

## ACUTE TOXICITY TO FISH

### TEST SUBSTANCE

**Identity:** A mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-185F. (1-Octanesulfonic acid) (CAS # 2795-39-3)

**Remarks:** The 3M production lot number was 1-2303. The test sample is FC-185F, cc 817-19. Current information indicates it is a mixture of 4% PFOS, 36% diethylene glycol butyl ether, 29.29% water, 14% ethylene glycol, 8% Sultone foamer, 8.35% sodium octyl sulfate, 0.3% sodium lauryl sulfate, and 0.06% tolyltriazole.

***The following summary applies to a mixture with incompletely characterized concentrations of impurities. Data may not accurately reflect the toxicity of the fluorochemical component of the test sample.***

### METHOD:

**Method:** ASTM-E729-80

**Type:** Static acute

**GLP:** No

**Year completed:** 1982

**Species:** *Pimephales promelas*

**Supplier:** Dale Fattig Fish Farm, Brady, NB

**Analytical monitoring:** Temperature, pH, and DO

**Exposure period:** 96-hours

**Statistical methods:** LC<sub>50</sub> values calculated using both moving average angle and probit programs in conjunction with the 3M TRAC Computer system

**Test fish age:** Juvenile

**Length and weight:** Average length = 38 mm  
Average weight = 0.38 g (wet)

**Loading:** 0.48 g fish/L

**Pretreatment:** None

**Test conditions:**

**Dilution water:** Carbon-filtered well water

**Dilution water chemistry:**

**Hardness:** 252 mg/L as CaCO<sub>3</sub>

**Alkalinity:** 225 mg/L as CaCO<sub>3</sub>

**Lighting:** A daily photoperiod of 16 hours light and 8 hours dark with a 30 minute transition period was maintained throughout the testing period.

**Stock and test solution preparation:** Test solutions were created by direct individual weight additions.

**Concentrations dosing rate:** Once

**Stability of the test chemical solutions:** Not noted

**Exposure vessels:** All-glass aquaria, 35x20x25 cm containing 16 liters of test solution

**Number of replicates:** 2

**Number of fish per replicate:** 20

**Number of concentrations:** five plus a blank control

**Water chemistry during the study:**

**pH range (0-96 hours):**

8.0 – 8.2 (control exposure)

7.7 – 8.2 (370 mg/L exposure)\*

**Temperature range (0-96 hours):**

17 - 21 °C

**Dissolved oxygen range (0-96 hours):**

5.8 – 9.2 mg/L (control exposure)

1.3 – 9.3 mg/L (370 mg/L exposure)\*

\* 370 mg/L (second highest concentration) exposure values used because the highest concentration used resulted in total mortality by 24 hours.

**Remarks:** The dissolved oxygen concentration was below 60% saturation in all exposure concentrations except the control by 48 hours. This may have contributed to the observed mortality.

## RESULTS

**Nominal concentrations:** Bk control, 100, 155, 240, 370, and 560 mg/L

**Element values:** 96-hour LC<sub>50</sub> = 344 (318 – 376) mg/L

Element values based on nominal concentrations

**Remarks:** Testing was conducted on a mixture of as described in the Test Substance Remarks field. The values reported apply to that mixture and not the fluorochemical components alone.

## CONCLUSIONS

The test sample 96-hour LC<sub>50</sub> for fathead minnow was determined to be 344 mg/L with a 95% confidence interval of 318 to 376 mg/L.

**Submitter:** 3M Company, Environmental Laboratory, P.O. Box 33331, St. Paul, Minnesota, 55133

## DATA QUALITY

**Reliability:** Klimisch ranking = 2. Testing meets the criteria for quality testing. However, sample purity was not properly characterized and the study lacks analytical confirmation of the amount of fluorochemical proportion in the solution.

## REFERENCES

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Test was conducted by the 3M Company, Environmental Laboratory, Lab Request number 7544, 1982.

## OTHER

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**Last changed:** 6/26/00

## TECHNICAL REPORT SUMMARY

Date  
2/1/82

TO: TECHNICAL COMMUNICATIONS CENTER - 201-2CN

(Important - If report is printed on both sides of paper, send two copies to TCC.) See "Guidelines for Completion of Technical Report Summary" available from Information Liaison or TCC (3-5545).

|                    |                                                               |                                   |            |
|--------------------|---------------------------------------------------------------|-----------------------------------|------------|
| Division           | Environmental Laboratory (EE & PC)                            | Dept. Number                      | 0535       |
| Project            | Commercial Chemicals                                          | Project Number                    | 9972210100 |
| Report Title       | Aquatic Toxicity Testing: FC-185F (cc817-19) L 1-2303 LR 7544 | Report Number                     | 007        |
| To                 | E. A. Reiner                                                  |                                   |            |
| Author(s)          | A. N. Welter - 2-3E                                           | Employee Number(s)                | 09362      |
| Notebook Reference |                                                               | No. of Pages Including Coversheet |            |

|                                                                                     |                           |                                                                                               |
|-------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------|
| SECURITY ► <input checked="" type="checkbox"/> Open <input type="checkbox"/> Closed | 3M CHEMICAL<br>REGISTRY ► | New Chemicals Reported<br><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
|-------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------|

KEYWORDS:  
Include Lab CodeEE & PC-Div.  
(Env. Lab)Toxicity  
(Aquatic)

## CURRENT OBJECTIVE:

To determine the acute aquatic LC<sub>50</sub>, following exposure to varying concentrations of FC-185F (cc817-19) Lot 1-2303.

REPORT ABSTRACT: This abstract information is distributed by the Technical Communications Center to alert 3M'ers to Company R&D.

The acute static aquatic 96-hour LC<sub>50</sub> values obtained for fathead minnows (Pimephales promelas) following exposure to FC-185F in replicated experiments were 339 (not defined) and 372 (333-415) mg/l. The combined 96-hour LC<sub>50</sub> was 354 (0) (not defined) mg/l as calculated using the probit analysis statistic.

Data generated include LC<sub>50</sub> values with 95% confidence limits

Information Liaison  
Initials:

## CONCLUSIONS

In these replicated 96-hour LC<sub>50</sub> aquatic tests, the calculated values for fathead minnows (Pimephales promelas) were 339 and 372 mg/l. Materials possessing an LC<sub>50</sub> of this order of magnitude are considered to be practically nontoxic based on the NIOSH criteria for aquatic toxicity interpretation. (2)

## INTRODUCTION

The test substance is a foamy, clear, dark amber liquid, soluble in water at ambient room temperature. Tests performed on this material evaluated its potential aquatic toxicity and the data generated form the basis of this report.

## ACCLIMATION AND EXPERIMENTAL DESIGN

The test protocol utilized for this study was modeled after that described by ASTM-E729-80. (1)

The fathead minnows (Pimephales promelas) were obtained from a private hatchery (a). Stock fish were held in a flow through system fiberglass holding tank filled with carbon-filtered well-water at 14-16 degrees C. A daily photoperiod of 16 hours light and 8 hours dark, with a 30-minute transition period was maintained throughout the acclimation and testing period. The fish were fed Tetra-Min (b) daily, food being withheld 48 hours prior to and throughout the test period. Fish were acclimated to test temperature for 2 days prior to use in assays.

Twenty (20) fathead minnows, uniform in size, were tested at each concentration of chemical. All-glass aquaria, 35x20x25 cm containing 16 liters of diluent plus toxicant comprised a study chamber. Test fish were randomly allocated to each test chamber within 30 minutes following toxicant addition. The fathead minnow experiments were conducted at 19±2 degrees C. Mortality, temperature, dissolved oxygen level, and pH of all test solutions were measured at 24-hour intervals or until total mortality had occurred. General observations were recorded relative to swimming pattern and behavioral changes induced by exposure to the test chemical.

The acute short-term static bioassays were performed on FC-185F using carbon-filtered well water of known composition and constant quality as the diluent (Tables 1,2).

- a) Dale Fattig Fish Farm, Brady, Nebraska.
- b) Commercial Fish Food of known composition.

The 96-hour fish studies were performed in replicate using the following FC-185F logarithmic concentrations: 100, 155, 240, 370, and 560 mg/l. This range of dilutions was selected to bracket 96-hr LC<sub>50</sub> values predicted from preliminary exploratory toxicity tests.

LC<sub>50</sub> values with 95% confidence limits were calculated using both moving average angle and probit programs in conjunction with the 3M TRAC Computer system.

Monitoring equipment used included ASTM thermometers, Orion temperature--compensating pH meter, a Yellow Springs dissolved oxygen meter, and a Taylor temperature chart recorder.

### RESULTS

The fathead minnows (Pimephales promelas) used in these studies had an average weight of 0.4 grams and a length of 3.8 cm. The loading factor was 0.48 g/l; the maximum recommended loading factor is 0.8 g/l (1). Temperature, pH, and dissolved oxygen values and ranges obtained during this study were: 19± 2°C, 7.7-8.2 pH units, and 96-hour dissolved oxygen values ranged from 1.3-5.9 mg/l. These latter values calculated out to a minimal oxygen saturation of 14-63%.

In this replicated study, the fish 96-hour LC<sub>50</sub> values were 339 and 372 mg/l. Chemical possessing an LC<sub>50</sub> value in this range are considered to be slightly toxic to the aquatic environment (2).

The data reported herein are based on studies performed by M. T. Elnabarawy and R. R. Robideau. Accompanying data sheets comprise original data. A copy of this report is filed in the Environmental Laboratory Archive System, Building 2-3E.

It should be noted that the generated results were reported in the absence of information relative to the "purity" and the "stability" of the chemical substance. The reported LC<sub>50</sub> values were calculated on the basis of the "observed mortality rates" and of the calculated initial concentrations of FC-185F in test solutions.

### REFERENCES

- (1) ASTM-Standard Practice E729-80. Standard Practice for Conducting Acute Toxicity Tests with Fishes, Macroinvertebrates, and Amphibians. American Society for Testing and Materials, Philadelphia, PA 1980.
- (2) Registry of Toxic Effects of Chemical Substances, '76 Edition, Christensen, H. E., and E. J. Fairchild, Eds., p. XV and Ci, U.S. Department of Health, Education and Welfare; National Institute for Occupational Safety and Health, Washington, D.C. (June, 1976).

TABLE 1

## WELL WATER QUALITY

SAMPLE DATE: 1/28/82

SAMPLE TAKEN: 3M Bldg. 2-3E, St. Paul

SAMPLE DATE 1/28/82 (TAKEN FROM ROOM 5)

| PARAMETER                                 | CONCENTRATION                 | ENV. LAB<br>WATER QUALITY<br>BOOK REF. |
|-------------------------------------------|-------------------------------|----------------------------------------|
| pH                                        | 7.7                           | 8                                      |
| Residual Chlorine                         | <0.02 mg/l                    | 9                                      |
| Ammonia Nitrogen                          | <0.1 mg/l as N                | 8                                      |
| Conductivity                              | 330 umhos/cm at 25°C          | 9                                      |
| M-Alkalinity                              | 223 mg/l as CaCO <sub>3</sub> | 8                                      |
| Total Solids                              | 315 mg/l                      | 8                                      |
| Total Hardness                            | 252 mg/l as CaCO <sub>3</sub> | 8                                      |
| Total Fluoride                            | <0.02 mg/l                    | 9                                      |
| Dilute COD                                | <0.4 mg/l                     | 9                                      |
| Total Coliform                            | Negative                      | 10                                     |
| Standard Plate Count                      | 21 per ml                     | 10                                     |
| Aluminum as Al*                           | 0.2 mg/l                      | 14                                     |
| Arsenic as As*                            | <0.005 mg/l                   | 14                                     |
| Boron as B*                               | <0.2 mg/l                     | 14                                     |
| Cobalt as Co*                             | <0.02 mg/l                    | 14                                     |
| Copper as Cu*                             | <0.02 mg/l                    | 14                                     |
| Chromium as Cr*                           | <0.03 mg/l                    | 14                                     |
| Cadmium as Cd*                            | <0.01 mg/l                    | 14                                     |
| Iron as Fe*                               | <0.02 mg/l                    | 14                                     |
| Nickel as Ni*                             | <0.02 mg/l                    | 14                                     |
| Lead as Pb*                               | <0.05 mg/l                    | 14                                     |
| Silver as Ag*                             | <0.02 mg/l                    | 14                                     |
| Zinc as Zn*                               | 0.05 mg/l                     | 14                                     |
| Mercury as Hg*                            | <0.2 ug/l                     | 14                                     |
| PCB's**                                   | ND                            | 95                                     |
| Total Organochlorine**<br>Pesticides      | ND                            | 95                                     |
| Total<br>Organophosphorus**<br>Pesticides | ND                            | 95                                     |

\* Sample Date 1/28/81

\*\*Sample Date 3/4/81

TABLE 2

ENVIRONMENTAL LABORATORY  
BLDG. 2-3E  
ST. PAUL, MINNESOTA

FOURTH QUARTERLY REPORT, 1981  
WELL WATER SUPPLY FOR AQUATIC TOXICITY TESTING

| PARAMETER                                                                   | NOV 2 | NOV 30 | DEC 29 | AVERAGE<br>( $\pm$ S) |
|-----------------------------------------------------------------------------|-------|--------|--------|-----------------------|
| TOTAL HARDNESS*<br>as mg/l CaCO <sub>3</sub>                                | 248   | 252    | 256    | 252 $\pm$ 4           |
| TOTAL "M" ALKALINITY*<br>as mg/l CaCO <sub>3</sub>                          | 228   | 226    | 221    | 225 $\pm$ 4           |
| ELECTRICAL SPECIFIC<br>CONDUCTANCE* as umhos per<br>cm <sup>2</sup> at 25°C | 330   | 340    | 380    | 350 $\pm$ 27          |
| TOTAL SOLIDS*<br>as mg/l                                                    | 320   | 300    | 308    | 309 $\pm$ 10          |
| pH**                                                                        | 7.6   | 7.6    | 7.7    | 7.6 $\pm$ 0.1         |
| STANDARD PLATE COUNT***<br>per 1.0 ml                                       | 2     | 10     | 27     | 13 $\pm$ 13           |

CRITERIA OF CONSTANT QUALITY

- \* Monthly ranges should be less than 10% of their respective averages. (ASTM Standard E729-1980.)
- \*\* Monthly range of pH should be less than 0.4 unit. (ASTM Standard E729-1980.)
- \*\*\* Total bacterial densities should not be greater than 500 organisms per ml. (USEPA-600/8-78-017, p. 101.)

ENVIRONMENTAL LABORATORY  
AQUATIC TOXICITY DATA SHEET  
DEFINITIVE (FULL-SCALE TEST)

LR 7544

pe Test 96HR. ACUTE STATIC Material Tested FC-185F c 817-19 Lot 1-2303  
st Organism FATHEAD MINNOWS Source BRADY, NEB Date Rec'd 11/30/81 Batch # 1-82  
g. Wt. 0.38 grams Avg. Size 3.8 cm No. Organisms per dose 20 Loading Factor 0.48 (8-81) g/l  
sh Disease Treatment: NONE

est Solution Volume 16 Liters/All-Glass Tank Tank Dimensions: 35x20 cm and 25 cm deep

me Started 1:30 PM Date Started 1/26/82 Date Completed 1/30/82

lution Water Carbon-filtered well water (Temp. 17 °C., D.O. 9.3 ppm, pH 8.2)

Investigator ANW, P3 LC<sub>50</sub> (95% Confidence Limits) N=2

ull Signature) PROBIT ANALYSIS 339 mg/l (No LIMITS) COMBINED 354 mg/l (No LIMITS)  
MOVING AVERAGE ANGLE METHOD 334 (296-383) mg/l (COMBINED 344 (318-376) mg/l)

| Tank No. | Initial Conc. mg/l | Total Amount Added | 24 Hours       |     |          | 48 Hours       |     |          | 72 Hours       |     |          | 96 Hours       |     |          |
|----------|--------------------|--------------------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|
|          |                    |                    | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm |
| CI       | Control            | <u>49</u>          | 0              | 8.1 | 6.8      | 0              | 8.1 | 6.5      | 0              | 8.0 | 6.0      | 0              | 8.0 | 5.9      |
| II       | Control            | —                  | 0              | 8.2 | 6.6      | 0              | 8.1 | 6.2      | 0              | 8.0 | 5.9      | 0              | 8.0 | 5.8      |
| 1C       | 100                | 1600*              | 0              | 8.1 | 6.6      | 0              | 8.6 | 2.6      | 0              | 7.9 | 2.1      | 0              | 7.9 | 2.1      |
| 2C       | 155                | 2480               | 0              | 8.2 | 7.4      | 2              | 8.1 | 2.6      | 2              | 7.9 | 1.9      | 2              | 7.9 | 1.9      |
| 3C       | 240                | 3840               | 0              | 8.2 | 7.2      | 0              | 8.1 | 1.6      | 0              | 7.9 | 1.4      | 2              | 7.9 | 1.4      |
| 4C       | 370                | 5920               | 2              | 8.1 | 7.1      | 9              | 8.0 | 1.5      | 9              | 7.8 | 1.4      | 9              | 7.8 | 1.4      |
| 5C       | 560                | 8960               | 20             | 8.2 | 8.0      | 20             | —   | —        | 20             | —   | —        | 20             | —   | —        |

Test Temp. °C 19°C 20°C 20°C 21°C  
Initials & Date P3 1/27/82 P3 1/28/82 P3 1/29/82 P3 1/30/82

Comments: INDIVIDUAL WEIGHTS. TEST MATERIAL IS A FOAMY, CLEAR DARK OLIVE LIQUID. SOLUBLE IN WATER AT AMBIENT ROOM TEMPERATURE.

Secondary Effects (other than Mortality):

EC50

| Tank No.   | Symptoms or Reactions | Total Number Affected |        |        |        |
|------------|-----------------------|-----------------------|--------|--------|--------|
|            |                       | 24-Hr.                | 48-Hr. | 72-Hr. | 96-Hr. |
| Control I  |                       | NONE                  | NONE   | NONE   | NONE   |
| Control II |                       | NONE                  | NONE   | NONE   | NONE   |
| 1C         | SURFACING             | NONE                  | 4      | 15     | 20     |
| 2C         | SURFACING             | NONE                  | 4      | 18     | 18     |
| 3C         | SURFACING             | NONE                  | 12     | 20     | 18     |
| 4C         | SURFACING             | NONE                  | 11     | 11     | 11     |
| 5C         |                       | —                     | —      | —      | —      |

ENVIRONMENTAL LABORATORY  
AQUATIC TOXICITY DATA SHEET  
DEFINITIVE (FULL-SCALE TEST)

LR 7544

Test 96HR. ACUTE STATIC Material Tested FC-185F cc 817-19 Lot 1-2303

Test Organism FATHEAD MINNOWS Source BRADY, NEB Date Rec'd 11/30/81 Batch # 1-82  
(8-81)

g.Wt. 0.38 grams Avg. Size 3.8 cm No. Organisms per dose 20 Loading Factor 0.48 g/l

Fish Disease Treatment: NONE

Test Solution Volume 16 Liters/All-Glass Tank Tank Dimensions: 35x20 cm and 25 cm deep

Time Started 1:30 PM Date Started 1/26/82 Date Completed 1/30/82

Dilution Water Carbon-filtered well water (Temp. 17 °C., D.O. 9.3 ppm, pH 8.2)

Investigator ANU, R3 LC<sub>50</sub> (95% Confidence Limits) K=2

Full Signature) PROBIT ANALYSIS 372 (333-415) mg/l COMBINED 354 mg/l (NO LIMITS)  
MOVING AVERAGE ANGLE METHOD 355 (322-398) mg/l COMBINED 344 (318-376) mg/l

| Tank No. | Initial Conc. mg/l | Total Amount Added | 24 Hours       |     |          | 48 Hours       |     |          | 72 Hours       |     |          | 96 Hours       |     |          |
|----------|--------------------|--------------------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|
|          |                    |                    | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm |
| CI       | Control            | —                  | 0              | 8.1 | 6.8      | 0              | 8.1 | 6.5      | 0              | 8.0 | 6.0      | 0              | 8.0 | 5.9      |
| CII      | Control            | —                  | 0              | 8.2 | 6.6      | 0              | 8.1 | 6.2      | 0              | 8.0 | 5.9      | 0              | 8.0 | 5.8      |
| 1D       | 100                | 1600*              | 0              | 8.1 | 6.6      | 0              | 8.1 | 2.8      | 0              | 7.9 | 2.4      | 0              | 7.9 | 2.2      |
| 2D       | 155                | 2480               | 0              | 8.2 | 6.6      | 0              | 8.1 | 2.8      | 0              | 7.9 | 1.9      | 0              | 7.9 | 1.8      |
| 3D       | 240                | 3840               | 0              | 8.1 | 6.6      | 0              | 8.0 | 1.9      | 0              | 7.9 | 1.6      | 1              | 7.9 | 1.5      |
| 4D       | 370                | 5920               | 2              | 8.1 | 7.1      | 5              | 8.0 | 1.9      | 8              | 7.8 | 1.5      | 8              | 7.7 | 1.3      |
| 5D       | 560                | 8960               | 16             | 8.2 | 7.8      | 20             | 8.0 | 1.4      | 20             | —   | —        | 20             | —   | —        |

Test Temp. °C 19°C 20°C 20°C 21°C  
Initials & Date PS 1/27/82 PS 1/28/82 PS 1/29/82 PS 1/30/82

Comments: \* INDIVIDUAL WEIGHTS. TEST MATERIAL IS A FOAMY, CLEAR, DARK AMBER LIQUID.

SOLUBLE IN WATER AT AMBIENT ROOM TEMPERATURE.

Secondary Effects (other than Mortality):

EC50

| Tank No.   | Symptoms or Reactions | Total Number Affected |        |        |        |
|------------|-----------------------|-----------------------|--------|--------|--------|
|            |                       | 24-Hr.                | 48-Hr. | 72-Hr. | 96-Hr. |
| Control I  |                       | NONE                  | NONE   | NONE   | NONE   |
| Control II |                       | NONE                  | NONE   | NONE   | NONE   |
| 1D         | SURFACING             | NONE                  | 5      | 15     | 20     |
| 2D         | SURFACING             | NONE                  | 10     | 20     | 20     |
| 3D         | SURFACING             | NONE                  | 10     | 20     | 19     |
| 4D         | SURFACING             | NONE                  | 15     | 12     | 12     |
| 5D         |                       | NONE                  | —      | —      | —      |

ENVIRONMENTAL LABORATORY  
AQUATIC TOXICITY DATA SHEET  
DEFINITIVE (FULL-SCALE TEST)

TYPE TEST 96HR. ACUTE STATIC

MATERIAL TESTED EC-185F CC 817-19 LOT 1-2303

TEST ORGANISM FATHEAD MINNOWS

LC<sub>50</sub>'s (95% CONFIDENCE LIMITS)

PROBIT ANALYSIS

| TEST RUNS | 24 HOURS                   | 48 HOURS                | 72 HOURS                | 96 HOURS                   | COMBINED 96 HOURS       |
|-----------|----------------------------|-------------------------|-------------------------|----------------------------|-------------------------|
| UN C      |                            | 353 mg/l<br>(No LIMITS) | 353 mg/l<br>(No LIMITS) | 339 mg/l<br>(No LIMITS)    | 354 mg/l<br>(No LIMITS) |
| UN D      | 475 mg/l<br>(429-529 mg/l) |                         |                         | 372 mg/l<br>(333-415 mg/l) |                         |

MOVING AVERAGE ANGLE METHOD

| TEST RUNS | 24 HOURS                   | 48 HOURS                   | 72 HOURS                   | 96 HOURS                   | COMBINED 96 HOURS          |
|-----------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| UN C      | 394 mg/l<br>(363-429 mg/l) | 370 mg/l<br>(327-431 mg/l) | 370 mg/l<br>(327-431 mg/l) | 334 mg/l<br>(296-383 mg/l) | 344 mg/l<br>(318-376 mg/l) |
| UN D      | 449 mg/l<br>(415-486 mg/l) | 383 mg/l<br>(360-406 mg/l) | 373 mg/l<br>(348-397 mg/l) | 355 mg/l<br>(322-398 mg/l) |                            |

ENVIRONMENTAL LABORATORY  
AQUATIC TOXICITY DATA SHEET  
EXPLORATORY (RANGE-FINDING TEST)

LR 7544

Type Test 96HR. ACUTE STATIC Material Tested EC-185F (CC 817-19) lot 1-2303

Test Organism FATHEAD MINNOW Source BRADY, NEB. Date Rec'd. 11/30/81 Batch No. 1-87  
(B-8)

Avg. Wt. 0.31 grams Avg. Size 3.4 CM No. Organisms per dose 5

Test Solution Volume 3 Liters/All-Glass Tank Tank Dimensions: WIDE-MOUTH 1 GALLON GLASS J.

Time Started 11:15AM Date Started 1/19/82 Date Completed 1/24/82

Dilution Water Carbon-filtered well water (Temp. 20 °C., D.O. 8.8 ppm, pH 8.1)  
1.5

Investigator ANUP, [Signature] LC<sub>50</sub> (95% Confidence Limits) 1.5

| Tank No. | Init. Conc. mg/l | Total Amount Added mg | 24 Hours       |     |          | 48 Hours       |     |          | 72 Hours       |     |          | 96 Hours       |     |          |
|----------|------------------|-----------------------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|----------------|-----|----------|
|          |                  |                       | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm | Total No. Dead | pH  | D.O. ppm |
| CI       | Control          | —                     | 0              | 8.1 | 6.5      | 0              | 8.0 | 6.3      | 0              | 7.9 | 6.0      | 0              | 7.9 | 5        |
| CII      | CONTROL          | —                     | 0              | 8.1 | 6.9      | 0              | 8.1 | 6.7      | 0              | 8.0 | 6.4      | 0              | 8.0 | 5        |
| 1A       | 10               | 30 *                  | 0              | 8.1 | 6.9      | 0              | 8.1 | 6.1      | 0              | 7.9 | 4.5      | 0              | 8.0 | 4        |
| 2A       | 100              | 300                   | 0              | 8.1 | 6.5      | 0              | 8.1 | 4.2      | 0              | 7.9 | 2.5      | 0              | 7.9 | 2        |
| 3A       | 500              | 1500                  | 4/5            | 8.1 | 6.4      | 5/5            | 7.9 | 1.5      | 5/5            | —   | —        | 5/5            | —   | —        |
| 4A       | 1000             | 3000                  | 5/5            | 8.1 | 7.3      | 5/5            | —   | —        | 5/5            | —   | —        | 5/5            | —   | —        |
| 5A       | 2000             | 6000                  | 5/5            | 8.2 | 8.0      | 5/5            | —   | —        | 5/5            | —   | —        | 5/5            | —   | —        |

Test Temp. °C. 20°C 21°C 21°C 19°C

Initials & Date [Signature] 1/20/82 [Signature] 1/21/82 [Signature] 1/22/82 1/24/82 AM

Comments: \* INDIVIDUAL WEIGHTS. TEST MATERIAL IS A FOAMY, CLEAR, DARK AMBER LIQUID. SOLUBLE IN WATER AT AMBIENT ROOM TEMPERATURE

Effects other than Mortality

EC<sub>50</sub>

| Tank No. | Symptoms or Reactions   | Total No. Affected |             |             |             |
|----------|-------------------------|--------------------|-------------|-------------|-------------|
|          |                         | 24-Hr.             | 48 Hr.      | 72-Hr.      | 96-Hr.      |
| Control  | <u>I AND CONTROL II</u> | <u>NONE</u>        | <u>NONE</u> | <u>NONE</u> | <u>NONE</u> |
| 1A       |                         | <u>NONE</u>        | <u>NONE</u> | <u>NONE</u> | <u>"</u>    |
| 2A       |                         | <u>NONE</u>        | <u>NONE</u> | <u>NONE</u> | <u>"</u>    |
| 3A       |                         | <u>NONE</u>        |             |             |             |
| 4A       |                         |                    |             |             |             |
| 5A       |                         |                    |             |             |             |

Comments: