ACUTE TOXICITY TO FISH (BLUEGILL)

TEST SUBSTANCE

Identity: A mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-600. (1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt, CAS # 2795-39-3)

Remarks: The 3M production lot number was not noted. The test sample is FC-600. Current information indicates it is a mixture of 1.0% PFOS, 81.20% water, 12.00% diethylene glycol butyl ether, 1.00% sodium octyl sulfate, 2.00% propane Sultone foamer, 1.00% sodium decyl sulfate, 0.85% xanthan gum, 0.1% N-(3-chloroallyl) hexaminium chloride, 0.80% starch, and 0.05 % benzotriazole.

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

METHOD:

Method: Not noted.
Test type: Static acute
GLP: No
Year Completed: 1975
Species: *Lepomis macrochirus*
Supplier: Not noted.
Analytical monitoring: Temperature, pH, DO
Exposure period: 96-hours
Statistical methods: Probit analysis.
Test fish age: Juveniles
Average Length and weight: Length = 1 inch
Weight = 0.5 grams
Loading: Not noted.
Pretreatment: Not noted.
Test conditions:
Dilution water: Carbon-filtered water, City of St. Paul, MN
Dilution water chemistry: Not noted.
Lighting: Not noted
Stock and test solution preparation: Test solutions were created by direct weights additions.
Concentrations dosing rate: Once
Stability of the test chemical solution: Not noted
Exposure vessels: Not noted.
Number of replicates: One
Number of fish per replicate: 20

Number of concentrations: 5 plus a blank control
Water chemistry during the study:
pH range (0 – 96 hours):
7.1 – 7.2 (control exposures)
7.2 – 7.3 (2,000 mg/L exposure)*
Dissolved Oxygen range (0 – 96 hours):
5.6 – 7.0 mg/L (control exposures)
4.5 – 6.0 mg/L (2,000 mg/L exposure)*
Temperature (0 – 96 hours):
72°F
* Values for the 2,000 mg/L exposure (third highest concentration) were used because total mortality occurred in the highest concentrations tested.

RESULTS

Nominal concentrations: Blank control, 1,000, 1,500, 2,000, 3,000, and 4,000 mg/L
Element value: 96-hour LC_{50} = 1,500 (1,282 – 1,755) mg/L

Element value based on nominal concentrations.

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

CONCLUSIONS

The FC-600 96-hour LC_{50} for *Lepomis macrochirus* was determined to be 1,500 mg/L with a 95% confidence interval of 1,282 to 1,755 mg/L.

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

DATA QUALITY

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

REFERENCES

This study was conducted by 3M Company, Environmental Laboratory, St. Paul, MN, 1975.

OTHER
Last changed: 6/28/00

740101

ENVIRONMENTAL ENGINEERING LABORATORY
AQUATIC TOXICITY WORK SHEET

Type Test 96-Hour Static — Material Tested FC-600

Test Organism Bluegill. — Avg. Weight 0.5g — Avg. Size 1 Inch

Date Started 8-25-75 — Date Completed 8-29-75

Time Started 2:00 PM — Plotted LC_{50}

Dilution Water Carbon filtered-city water

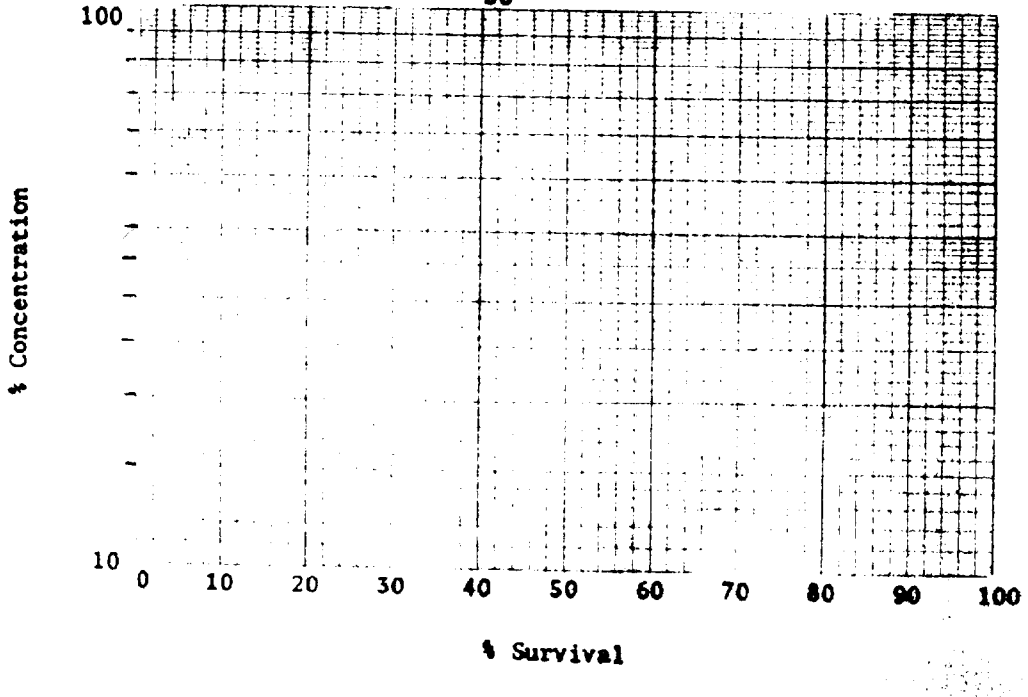
Lepomis Macrochirus

Conc.	24 hrs % Survival	pH	D.O ppm	48 hrs % Survival	pH	D.O ppm	72 hrs % Survival	pH	D.O ppm	96 hrs % Survival	pH	D.O ppm
Control	100	7.2	7.0	100	7.2	6.5	100	7.2	6.0	100	7.1	5.6
1,000 mg/l	100	7.2	6.5	100	7.2	6.2	90	7.0	5.8	80	7.2	5.0
1500	100	7.3	6.3	100	7.2	5.9	70	7.2	5.4	50	7.3	4.9
2,000	100	7.3	6.0	50	7.3	5.5	40	7.2	5.0	30	7.3	4.5
3,000	40	7.4	5.7	20	7.3	4.8	0	7.3	4.0	0	—	—
4,000	10	7.6	5.4	0	—	—	0	—	—	0	—	—
Average Temperature			72			72			72			72

Comments: 8 liter 20 Bluegills per test container

16 24 32 48 64

LC_{50} Calculation



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ENVIRONMENTAL ENGINEERING LABORATORY

AQUATIC TOXICITY - PROBIT ANALYSIS WORK SHEET

Date Started: 8-25-75 Material Tested: FC-600

Time Started: 2:00 (AM)(PM) Test Organism (~~Fathead minnow~~) Bluegills

Type Test: (~~Continuous Flow~~)(Static) Avg. Wt. .5 (gram) Avg. Size 1 (inch)

Exposure Period: 96-Hour Date Completed: 8-29-75

Diluent: (carbon-filt.-St.P. City Wtr.) Analysis by: M.T. Elnabarawy

K No. of Doses Plotted (1)	Conc.	Observed % Mortality	Expected % Mortality (2)	Corrected Values (3)	O - E Observed-Expected	Contribution to chi (from Nomograph #1)
1	1000mg/l	20	13		7	.043
2	1500	50	50		—	—
3	2,000	70	78		8	.037
4	3,000	100	90	96.8	6.8	0.150
5						
6						
7						

K = 4 Animals/Dose = 20 Total contribution to chi = 0.230

Total Animals = 80 (chi^2)= contrib. to chi x Tot. Animals = 4.60

chi^2 (P-.05) for (K-2) 2 degree of freedom (from Table 2) = 5.99

4.60 is less than 5.99 ; therefore, the data are not significantly heterogenous.

95% Confidence Limits for LC_{50}*

LC_{84} = 2150 mg/l LC_{50} = 1500 mg/l LC_{16} = 1050 mg/l

Slope function (S) = $LC_{84}/LC_{50} + LC_{50}/LC_{16} = \frac{2150/1500 + 1500/1050}{2} = \frac{1.43 + 1.43}{2} = 1.43$

Total number of animals used between 16% and 84% expected effects (N')= 40

$fLC_{50} = (S)^{2.77/\sqrt{N'}} = (1.43)^{.44}$ = (from Nomograph #2) 1.17

LC_{50}/fLC_{50} = lower limit = 1500/1.17 = 1,282 mg/l

LC_{50} X fLC_{50} = upper limit = 1500 X 1.17 = 1,755 mg/l

LC_{50} = 1,500 (95% confidence limits 1,282 to 1,755)

(1) Do not list more than two consecutive 0% effects or more than two consecutive 100% effects.

(2) Expected value for any dose should be greater than 0.01% or less than 99.99%.

(3) Corrected value for each 0% or 100% effect (from Table 1).

* There is a 95% chance that the true value of LC_{50} lies within these limits.

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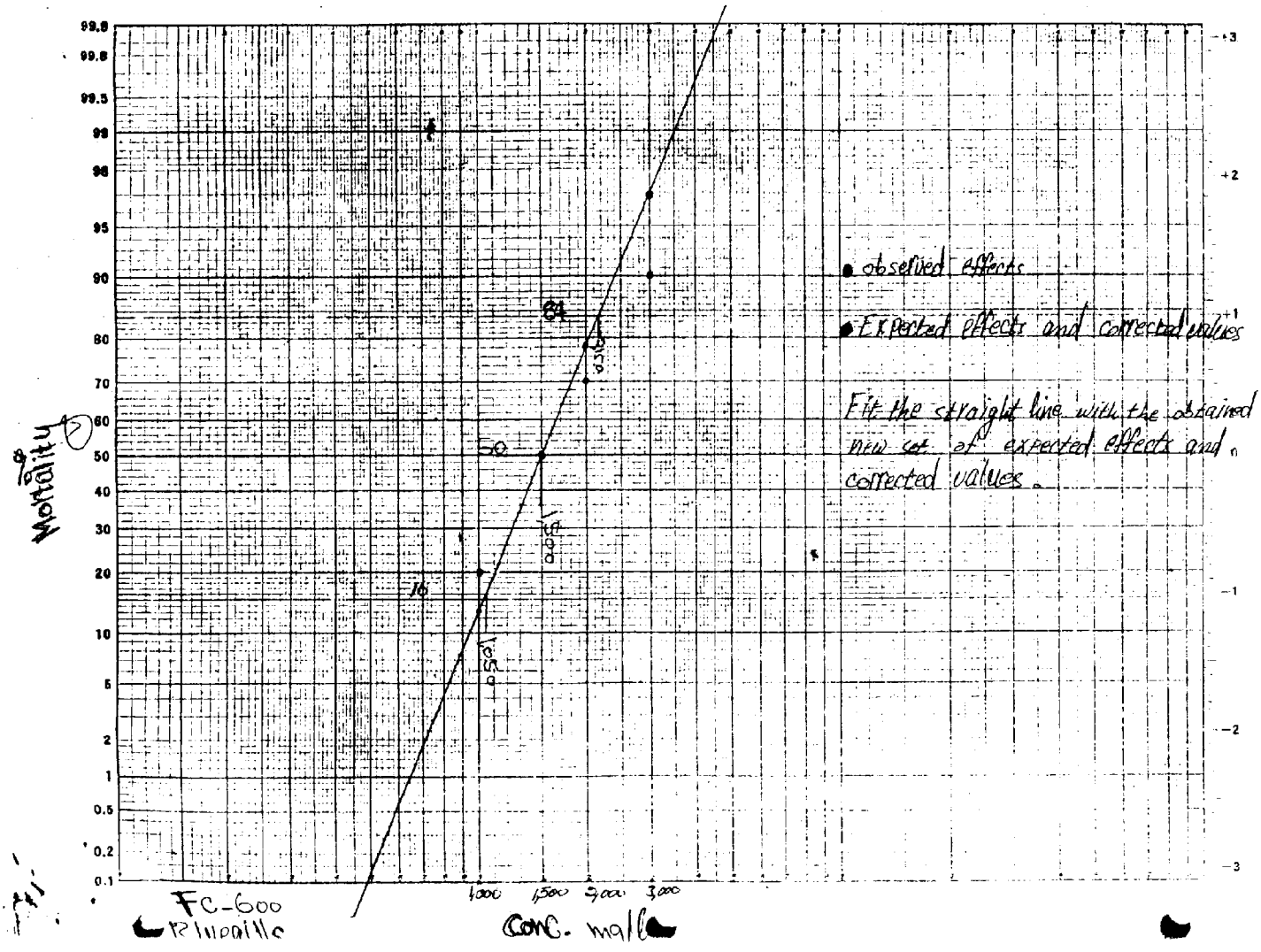

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