

ACUTE TOXICITY TO AQUATIC INVERTABRATES (DAPHNIA MAGNA)

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 (SCAS Treated Effluent\*). Current information indicates FC-600 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 that was treated in a SCAS reactor. Data may not accurately reflect the toxicity of the fluorochemical component of the test sample.***

This study is the second of 3 daphnia studies conducted to determine the toxicity of FC-600 after being treated through a SCAS reactor. This study used the supernatant of a mixed microbial culture that initially contained FC-600 at 667 mg/L\*. The effluent was collected after 4 hours of treatment in a SCAS reactor. The inoculum used came from the Metro Wastewater Treatment Plant, St. Paul, MN.

\* The study references a "1,000 mg/L" concentration. This value is not accurate as it does not include dilution by the sewage mixed liquor.

METHOD:

**Method:** Not noted.  
**Type:** Static acute  
**GLP:** No  
**Year completed:** 1977  
**Species:** *Daphnia magna*  
**Supplier:** Not noted.  
**Analytical monitoring:** Dissolved oxygen  
**Exposure period:** 48-hours  
**Test organism age:** Not noted.  
**Statistical method:** EC<sub>50</sub> calculated by graphing data and by probit analysis.  
**Test conditions:**  
**Dilution water:** Carbon-filtered well water, aerated.  
**Dilution water chemistry:**  
**Dissolved oxygen:** 9.4 mg/L

Exhibit  
1143

State of Minnesota v. 3M Co.,  
Court File No. 27-CV-10-28862

3M\_MN01658221

**Lighting:** Not noted.

**Stock and test solution preparation:** Volume/volume addition

**Exposure vessels:** Not noted.

**Number of replicates:** two

**Number of daphnids per replicate:** 10

**Number of concentrations:** six (control was written up as a separate study)

**Water chemistry during the study:**

**Dissolved oxygen (final):**

5.6 mg/L (control)

0.6 mg/L (100% effluent exposure)

## **RESULTS**

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**Nominal concentrations:** 5.6%, 10%, 18%, 32%, 56%, and 100%

**Element values:** 48-hour EC<sub>50</sub> = 12.6 (10 – 15) %

Element values based on nominal concentrations

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

## **CONCLUSIONS**

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The SCAS treated FC-600 effluent 48-hour EC<sub>50</sub> was determined to be 12.6% with a 95% confidence interval of 10 to 15%.

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

## **DATA QUALITY**

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**Reliability:** Klimisch ranking = 3. This study lacks description of the methodology used, reporting of test conditions and information on the amount of test substance remaining after SCAS treatment. The 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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This study was conducted by 3M Company, Environmental Laboratory, St. Paul, MN, 1977.

## **OTHER**

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**Last changed:** 6/16/00

740101

ENVIRONMENTAL ENGINEERING LABORATORY  
AQUATIC TOXICITY WORK SHEET

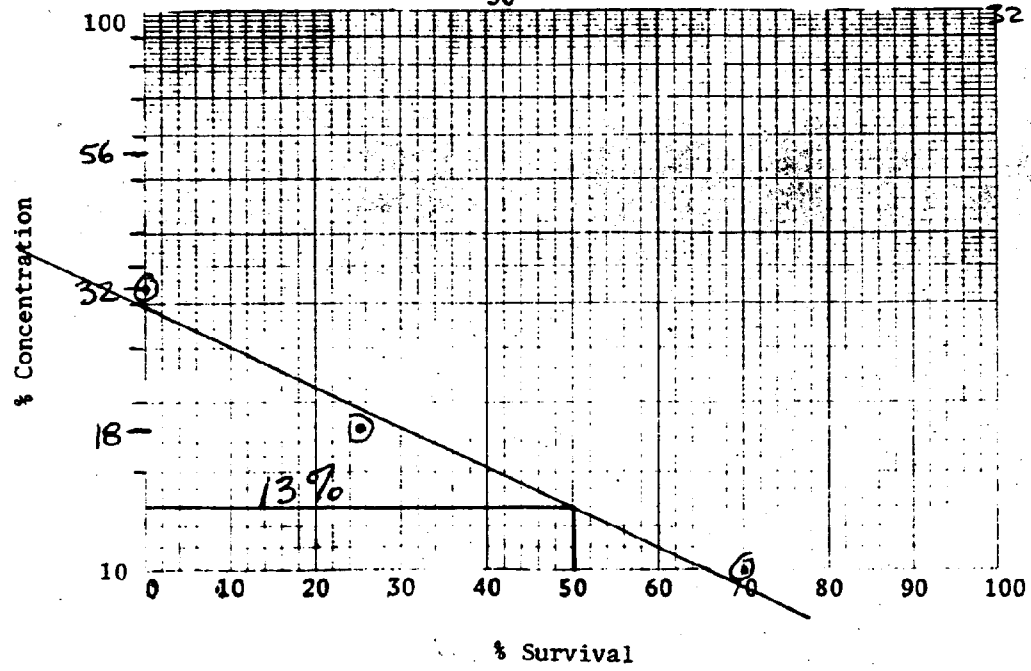
Type Test 48<sup>96</sup> Hours - TOLERANCE STUDY Material Tested FC 600 (SEAB TREATED) ~1000  
 Test Organism DAPHNIA MAGNA Fathead Minnow Avg. Weight \_\_\_\_\_ Avg. Size \_\_\_\_\_  
 Date Started 8/8/77 Date Completed 8/10/77  
 Time Started 1:30 PM Plotted LC<sub>50</sub> 13%  
 Dilution Water Carbon Filtered - Well Water (AERATED TO 9.4 mg/l)

Conc.	24 hrs			24 hrs			48 hrs			96 hrs		
	Survival %	pH	D.O ppm	Survival %	pH	D.O ppm	Survival %	pH	D.O ppm	Survival %	pH	D.O ppm
5.6% <del>Control</del>	100			100			95		5.9			
10%	100			80			70		5.2			
18	70			30			25		5.0			
32	10			0			0		4.6			
56	0			0			0		1.9			
100*	0			0			0		0.6			
Average Temperature			69	69			68					

Comments: \* 100% ~ 1,000 ppm FC 600

INITIAL D.O. 4.0 mg/l  
LC<sub>50</sub> Calculation

5.6	20	1
10	20	6
18	20	15
32	20	20



INTERCEPT (A) = -5.600499  
 SLOPE (B) = 5.097114  
 CHI-SQ FOR LINEARITY = 0.6590621  
 CHI-SQ FOR PROBABILITY = 0.7192609  
 HETEROGENEITY FACTOR (H) = 1  
 G = 0.1238887  
 LOWER CONF. LIMIT = 10.47605  
 UPPER CONF. LIMIT = 15.01223  
 NO. OF CONC. FOR CURVE 2 ?

FC-600  
 2-13/27  
 RAW

INPUT DATA CONC. NO. EXPOSED NO. DEAD  
 5 6 20 1  
 1 20 6  
 3 20 15  
 2 20 20

LOG CONC.	FRACTION RESPONDING	FITTED FRACTION
0.748188	0.05	0.03697681
1	0.3	0.3073466
1.255273	0.75	0.7874975
1.50515	1	0.9808404

LOG PROBABILITY IS > 0.05

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 SLOPE (B) = 5.097114  
 CHI-SQ FOR LINEARITY = 0.6590621  
 CHI-SQ FOR PROBABILITY = 0.7192609  
 HETEROGENEITY FACTOR (H) = 1  
 G = 0.1238887  
 LOWER CONF. LIMIT = 10.47605  
 UPPER CONF. LIMIT = 15.01223  
 NO. OF CONC. FOR CURVE 3 ?

FC-600  
 SCAS TREATED  
 ~1,000 ppm