People working with C-8 generally accumulate organic fluorine in the blood, and levels generally correlate with job exposure potential.
- Although this has caused no health effects continued exposure is not tolerable.
- Our basic goals are to reduce exposures to below the provisional AEL, and to reduce organic fluorine levels in blood of exposed workers and prevent accumulation in new workers.
- This will require equipment changes that are being done.
- It will also require use of disposable protective clothing and use of breathing air or respirators for certain jobs.

One other ingredientient is needed -- your cooperation in controlling this hazard.

CES
6/3/80

# C-8 COMMUNICATION MEETING

The purpose of this meeting is to bring everyone up to date on our findings regarding C-8, our immediate program , and our long term plans.

Most of you know that C-8 is a fluorochemical surfactant that is used for producing fine powder, dispersion, granular and FEP. It has unique properties that allow it to wet Teflon's surface, shorten reaction cycle time, stabilize dispersions and provide sites for reactions. It has been used for Teflon® manufacture for over 25 years. Other chemicals have been tested but none match C-8's properties. Four years ago it was introduced in FEP manufacture where it was a manufacturing improvement.

Let's look over the highlights of the Technical history of C-8. In 1965 tests showed that C-8 was slightly toxic when swallowed. This was not surprising. There is a dose level where almost every chemical becomes poisonous, even water. (Chart 1). This chart shows the oral toxicity of C-8 relative to some common chemicals. These tests were done on animals, and represent what dose would kill 50% of the animals tested. I've scaled up the dose from test data to animal weights comparable to an operator's weight. You can see that C-8 is not as toxic as acetone. It has a lower toxicity like table salt.

C-8, like table salt, can also be absorbed through the skin where it is about as toxic as it is orally. But, based on this low toxicity, no change in our safety program was necessary.

In 1969 it was found that C-8 was more toxic by inhalation, Chart 2. This second chart shows the approximate concentration that will kill test animals in a 4 hour period. This approximate lethal concentration for rats exceeds anything we have measured in the plant. The highest level ever measured in the plant is about 1/4 of that level -- and that a 1.1mpm leak at the feed end of No. 3 dryer which has been repaired. The other C-8 concentrations are generally about 1,000 to 10,000 times lower than this so people working in the area see no immediate effect. (.004-.04 mpm)

However, since 3M informed us in 1978 of organic fluorine being detected in the blood of their employees who worked with C-8, we have been reviewing and expanding our C-8 program. We have concluded that personnel routinely exposed to C-8 will absorb it in their body. Tests at Washington Works show that blood fluorine levels which indicate C-8 levels generally correlate with potential job exposure.

Repeated exposures can result in accumulation of C-8 in the blood. One of the things that we are studying with the blood samples is the rate that C-8 is eliminated from the body.

Some of the old timers remember when C-8 was treated with less respect and they wonder "Why is it suddenly harmful now?"

Throughout the chemical industries over the last 50 years this story has been repeated with the same disbelief but often with more drastic consequences.

For example, carbon tetrachloride was used to clean auto parts and as a fire extinguisher for years, and now it is known to cause damage in some people and is used with care. The same story has been repeated several times for things like chloroform (which was used in cough suryp), methyl alcohol and other chemicals.

The difference between the ending of the C-8 story and the others is that Du Pont is reacting while C-8 levels in the blood are low and before any damage is done in the body.

The medical data show that no one has been injured by C-8 (Chart 4). The Medical Division after a thorough study has concluded that ". . .there is no conclusive evidence of an occupationally related health problem among workers exposed to C-8." All that was noted was a small increase in two liver enzyme levels. After 25 years of handling C-8 we see no damage among the workers. However, the potential is there -- C-8 has accumulated in the blood.

Because of this accumulation we have decided to undertake programs to minimize accumulation of C-8 in the blood of new workers.

The AEL Committee of Haskell Laboratories has set a provisional Allowable Exposure Limit or "AEL" at 0.55 mpb of C-8 in air. This very low proposal is based on a safety factor of 800 below the level where reversible liver effects were observed. An AEL is the same thing as a TLV or EGL -- it is a safe concentration in the air of a working environment.

In order to meet the expected low AEL, equipment changes are necessary to protect from solid, liquid and airborn C-8.

The next transparencies show the changes that have been made recently to protect against C-8 exposure. To date we have:

- Modified the Fine Powder/Dispersion ingredients addition hood to reduce C-8 emissions and bring the mixing operations into the hood. C-8 tools will also be stored in the hood where possible.
- Improved the C-8 addition hood exhaust stack. The hood exhaust stack was close to an H & V inlet on the roof.
- Removed operations that don't have to be done in the C-8 hood -- like citric acid weighing. This has reduced exposure of concentration to the operators.

The dryers have been improved also:

- Air supply inlets have been raised to remove C-8 rich air from the ceiling.

- Seals of No. 3 dryer doors and seams have been improved.
- Inspection windows have been added to reduce need to open dryer doors.

We have also put guards inside the dryer that will permit using the exhaust fans to remove C-8 when dryers are being cleaned. This has reduced some C-8 concentrations, but more work is to be done; for example, we plan to cover injection pump tanks, seal openings in floor and vent oscillating feeder compartments, sealing No. 3 dryer fans.

The next chart shows the three different protection levels required for three exposure classes: Low dry exposure, high dry exposure and wet exposure. A disposable garments of the appropriate design, gloves and air protection are recommended for each of these exposure classes. Sample garments have been selected and an EOD will be run to evaluate this clothing. Tyvek® was selected over cloth or paper garments because it is light fairly resistant to tearing, a good filter and disposable. Disposability is required to prevent secondary contamination when laundering. During this EOD, sample garments will be tried and evaluated by operators and mechanics.

C-8 will permeate all glove materials over a period of time. New flock lined latex gloves will be used in jobs where C-8 exposure is likely. Even these gloves will be permeated by C-8 over a period of time, so these gloves will be disposed of after each shift.

Breathing protection is very important to reducing C-8 exposures. Equipment improvements will reduce airborn C-8 in most areas but there will still be areas where exposure is possible. A COMFO II air respirator with a special GMAH cartridge is required as a minimum. Breathing air is better and will be available soon. The yellow 3M masks are not acceptable.

I've had some questions on future C-8 air samples and blood samples. We now have our baseline data and have mapped out the problem areas. The procedures are modified and equipment improved so C-8 exposures will be reduced.

Blood sampling will probably be done on an annual basis in the future to define the real improvements in C-8 control.

Let me summarize the items covered:

- C-8 is toxic, but it can be used and controlled below the proposed toxic limit.
- In the past, people working with C-8 have accumulated organic fluorine in the blood and levels generally correlate with job exposure potential.
- Although this has caused no health effects, continued exposure should be minimized with controls.
- Our objective is to reduce exposures to below the provisional AEL, and to reduce organic fluorine levels in blood of exposed workers and to limit accumulation in new workers.

- This will require equipment changes that are partially complet
- It will also require use of disposable protective clothing and use of breathing air or respirators for certain jobs.
- One other ingredient is needed -- Total Division cooperation in controlling this material.

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## CHART 1

## ORAL TOXICITY

(DOSES LETHAL TO ABOUT 50% OF ANIMALS)

| | OZ./150 LB. ANIMAL | |
|---|---|---|
| ACETONE | 0.2 | (DOG) |
| C-8 | 1.0 | (DOG) |
| TABLE SALT | 7.2 | (RAT) |
| METHYLENE CHLORIDE | 7.2 | (RAT) |

## CHART 2

## INHALATION TOXICITY

(APPROXIMATE LETHAL CONCENTRATIONS FOR 4-HOUR EXPOSURES WITH RATS)

| | MPM* |
|---|---|
| C-8 | 41 |
| METHANOL | 300 |

* MPM = MOLES PER MILLION -- SAME AS PARTS PER MILLION BY VOLUME.



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## CHART 4

## MEDICAL STUDIES

- MEDICAL DIVISION 1/25/80 STATEMENT BASED ON LIVER ENZYME STUDY -- " . . . . THERE IS NO CONCLUSIVE EVIDENCE OF AN OCCUPATIONALLY RELATED HEALTH PROBLEM AMONG WORKERS EXPOSED TO C-8."

- 3M MEDICAL DIRECTOR IN 3/14/80 MEETING WITH DU PONT STATED THAT THEY HAVE NOT IDENTIFIED ANY SIGNIFICANT INDUSTRIAL DISEASE RELATED TO C-8 EXPOSURE.

- NO EVIDENCE OF HEALTH PROBLEMS IN MORE THAN 25 YEARS USE OF C-8. HANDLING PRACTICES IN EARLIER YEARS HAD GREATER EXPOSURE POTENTIAL THAN RECENT OPERATIONS.

## CONCLUSION

- NO CONCLUSIVE EVIDENCE OF HEALTH PROBLEMS RELATED TO C-8 EXPOSURE.

# C-8 EXPOSURE CLASS
## AND PROTECTIVE CLOTHING SUMMARY

| Class 1 | Class 2 | Class 3 |
|---|---|---|
| DRY LOW EXPOSURE | DRY HIGH EXPOSURE | WET EXPOSURE |
| • Disposable TYVEK® coat or smock | • Disposable TYVEK® coveralls with hood or cap | • Disposable coated TYVEK® coveralls with hood or coated smock and coated pants |
| • Disposable latex gloves (or orange rubber gloves if yellow latex is unavailable) | • Disposable latex gloves<br>• Black rubber boots | • Disposable latex gloves<br>• Black rubber boots |

NOTE: Breathing air or COMFO II respirator with GMAH cartridge is also recommended for all exposures, but are not included as part of this test.

CES/ilm
5/13/80

## SUMMARY

- C-8 IS TOXIC
- PEOPLE ACCUMULATE C-8
- NO HEALTH EFFECTS AT PRESENT LOW LEVELS
- GOALS:
  - TO REDUCE EXPOSURE BELOW AEL
  - TO REDUCE ORGANIC FLUORINE IN BLOOD
- REQUIRES:
  - EQUIPMENT CHANGES
  - DISPOSABLE PROTECTIVE CLOTHING AND GLOVES
  - BREATHING AIR OR COMFO II
  - COOPERATION

Z-47 REV 1-80

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
P. O. BOX 1217
PARKERSBURG, W. VA. 26101

POLYMER PRODUCTS DEPARTMENT

CC: E. D. Champney, Jr. - Wilm.
D. K. Duncan - Wilm.
J. W. Raines/R. M. Shepherd-Wil
R. J. Burger
R. E. Putnam

September 30, 1980

PERSONAL AND CONFIDENTIAL

TO: T. F. JORDAN
TOKYO

J. S. LINDELL
DORDRECHT

FROM: PAUL THISTLETON
WASHINGTON WORKS

TEFLON® DIVISIONS - C-8 (FC-143) CONTROL

Attached is a copy of the "Status and Program" that was reviewed at our Teflon® Divisions' C-8 meeting on Sept. 25, 1980.

Please let me know if you have comments or questions.

Attachment

PT/nsw

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# TEFLON® DIVISIONS C-8 (FC-143) CONTROL

## STATUS AND PROGRAM

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| | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MARCH |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1981 | | |
| **A. COMMUNICATION MEETINGS** | | | | | | | | | |
| (1) August - Nine shift meetings held for Mechanics, Operators and Research Semiworks Operators. Kronberg and Steiner reviewed C-8 toxicity, discussed engineering controls, protective equipment, etc. | | X | | | | | | | |
| (2) Oct. - Meeting(s) will be held for laboratorians. | | | | X | | | | | |
| **B. EPIDEMIOLOGY STUDIES** | | | | | | | | | |
| (1) 1/25 - Medical Division Statement based on liver enzyme study - ". . . there is no conclusive evidence of an occupationally related health problem among workers exposed to C-8." (report expected in Oct.). | | | | | | | | | |
| (2) July - Teflon® area workers had no significant excess of heart attacks compared with rest of plant. | X | | | | | | | | |
| (3) July - Teflon® area workers had no significant difference in blood pressure from a control group with no Teflon® (or C-8) exposure (adjusted for age, smoking,etc) | X | | | | | | | | |
| (4)August - 3M Medical Dept. published a paper, "Health status of plant workers exposed to fluoro-chemicals - a preliminary report." in the American Industrial Hygiene Association Journal. | | X | | | | | | | |

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| | | | | | | | | | | 1981 | |
| C. BLOOD ANALYSES | | | | | | | | | | | |
| (1) | May | - Comparison at Jackson Lab showed good agreement of 3M (Bomb) and Du Pont (Torch) methods at low levels (0.3 and 1.2 ppm fluorine). | | | | | | | | | |
| (2) | May | - C-8 Specific method demonstrated at ESL (improved 3M method). | | | | | | | | | |
| (3) | 8/1 | - Letter detailing blood sampling program issued. Includes comparison of analytical methods and discussion of data interpretation. | | X | | | | | | | |
| (4) | 8/4 | - Release of employee communication "Fluoro-surfactants in Blood" started. It described blood sampling plans and summarized overall program. | | X | | | | | | | |
| (5) | August | - ESL established for C-8 Specific blood analyses. | | X | | | | | | | |
| (6) | August | - Sampling started for comparison of test methods. | | X | | | | | | | |

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| | | | | | | | | 1981 | |
| **C. BLOOD ANALYSES - (continued)** | | | | | | | | | |
| (7) 9/2 - Comparison of C-8 Specific and Torch methods started at ESL. About 25 samples from WW Teflon® workers will be tested. | | | X | | | | | | |
| (8) Nov. - Decide which method should be used for routine analyses. | | | | | X | | | | |
| (9) Nov. - Start routine sampling as outlined in 8/1/80 letter. | | | | | X | | | | |
| **D. TOXICITY TESTS AND EXPOSURE LIMITS** | | | | | | | | | |
| (1) 2/11-2/29 - Inhalation subacute test exposure period. | | | | | | | | | |
| (2) 2/22 - Blood analyses finished for skin subacute tests. | | | | | | | | | |
| (3) August - Haskell Lab ingestion studies showed no significant sex differences in lethal doses for guinea pigs, mice and rats. Tests made by 3M showed that female rats eliminate C-8 much faster than males. | | X | | | | | | | |
| (4) Oct. - Initial blood results from inhalation subacute tests. | | | | X | | | | | |

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| | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MARCH |
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| | | | | | | | | 1981 | |
| D. TOXICITY TESTS AND EXPOSURE LIMITS - (continued) | | | | | | | | | |
| (5) Sept. - Haskell Lab report on skin subacute tests to be issued. | | | X | | | | | | |
| (6) Jan '81 - AEL Committee Review | | | | | | | X | | |
| E. C-8 SUPPLY | | | | | | | | | |
| (1) 7/31 - 3M representatives visited WW to promote rapid conversion from current solid C-8 (from ribbon dryer) to spray dried C-8. Change in dryer eliminates many of their environmental problems. Activity on C-8 solution terminated (at least temporarily). | X | | | | | | | | |
| (2) August - 450 lb. spray dried C-8 C-8 received from 3M for evaluation. | | X | | | | | | | |
| (3) Sept. - Fine powder, granular and FEP made using spray dried C-8 in EOD tests. Dispersion polymerization reaction rate 10 - 15% below normal. Granular polymer thermal stability below normal. May be a problem with operator acceptance because C-8 is very fine and clings to scoops. | | | X | | | | | | |
| (4) 9/17 - 3M representatives visited WW to review spray dried C-8 evaluation. More semiworks evaluation of samples will be made before plant tests. | | | X | | | | | | |

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| | | | | | | | | | 1981 | |
| F. | C-8 REPLACEMENT | | | | | | | | | |
| (1) | 3/4 - Evaluation of "in-situ" surfactant recommended. (Morgan/Thistleton letter) | | | | | | | | | |
| (2) | May - Semiworks products made with three fluorinated surfactants appear to yield satisfactory end product. Evaluation continues. | | | | | | | | | |
| (3) | 5/8 - PMN* testing program reviewed at Haskell Lab. Tests will include monitoring blood fluoride levels. | | | | | | | | | |
| (4) | August - Tests authorized. Timing depends on availability of material. | | X | | | | | | | |
| (5) | ** - FEP Plant Test. | | | | | | | | | |

* Premanufacture notice as required by TOSCA.
** Timing depends on toxicity testing and plant availability.

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| | | | | | | | 1981 | | |
| **I. ENGINEERING CONTROLS - FEP** | | | | | | | | | |
| (1) Sept. - Completed COD TY-077 Eliminate free falling streams in clean room by installing eductors under V-Disc press and Torus Disc dryer scrubber. -- ($32,000) | | | X | | | | | | |
| (2) Coagulator to fluff bin seal. | | | | | | | | | |
| July - Drafting request. | X | | | | | | | | |
| Oct. - COD issue. | | | | X | | | | | |
| Dec. - Installed on one coagulator | | | | | | X | | | |
| (3) New recycle tank to return recycle tank fluff to fluff blender instead of manual dipping. | | | | | | | | | |
| Sept. - COD circulating ($36,000) | | | X | | | | | | |
| Feb. - New tank installed. | | | | | | | | X | |
| (4) Eliminate the once/shift dumping of coagulator bag filter. | | | | | | | | | |
| Aug. - COD TY-127 approved ($7800). | | X | | | | | | | |
| Nov. - Installed | | | | | X | | | | |
| (5) Provide means to vacuum sump rather than scoop polymer - COD TY-085 ($5900) | | | | | | | | | |
| Sept. - Equipment due. | | | X | | | | | | |
| Oct. - In use. | | | | X | | | | | |

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| | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MARCH |
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| | | | | | | | 1981 | | |
| I. ENGINEERING CONTROLS - FEP - (continued) | | | | | | | | | |
| (6) Engineering controls at trayout. | | | | | | | | | |
| July - Rec'd recommendations from Fernandes, ESD Consultant, on dust control and ventilation. | X | | | | | | | | |
| Aug. - Drafting request. | | X | | | | | | | |
| Nov. - COD issue - ($40,000) | | | | | X | | | | |
| May '81 - Installation. | | | | | | | | | |
| (7) Eliminate polymer exhaust from coagulation bag filter. | | | | | | | | | |
| Sept - Receive bags from vendor for evaluation. | | | X | | | | | | |
| Nov. - Install first set. | | | | | X | | | | |
| Dec. - Install second set, if necessary. | | | | | | X | | | |
| Jan. - Install third set, if necessary. | | | | | | | X | | |
| Feb. - Determine final effluent concentration and determine necessary stack height. | | | | | | | | X | |
| (8) Eliminate the manual dumping of the central vacuum system. | | | | | | | | | |
| Oct. - COD issue - ($17,750). | | | | X | | | | | |
| March '81 - Installed. | | | | | | | | | X |

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1981

| I. ENGINEERING CONTROLS - FEP - (continued) | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MARCH |
|---|---|---|---|---|---|---|---|---|---|
| (9) Raise exhaust stacks of coagulation and wet finishing bag filters. | | | | | | | | | |
| March - Determine final concentration after bag test. | | | | | | | | | X |
| April - Contact Wevodau for height needed. | | | | | | | | | |
| May - COD issue. | | | | | | | | | |
| (10) Investigate Shoe cleaner. | | | | | | | | | |
| July - Installed but removed from service twice due to decanter overflows. | X | | | | | | | | |
| (11) Determine effect of Torus Disc product temperature on C-8 concentration. | | | | | | | | | |
| Sept. - Asked ADG to set up bench scale work because too much plant penalty. | | | X | | | | | | |
| Nov. - Complete bench scale work and issue findings. | | | | | X | | | | |
| (12) Prevent hot steams containing polymer/ C-8 from flowing through sumps. | | | | | | | | | |
| Sept. - COD TY-183 ($4700). | | | X | | | | | | |
| Dec. - Installation | | | | | | X | | | |

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STATUS AND PROGRAM

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| | | | | | | | | 1981 | |
| I. ENGINEERING CONTROLS - FEP (continued) | | | | | | | | | |
| (13) Monitoring of equipment with RAM (Real-time Aerosol Monitor) to determine effectiveness of seals. | | | | | | | | | |
| Jan. - Restart program. | | | | | | | X | | |
| (14) Improve ventilation in clean room through use of diamond plate on top of grating. | | | | | | | | | |
| COD on hold pending outcome of eductor COD. | | | | | | | | | |

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| | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | 1981 JAN. | FEB. | MARCH |
|---|---|---|---|---|---|---|---|---|---|
| **J. ENGINEERING CONTROLS-FINE POWDER/DISPERSION** | | | | | | | | | |
| (1) May - completed COD TX-586 - Raise Fine Powder dryer air supply inlets to exhaust additional airborne C-8 ($1,200). | | | | | | | | | |
| (2) May - completed COD TY-047 - Internal Fine Powder dryer fan guards to exhaust airborne C-8 during outages - ($8,500). | | | | | | | | | |
| (3) May - completed COD TY-048 - Additional inspection windows for Fine Powder dryers ($2,500). | | | | | | | | | |
| (4) May - completed COD TY-061 - Improve dispersion ingredients hood and its exhaust stack - ($5,000). | | | | | | | | | |
| (5) May - Improved sealing of Fine Powder Dryers - included better door seals and sealing between dryer sections. | | | | | | | | | |
| (6) Oct. - Further improvements to be made in dryer sealing. | | | | X | | | | | |
| (7) Reduce Fine Powder Dryer Exhaust Stacks' C-8 emissions - ($100,000). | | | | | | | | | |
| Nov. - COD approval | | | | | X | | | | |
| May '81 - Installation | | | | | | | | | |
| (8) Oct. - Seal holes in floor above Fine Fine Powder Dryers to reduce C-8 concentration upstairs. | | | | X | | | | | |
| (9) Increase exhaust capacity from #2 Dryer. | | | | | | | | | |
| Oct. - COD issue. | | | | X | | | | | |
| Feb. - Installation | | | | | | | | X | |

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# TEFLON® DIVISIONS C-8 (FC-143) CONTROL

## STATUS AND PROGRAM


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| **A. COMMUNICATION MEETINGS** | | | | | | | | | |
| (1) August - Nine shift meetings held for Mechanics, Operators and Research Semiworks Operators. Kronberg and Steiner reviewed C-8 toxicity, discussed engineering controls, protective equipment, etc. | | X | | | | | | | |
| (2) Oct. - Meeting(s) will be held for laboratorians. | | | | X | | | | | |
| **B. EPIDEMIOLOGY STUDIES** | | | | | | | | | |
| (1) 1/25 - Medical Division Statement based on liver enzyme study - ". . . there is no conclusive evidence of an occupationally related health problem among workers exposed to C-8." (report expected in Oct.). | | | | | | | | | |
| (2) July - Teflon® area workers had no significant excess of heart attacks compared with rest of plant. | X | | | | | | | | |
| (3) July - Teflon® area workers had no significant difference in blood pressure from a control group with no Teflon® (or C-8) exposure (adjusted for age, smoking, etc) | X | | | | | | X | | |
| (4) August - 3M Medical Dept. published a paper, "Health status of plant workers exposed to fluorochemicals - a preliminary report." in the American Industrial Hygiene Association Journal. | | X | | | | | | | |

1/8 of Teflon area workers are on antihypertensive drugs whereas 3/8 C-8 workers are on antihypertensive drugs. However, a sample of 8 persons - can't really say it's statistically significant. Also, only took one set of blood pressure readings - These vary somewhat by the each person taking them - should take a set of 2 or 3 readings.

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| **C. BLOOD ANALYSES** | | | | | | | | | |
| (1) May - Comparison at Jackson Lab showed good agreement of 3M (Bomb) and Du Pont (Torch) methods at low levels (0.3 and 1.2 ppm fluorine). | | | | | | | | | |
| (2) May - C-8 Specific method demonstrated at ESL (improved 3M method). | | | | | | | | | |
| (3) 8/1 - Letter detailing blood sampling program issued. Includes comparison of analytical methods and discussion of data interpretation. | | X | | | | | | | |
| (4) 8/4 - Release of employee communication "Fluoro-surfactants in Blood" started. It described blood sampling plans and summarized overall program. | | X | | | | | | | |
| (5) August - ESL established for C-8 Specific blood analyses. | | X | | | | | | | |
| (6) August - Sampling started for comparison of test methods. | | X | | | | | | | |

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| **C. BLOOD ANALYSES - (continued)** | | | | | | | | | |
| (7) 9/2 - Comparison of C-8 Specific (GC) and Torch methods started at ESL. ~~About~~ 28 samples from WW Teflon® workers ~~will be~~ tested. | | | X | | | | | | |
| C-8/GC method recommended | | | | | | | | | |
| (8) Nov. - ~~Decide which method should be used~~ for routine analyses. | | | | | X | X | | | |
| Use of C-8/GC method approved by Manufacturing Division | | | | | | | | | |
| (9) ~~Nov.~~ Feb - Start routine sampling as outlined in 8/1/80 letter. | | | | | X | | | X | |
| **D. TOXICITY TESTS AND EXPOSURE LIMITS** | | | | | | | | | |
| ~~(1) 2/11 - Inhalation subacute test exposure period. 2/29~~ | | | | | | | | | |
| ~~(2) 2/22 - Blood analyses finished for skin subacute tests.~~ | | | | | | | | | |
| (3) August - Haskell Lab ingestion studies showed no significant sex differences in lethal doses for guinea pigs, mice and rats. Tests made by 3M showed that female rats eliminate C-8 much faster than males. | | X | | | | | | | |
| (4) Oct. - Initial blood results from inhalation subacute tests. | | | | X | | | | | |

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| D. TOXICITY TESTS AND EXPOSURE LIMITS - (continued) | | | | | | | | | |
| (5) ~~Sept.~~ Oct - Haskell Lab report on skin subacute tests ~~to~~ ~~be~~ issued. | | | X | | | | | | |
| (6) ~~Jan '81~~ April - AEL Committee Review | | | | | | | X | | |
| E. C-8 SUPPLY | | | | | | | | | |
| (1) 7/31/~~80~~ 3M representatives visited WW to promote rapid conversion from current solid C-8 (from ribbon dryer) to spray dried C-8. Change in dryer eliminates many of their environmental problems. Activity on C-8 solution terminated (at least temporarily). | X | | | | | | | | |
| (2) August ~~80~~ 450 lb. spray dried C-8 C-8 received from 3M for evaluation. | | X | | | | | | | |
| (3) Sept. ~~80~~ - Fine powder, granular and FEP made using spray dried C-8 in EOD tests. Dispersion polymerization reaction rate 10 - 15% below normal. Granular polymer thermal stability below normal. May be a problem with operator acceptance because C-8 is very fine and clings to scoops. | | | X | | | | | | |
| (4) 9/17/~~80~~ 3M representatives visited WW to review spray dried C-8 evaluation. More semiworks evaluation of samples will be made before plant tests | | | X | | | | | | |

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F. C-8 REPLACEMENT

(1) ~~3/4 - Evaluation of "in-situ" surfactant recommended. (Morgan/Thistleton letter)~~

(2) May '85 - Semiworks products made with three fluorinated surfactants appear to yield satisfactory end product. Evaluation continues.

(3) 5/8/85 - PMN* testing program reviewed at Haskell Lab. Tests will include monitoring blood fluoride levels.

(4) August '80 - Tests authorized. Timing depends on availability of material. X

(5) ** - FEP Plant Test.

* Premanufacture notice as required by TOSCA.
** Timing depends on toxicity testing and plant availability.

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| **G. AIR MONITORING** | | | | | | | | | |
| (1) April - 7 day personal sampling program for Fine Powder & FEP Wet Finishing Operators showed 60 to 80% above 0.6 mpb limit. | | | | | | | | | |
| (2) Sept. - 7 day personal samples for Fine Powder Dryer Operators had an average of 0.25 mpb with no values above limit. | | | X | | | | | | |
| (3) Sept. - 7 day personal samples for FEP Wet Finishing Operators had an average of 0.91 mpb. Personal samples in April had an average of 0.95 mpb. | | | X | | | | | | |
| (4) * - Repeat personal sampling for Fine Powder and Wet Finishing Operators and FEP PK operators. | | | | | | | | | |
| **H. AIR MONITORING PROCEDURE** | | | | | | | | | |
| (1) May - Comparison of methylene blue and C-8 Specific methods (developed at ESL) using split sample shows excellent agreement. | | | | | | | | | |
| (2) May - Chloroform/Azure A Method developed from Dutch method by C. S. Cope. | | | | | | | | | |
| (3) 9/2 - C-8 Specific method available for review at WW. | | | X | | | | | | |
| (4) Oct. - Recommend preferred method for routine use. | | | | X | | | | | |

* Will depend on completion of Engineering Controls.



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| I. ENGINEERING CONTROLS - FEP | | | | | | | | | |
| (1) Sept. - Completed COD TY-077 Eliminate free falling streams in clean room by installing eductors under V-Disc press and Torus Disc dryer scrubber. -- ($32,000) | | | X | | | | | | |
| (2) Coagulator to fluff bin seal. | | | | | | | | | |
| July - Drafting request. | X | | | | | | | | |
| Oct. - COD issue. | | | | X | | | | | |
| Dec. - Installed on one coagulator | | | | | | X → | | X | |
| (3) New recycle tank to return recycle tank fluff to fluff blender instead of manual dipping. | | | | | | | | | |
| Sept. - COD circulating ($36,000) | | | X | | | | | | |
| July ~~Feb.~~ - New tank installed. | | | | | | | | | |
| (4) Eliminate the once/shift dumping of coagulator bag filter. | | | | | | | | | |
| Aug. - COD TY-127 approved ($7800). | | X | | | | | | | |
| Nov. - Installed (done) | | | | | → | X | | | |
| (5) Provide means to vacuum sump rather than scoop polymer - COD TY-085 ($5900) | | | | | | | | | |
| Sept. - Equipment due. | | | X | | | | | | |
| Oct. - In use. | | | | | | | | | |
| Nov - Failed Trail Retest/Redesign | | | | | X | | | | |

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| I. ENGINEERING CONTROLS - FEP - (continued) | | | | | | | | | |
| (6) Engineering controls at trayout. | | | | | | | | | |
| July - Rec'd recommendations from Fernandes, ESD Consultant, on dust control and ventilation. | X | | | | | | | | |
| Aug. - Drafting request. Prototype being built for Prod/mech. | | X | | | | | | | |
| ~~Nov. - COD issue ($40,000)~~ Review COD TX677 | | | | | X | | | X | X |
| ~~Review~~ Results on Prototype (if successful) | | | | | | | | | |
| ~~May '81~~ Oct '81 - Installation. (if prototype acceptable) | | | | | | | | | |
| (7) Eliminate polymer exhaust from coagulation bag filter. | | | | | | | | | |
| Sept - Receive bags from vendor for evaluation. | | | X | | | | | | |
| Nov. - ~~Install first set.~~ Substantial Improvement in Total Discharge | | | | | X | | | | |
| Dec. - ~~Install second set, if necessary.~~ Notice slight Dust Break thru but total discharge same as Nov. | | | | | | X | | | |
| Jan. - ~~Install third set, if necessary.~~ Plan to go with Teflon treated bags when we combine full T-100 system with good weather (late as March-April). | | | | | | | X | | |
| ~~Feb. - Determine final effluent concentration and determine necessary stack height.~~ | | | | | | | | X | |
| May - Determine final effluent concentration & determine necessary stack height | | | | | | | | | |
| (8) Eliminate the manual dumping of the central vacuum system. | | | | | | | | | |
| Oct. - COD issue - ($17,750). | | | | X | | | | | |
| March '81 - Installed. | | | | | | | | | X |

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| I. ENGINEERING CONTROLS - FEP - (continued) | | | | | | | | | |
| (9) Raise exhaust stacks of coagulation and wet finishing bag filters. | | | | | | | | | |
| ~~March~~ May - Determine final concentration after bag test. | | | | | | | | | X |
| ~~April~~ June - Contact Wevodau for height needed. | | | | | | | | | |
| ~~May~~ July - COD issue. | | | | | | | | | |
| (10) Investigate Shoe cleaner. | | | | | | | | | |
| July - Installed but removed from service twice due to decanter overflows. | X | | | | | | | | |
| JAN. - Re-installed at new location | | | | | | | X | | |
| (11) Determine effect of Torus Disc product temperature on C-8 concentration. | | | | | | | | | |
| Sept. - Asked ADG to set up bench scale work because too much plant penalty. | | | X | | | | | | |
| ~~Nov.~~ Dec. - Complete bench scale work and issue findings. | | | | | X → | X | | | |
| (12) Prevent hot steams containing polymer/ C-8 from flowing through sumps. | | | | | | | | | |
| Sept. - COD TY-183 ($4700). | | | X | | | | | | |
| ~~Dec.~~ JAN. - Installation (done) | | | | | | X → | X | | |



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TEFLON® DIVISIONS C- (FC-143) CONTROL

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| I. ENGINEERING CONTROLS - FEP (continued) | | | | | | | | | |
| (13) Monitoring of equipment with RAM (Real-time Aerosol Monitor) to determine effectiveness of seals. Feb - ~~Jan~~. - Restart program. | | | | | | | X | | |
| (14) Improve ventilation in clean room through use of diamond plate on top of grating. | | | | | | | | | X |
| COD on hold pending outcome of eductor COD. | | | | | | | | | |
| (15.) ~~Tem~~ Additional Breathing Air Facilities - FEP ($66.5M) → AIR SUPPLIED SYS. | | | | | | | | | |
| Authorize COD - JAN | | | | | | | X | | |
| Complete Installation - MAR | | | | | | | | | X |
| House keeping Improvements | | | | | | | | | |
| (1) MAJOR WINANS CLEANUP OF FEP BUILDING (~~$~~ 5/M CONTRACT FOR TOTAL OF 4 CLEANUPS) | | | | | | | | | |
| Issued Purch Req - JAN | | | | | | | X | | |
| 1ST CLEANING → FEB | | | | | | | | X | |
| MONITOR AREA FOR C-8 & DECIDE TIMING FOR 2ND CLEANING | | | | | | | | | X |



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| **J. ENGINEERING CONTROLS-FINE POWDER/DISPERSION** | | | | | | | | | |
| (1) May - completed COD TX-586 - Raise Fine Powder dryer air supply inlets to exhaust additional airborne C-8 ($1,200). | Complete ~ March | | | | | | | | |
| (2) May - completed COD TY-047 - Internal Fine Powder dryer fan guards to exhaust airborne C-8 during outages - ($8,500). | Complete 5/80 | | | | | | | | |
| (3) May - completed COD TY-048 - Additional inspection windows for Fine Powder dryers ($2,500). | Comp 5/80 | | | | | | | | |
| (4) May - completed COD TY-061 - Improve dispersion ingredients hood and its exhaust stack - ($5,000). | Comp 5/80 | | | | | | | | |
| (5) May - Improved sealing of Fine Powder Dryers - included better door seals and sealing between dryer sections. | Comp 5/80 | | | | | | | | |
| (6) Oct. - Further improvements to be made in dryer sealing. | | | X | X | | | | | |
| (7) Reduce Fine Powder Dryer Exhaust Stacks' C-8 emissions - ($100,000). | | | | | | | | | |
| Nov. - COD approval | | | | | X | No. 2 X | | No. 3 X | |
| May '81 - Installation | OK | | | | | | | | |
| (8) Oct. - Seal holes in floor above Fine Fine Powder Dryers to reduce C-8 concentration upstairs. | | | | X | X | | | | |
| (9) Increase exhaust capacity from #2 Dryer. | | | | | | | | | |
| Oct. - COD issue. | | | | X | | | | | |
| Feb. - Installation | | | | | | | | X | |

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| **K. PROTECTIVE EQUIPMENT - RESPIRATORS** | | | | | | | | | |
| **Comfo II** | | | | | | | | | |
| (1) 3/5 - Use of GMA-H cartridges (combination high efficiency filter and activated charcoal) approved by R. F. Kinter, Chairman, Respiratory Protection Subcommittee. | | | | | | | | | |
| (2) March-June - GMA-H cartridges established for routine use. | | | | | | | | | |
| (3) May - GMA-H cartridge tested at Haskell Lab with 1 mg/m$^3$ C-8 (100X proposed limit) feed. Capacity exceeds 40 hours. | | | | | | | | | |
| (4) 9/15 - Report on cartridge tests issued (HLR 664-80). It should provide a basis to extend cartridge use to a month. This is under review. | | | X | | | | | | |
| **Air Supplied Systems** | | | | | | | | | |
| (5) May/June - Field tested 3M Hardcap system. | | | | | | | | | |
| (6) July - Recommended to Production to provide 3M Hardcap units for all Wet Finishing personnel. | X | | | | | | | | |
| (7) May - ACCEPTED BY PRODUCTION completed COD TY-045 ($7290) for breathing air stations in FEP area. | | | | | | | | | |
| (8) Sept.- completed COD TY-082 ($1,994) for breathing air station for weigh station. | | | X | | | | | | |
| (9) 3/11 - COD TY-051 ($16,750) for breathing air stations in Polymers area authorized. | | | | | | | | | |
| Oct. - Breathing air stations in service. | | | | X | | | | | |
| (10) ADD'L BREATHING AIR FACILITIES - FEP | | | | | | | | | |

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| **L. PROTECTIVE EQUIPMENT - CLOTHING** | | | | | | | | | |
| Disposable Clothing & Gloves | | | | | | | | | |
| (1) 8/28 - Started field test of protective clothing. | | X | | | | | | | |
| (2) Nov. - Start field test of protective clothing with more breathing capability. | | | | | X | | | | |
| (3) Feb 80 - Stock approved protective clothing in Stores. | | | | | | | | X | |
| (4) May - Started routine use of #L-61 latex rubber gloves in Fine Powder/Dispersion and FEP Areas. | | | | | | | | | |

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