

ACUTE TOXICITY TO FISH (FATHEAD MINNOW)

TEST SUBSTANCE

Identity: A mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-206 or L-3243. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number was 1. The test sample is FC-206. Current information indicates it is a mixture of 0.67% PFOS, 17.5% diethylene glycol butyl ether, 78.91% water, 1.33% Sultone foamer, 1% sodium octyl sulfate, 0.04% sodium lauryl sulfate, 0.5% polyoxyethylene monooctylphenyl ether, and 0.05% benzotriazole.

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

METHOD:

Method: Not given.

Type: Acute static and continuous flow

GLP: No

Year completed: 1974

Species: *Pimephales promelas*

Supplier: Not given.

Analytical monitoring: Temperature, pH, and DO.

Exposure period: 96-hours

Statistical methods: LC₅₀ value calculated using graphic interpolation.

Test fish age: Juveniles

Length and weight: Average length = 2 in.
Average weight = 1.6 g (wet)

Loading: Not given

Pretreatment: None

Test conditions:

Dilution water: Carbon-filtered city water, St. Paul, MN

Dilution water chemistry: Not given.

Lighting: Not given.

Stock and test solution preparation: A 50% primary stock solution was prepared for the continuous flow study. The test material was added directly to the dilution water on a volume/volume basis for the static study.

Diluter Flow rate: Not given.

Concentrations dosing rate: Continuous for the flow study, once for the static study.

Stability of the test chemical solutions: Not noted.

Exposure vessels: Not given.

Number of replicates: 1

Number of fish per replicate: Not given.

Number of concentrations: five plus a blank control

Water chemistry during the static study:

pH range (0-96 hours):

6.9 – 7.0 (control exposure)

7.1 – 7.2 (1250 mg/L exposure)*

Temperature range (0-96 hours): 67 - 72 °F

Dissolved oxygen range (0-96 hours):

4.7 – 5.7 mg/L (control exposure)

3.9 – 5.7 mg/L (1250 mg/L exposure)*

* 1250 mg/L (intermediate concentration) exposure values used because the highest three concentrations resulted in total mortality by 72 hours.

Water chemistry during the continuous flow study:

pH range (0-96 hours):

6.9 – 7.0 (control exposure)

7.0 – 7.1 (2500 mg/L exposure)*

Temperature range (0-96 hours): 67 - 72 °F

Dissolved oxygen range (0-96 hours):

6.0 – 6.3 mg/L (control exposure)

4.5 – 6.0 mg/L (2500 mg/L exposure)*

* 2500 mg/L (intermediate concentration) exposure values used because the highest two concentrations resulted in total mortality by 48 hours.

RESULTS

Nominal concentrations: Blank control, 500, 1250, 2500, 3750, and 5000 mg/L

Element values: 96-hour LC₅₀ (static) = 1750 mg/L

96-hour LC₅₀ (continuous flow) = 3000 mg/L

Element values based on nominal concentrations

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

CONCLUSIONS

The test sample 96-hour LC₅₀ for fathead minnow was determined to be 1750 mg/L under static conditions and 3000 mg/L under continuous flow conditions.

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

DATA QUALITY

Reliability: Klimisch ranking 3. Testing lacks record of methodology used and documentation. The sample purity was not properly characterized and the study lacks analytical confirmation of the amount of fluorochemical proportion in the solution.

REFERENCES

This study was conducted by the 3M Company, Environmental Laboratory, St. Paul, MN, Lab Request number 2083, 1974.

OTHER

Last changed: 6/27/00

cc: LAB REQUEST BOOK - 42-5W

File: _____

Water and Wastewater

REQUEST FOR LABORATORY WORK

Lab Request No. 2083

TO: ENVIRONMENTAL ENGINEERING LABORATORY - BUILDING 53-6N

Requestor	Lab Personnel
Name: <u>Dale Bacon</u> Request Date _____ Project No. _____ Prob. No. _____ Code # _____ Description: <u>L-3243 Lot #1</u> Sample Date: <u>Feb 15 1974</u> Date Needed: _____ Hold Sample For _____ Days Est. Time: _____ Hrs.	Date Rec'd. Sample: _____ Analyst: <u>MTE</u> Y _____ B _____ P <u>Bio-Assay</u> Date Completed: <u>2-15-74</u> Hrs. Spent: <u>16</u>

Test Description	static	C.Flow				
Total Hardness, mg/l as CaCO ₃						
Calcium Hardness, mg/l as CaCO ₃						
"P" Alkalinity, mg/l as CaCO ₃						
"M" Alkalinity, mg/l as CaCO ₃						
pH						
Sulfate, mg/l as SO ₄						
Nitrate, mg/l as NO ₃						
Chloride, mg/l as Cl						
Silica, mg/l as SiO ₂						
Fluoride, mg/l as F						
Ortho Phosphate, mg/l as P						
Total Phosphate, mg/l as P						
Total Chromium, mg/l as Cr						
Hex. Chromium, mg/l as Cr						
Total Cyanide, mg/l as CN						
Ferrocyanide, mg/l as CN						
Iron, mg/l as Fe						
Manganese, mg/l as Mn						
Surfactant, mg/l as LAS						
Phenol, mg/l						
BOD, mg/l						
COD, mg/l (Short, Long, Dilute)						
Total Suspended Solids, mg/l						
Volatile Suspended Solids, mg/l						
Turbidity, mg/l Silica						
Total Solids, mg/l						
Total Volatile Solids, mg/l						
Conductivity, mhos						
Total Bacteria, No./100 ml						
Total Coliform, No./100 ml						
Fecal Coliform, No./100 ml						
Fecal Streptococcus, No./100 ml						
Ammonia Nitrogen, mg/l as N						
Kjeldahl Nitrogen, mg/l as N						
Oil and Grease, mg/l						
<u>Bioassay 96 hour LC50</u>	<u>* 1.750</u>	<u>** 3,000</u>				
	<u>ppm</u>	<u>ppm</u>				
Comments: <u>* 0.175%</u>	<u>** 0.3%</u>					

001462 3M Carbonless

ENVIRONMENTAL ENGINEERING LABORATORY
 AQUATIC TOXICITY WORK SHEET

Type Test 96 hour, static Material tested L-3243 Lot #1
 Test organism Fathead Minnows Avg. Weight 1.6g Avg. Size 2 Inches
 Date Started 2-11-74 Date Completed 2-15-74
 Time Started 2:30 PM
 Dilution Water city water after carbon filter **BEST COPY AVAILABLE**

Conc.	24 hrs			48 hrs			72 hrs			96 hrs		
	% Survival	pH	D.O ppm	% Survival	pH	D.O ppm	% Survival	pH	D.O ppm	% Survival	pH	D.O ppm
Control	100	7.0	5.7	100		5.2	100		5.0	100	6.9	4.7
500 PPM	100	7.1	5.6	100		5.0	100		4.5	100	7.1	4.2
1,250	100	7.1	5.7	100		4.7	100		4.0	100	7.2	3.9
2,500	100	7.1	5.5	50		2.9	0		2.0	0	—	—
3,750	100	7.2	5.2	0		2.5	0		—	0	—	—
5,000	60	7.2	5.5	0		2.0	0		—	0	—	—
Average Temperature			72	70			69			67		

Comments:

 $\frac{1}{10} \rightarrow 0.05$

0.125

0.25

0.375

0.5

 $\frac{1}{16} \rightarrow 8$

20

40

60

80

001464

2-11-74

Bioassay study of L-3243 10⁴

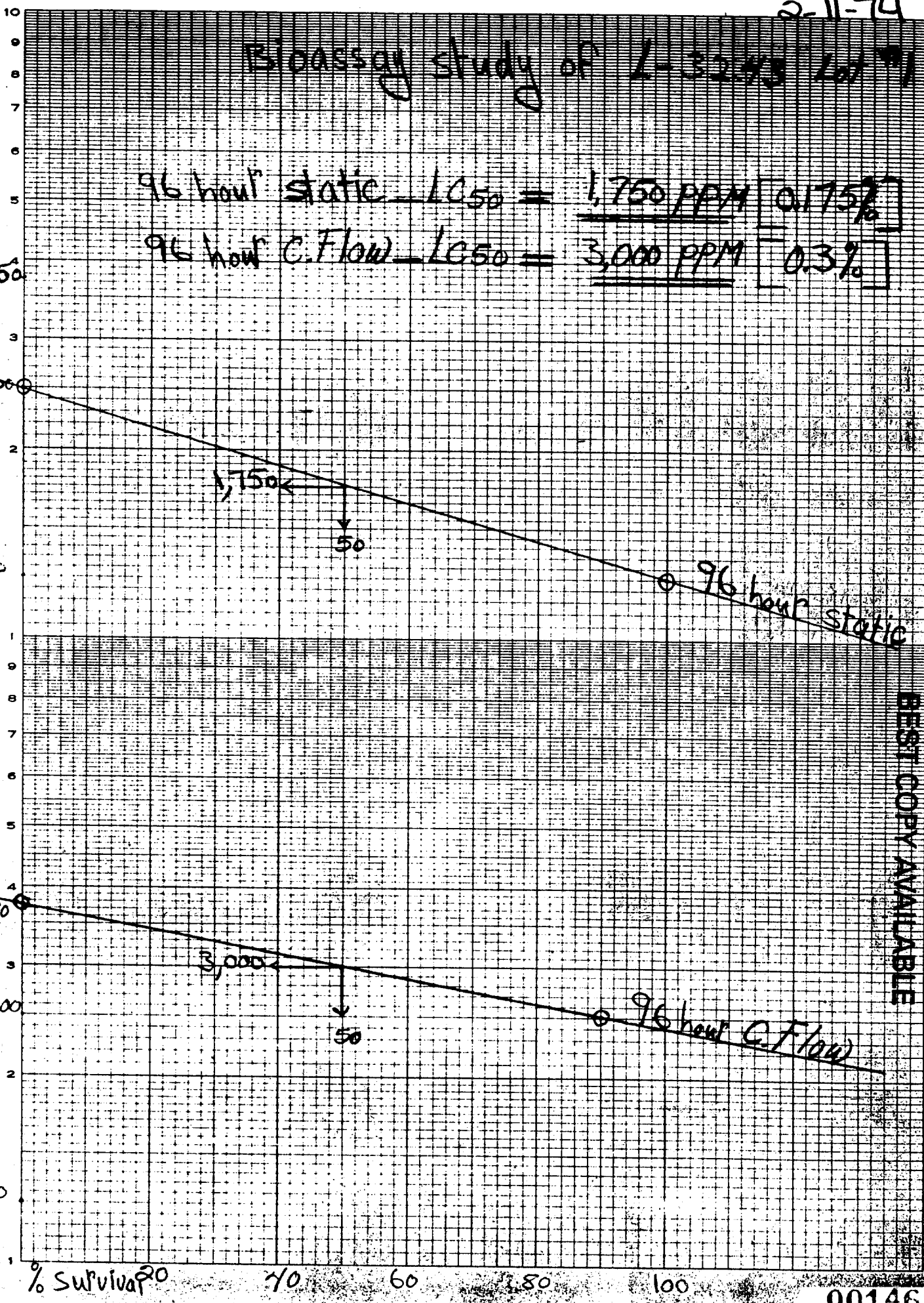
96 hour static LC₅₀ = 1,750 ppm [0.175%]

96 hour C.Flow LC₅₀ = 3,000 ppm [0.3%]

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