

TOXICITY TO AQUATIC PLANTS

TEST SUBSTANCE

Identity: A mixture containing perfluorooctanesulfonate, which may also be referred to as PFOS, FC-95, or as a component of FC-603EF. (1-Octanesulfonic acid) (CAS # 2795-39-3).

Remarks: The 3M production lot number is not noted. The test sample is FC-603EF. Current information indicates it is a mixture of 1.30% PFOS, 10% diethylene glycol butyl ether, 54.15% water, 22.5% ethylene glycol, 2.6% propanesultone foamer, 5% Alkylether sulfate, 0.1% N-(3-Chloroallyl)hexaminium chloride, 0.9% Xanthan gum, 0.9% starch, 1.0% triethanolamine, and 0.05% tolyl triazole.

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

METHOD:

Method: NS-EN ISO 10253, 1998: Water quality – Marine algal growth inhibition test

Type: Acute Static

GLP: No

Year completed: 2000

Species: *Skeletonema costatum*

Source: Strain NIVA BAC1, stock culture maintained at RF – Rogaland Research, Stavanger, Norway.

Element basis: Estimate biomass by measuring fluorescence

Exposure period: 72 hours

Statistical Methods: Growth rates by Log linear regression on biomass (fluorescence) vs. time, as described in NS-EN ISO 10253. Calculation of NOEC done by single factor ANOVA followed by Bonferroni procedure.

Analytical monitoring: pH

Test Conditions:

Algal Nutrient Medium: Filtered natural seawater (34 ppt salinity) from an unpolluted site in Byfjord, Norway, enriched with nutrients according to ISO 10253 and recommendations from the Paris Commission. This nutrient medium provided all mineral nutrients essential for algal growth and also served as the diluent for all algal operations. The pH of this synthetic algal medium was 8.2.

Stock and test solution preparation: A 1020 mg/L primary stock solution was prepared by diluting 1.020 g of test substance in 1 L of growth medium.

Aliquots were then added directly to growth medium in test vessels to create test solutions.

Exposure vessels: 100 ml flat-bottomed flasks containing 50 ml test solution.

Agitation: Shaken continuously on an orbital shaker.

Number of replicates: 3

Initial cell loading: 2.0×10^3 cells/mL

Number of concentrations: six plus a blank control

Lighting: Continuous fluorescent lighting at $>50 \mu\text{E}/\text{m}^2 \text{ sek.}$

Water Chemistry:

pH range (0-72 hours):

8.2 – 8.2 (control exposure)

8.2 – 8.3 (1000 mg/L exposure)

Test temperature range: $20 \pm 2^\circ\text{C}$

RESULTS

Nominal concentrations: Blank control, 3.2, 10, 32, 100, 320, and 1000 mg/L. Reference substance (3,5-dichlorophenol) at 1.5 mg/L.

Algal Growth Response E_rC_{50} values (based on growth rate)

72-hour E_rC_{50} = ~170 mg/L

72-hour NOEC = 100 mg/L

Element values are based on nominal concentrations.

Reversibility of Growth Inhibition: Not conducted.

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 exhibits a 72-hour E_rC_{50} growth rate value of ~170 mg/L. The 72-hour No Observed Effect Concentration (NOEC) is 100 mg/L for growth rate.

Validity criteria fulfilled. Control cell density increased by a factor of more than 16 in the test period and reference substance was within normal range.

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

DATA QUALITY

Reliability: Klimisch ranking = 2. This study 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

Test was conducted by RF Rogaland Research, of Stavanger, Norway at the request of 3M Norge, Lab reference number 99312-4, 2000.

OTHER

Last changed: 6/26/00



"FC-603 EF Light Water™ ATC™ 3%" Toxicity tests

Report RF-2000/004

Lab. ref. no.: 99312-4	Author: Elin Horve	Version No. / date: Vers. 1 / 14.01 2000
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ISBN:	Distribution restriction:	Open from (date):

Summary:

The following test results were obtained with "FC-603 EF Light Water™ ATC™ 3%" :

Toxicity: <i>Skeletonema costatum</i>	72 h EC ₅₀	(mg/l) :	~170
<i>Acartia tonsa</i>	48 h LC ₅₀	(mg/l) :	280
<i>Corophium volutator</i>	10 d LC ₅₀	(mg/kg dry weight) :	>3060

The results relate to the product as supplied by Novatech.

Key-words:

Toxicity, *Skeletonema costatum*, *Acartia tonsa*, *Corophium volutator*.

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Inger Lisa Andersen
Study director
Inger Lisa Andersen

Kåre Netland
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CONTENTS:

1. PREFACE	3
2. TEST FOR TOXICITY WITH <i>SKELETONEMA COSTATUM</i>	4
3. TEST FOR TOXICITY WITH <i>ACARTIA TONSA</i>	10
4. TEST FOR TOXICITY WITH <i>COROPHIUM VOLUTATOR</i>	15
5. DATA SHEETS	20

PREFACE:

Ecotoxicological tests were performed on "FC-603 EF Light Water™ ATC™ 3%" in agreement with Novatech. The sample is a concentrate that normally will be used in a 3% AFFF/3% AR solution. Tests were conducted in accordance with the "Harmonised Offshore Chemical Notification Format" (OSPARCOM 1995 / SFT 1998).

The project was carried out at RF - Rogaland Research for 3M Norge. All the tests were performed by RF - Miljølab. Study director was Senior Engineer Inger Lisa Andersen.

The test results are presented in separate sections. The results relate to the product as supplied by Novatech.

This test report is issued by a laboratory accredited by Norwegian Accreditation (NA). The accreditation states that the laboratory meets the NA requirements concerning competence, equipment and working procedures for all the test methods contained in the accreditation. It also states that the laboratory has a satisfactory quality assurance system, which includes internal quality control schemes, participation in interlaboratory comparisons, and the use of certified reference materials and secondary reference materials.

The tests performed are covered by the accreditation.

This test report may not be reproduced in any form other than in full, without the permission in writing by RF - Miljølab.

TEST FOR TOXICITY

Marine alga: *Skeletonema costatum*



TEST REPORT

GROWTH INHIBITION TEST WITH THE MARINE ALGA *Skeletonema costatum*

TEST SUBSTANCE: "FC-603 EF Light WaterTM ATCTM 3%"

TEST RESULT:

The 72 hours EC₅₀ was calculated to ~170 mg/l.

The test substance was supplied by Novatech, and the test results relate to this product.

TEST DETAILS:

METHOD: NS-EN ISO 10253, 1998: Water quality - Marine algal growth inhibition test with *Skeletonema costatum* and *Phaeodactylum tricornutum*.

TEST ORGANISM: *Skeletonema costatum*, strain NIVA BAC 1. A stock culture of the test organism is kept at RF - Rogaland Research.

PREPARATIONS: Natural seawater (salinity: 34 ‰) from an unpolluted site in Byfjord was used as basis for the growth medium. The water was filtered through a GF/C filter, and briefly heated to about 75°C prior to use. The seawater was enriched with nutrients according to ISO 10253, and recommendations from the Paris Commission.

Test solutions were prepared from a stock solution. A stock solution of 1020 mg/l was prepared by stirring 1.020 grams of the product in 1 litre of growth medium. Other concentrations were prepared from this stock solution.

INCUBATION: Test cultures of 50 ml were incubated in 100 ml flat-bottomed flasks on an orbital shaker, 3 replicates for each concentration. Test cultures were inoculated to about 2000 cells/ml from an exponentially growing inoculum culture. The test was run under continuous light ($> 50 \mu\text{E}/\text{m}^2 \cdot \text{sek}$) from fluorescent tubes of universal natural white type, at a temperature of $20 \pm 2^\circ\text{C}$.

The test was run for about 72 hours, and subsamples of 5 ml were taken from the test flasks each day for growth measurements. Algal growth was measured by fluorescence. pH measurements were performed as indicated on data sheet.

DATA ANALYSIS:

CALCULATIONS: Growth rates were calculated by log linear regression on biomass (fluorescence) versus time, as described in NS-EN ISO 10253.

E_rC_{50} : The inhibitory effect on the growth of *Skeletonema costatum* is expressed as the concentration of a product giving 50% reduction of growth rate (E_rC_{50}). This effect concentration was calculated by interpolation between 100mg/l and 320mg/l.

NOEC: Calculation of NOEC (No Observed Effect Concentration) is done by single-factor ANOVA followed by Bonferroni's procedure for comparing each concentration mean with the control mean.

TEST RESULTS: Table 1. EC and NOEC values obtained with *Skeletonema costatum*.

Test substance	E_rC_{10}	E_rC_{50}	E_rC_{90}
"FC-603 EF Light Water TM ATC TM 3%"	-	~170	100< E_rC_{90} <320

NOEC: 100

Values indicate concentrations giving 10%, 50% and 90% inhibition of growth rate. Units in mg/l. Values are calculated by interpolation. NOEC are calculated by using the computer programme GraphPad InStat 3.0.

COMMENTS: The results are based on growth rates for the time span 0 - 72 h, the period during which the growth is considered to be exponential in the control cultures (see growth curves).

VALIDATION: The validity criteria given in the test protocol are fulfilled, in that the control cell density increased by a factor of more than 16 in the test period (corresponding to a growth rate of more than 0,9 d⁻¹), the control pH did not vary by more than 1,0 units during the test and the 72 hours test results with 3,5-dichlorophenol was in the range normally found.

Lab. ref. no.: 99312-4
Sample received.: 20.09.99
Test period: 07-10.12.99
Report date: 10.01.2000

Elin Horve
Elin Horve
Engineer
Analytical technician


Åge Molversmyr
Senior Research Scientist
Quality Assurance

Enclosed: Data sheets

PRIMARY DATA: Growth inhibition test with *Skeletonema costatum*

Test substance: FC-603 EF Light Water TM ATC TM 3%

Lab. ref.: 99312-4

Start date: 07.12.99

Conc. unit: mg/l

Measurement: The biomass was measured by fluorescence; values in fluorescence units

Concentration	Time:				Growth rate day -1	Correlation	pH at start of test	pH at end of test
	07.12.99 14:50	08.12.99 09:30	09.12.99 10:25	10.12.99 11:55				
0	0.12	0.26	0.93	4	1.22	0.998	8.2	8.2
0	0.1	0.34	1.7	9.7	1.59	1.000		
0	0.1	0.33	1.1	6	1.42	0.998		
0	0.09	0.3	1.1	6.4	1.48	0.998		
0	0.09	0.26	0.88	6	1.46	0.995		
0	0.09	0.26	0.9	7	1.51	0.994		
3.2	0.09	0.43	1.75	11	1.67	0.998	8.3	8.2
3.2	0.09	0.28	1.2	6.3	1.48	1.000		
3.2	0.08	0.23	1	4.7	1.42	1.000		
10	0.08	0.4	3.4	14.5	1.81	0.995	8.3	8.3
10	0.09	0.4	2	11.5	1.69	0.999		
10	0.1	0.4	2.2	12	1.66	1.000		
32	0.1	0.28	2.05	9.3	1.57	0.998	8.3	8.2
32	0.1	0.3	1.9	9.2	1.57	0.999		
32	0.11	0.3	1.65	8.8	1.52	0.999		
100	0.09	0.31	0.77	5.4	1.42	0.991	8.3	8.2
100	0.11	0.35	0.75	5.1	1.33	0.986		
100	0.1	0.36	0.78	5.4	1.39	0.987		
320	0.07	0.04	0.03	0.04	0.00		8.3	8.2
320	0.09	0.03	0.01	0.04	0.00			
320	0.06	0.04	0.02	0.06	0.00			
1000	0.09	0.07	0.08	0.05	0.00		8.3	8.2
1000	0.09	0.03	0.03	0.05	0.00			
1000	0.1	0.03	0.03	0.02	0.00			

Reference substance (3,5-dichlorophenol):

1.5 mg/l	0.09	0.15	0.15	0.2	0.28	0.908		
1.5 mg/l	0.08	0.1	0.12	0.22	0.35	0.968		
1.5 mg/l	0.08	0.14	0.18	0.2	0.32	0.921		

Mean values:

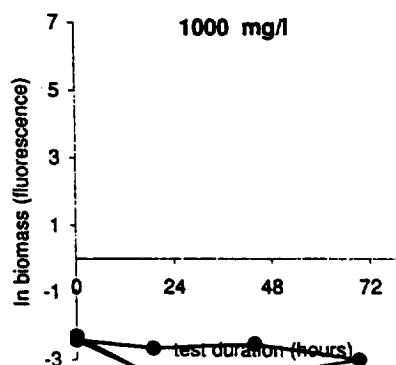
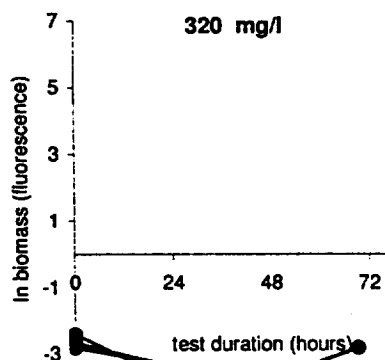
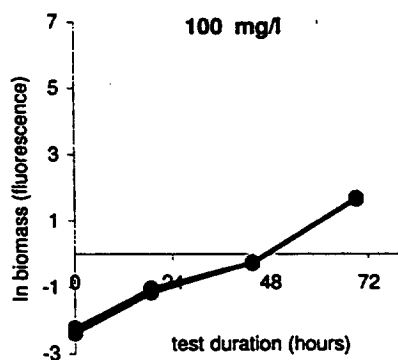
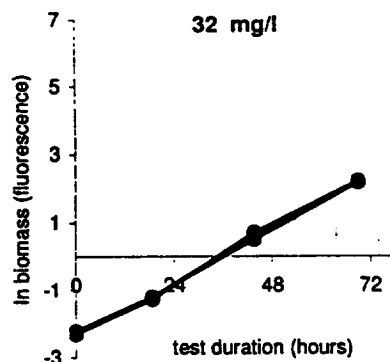
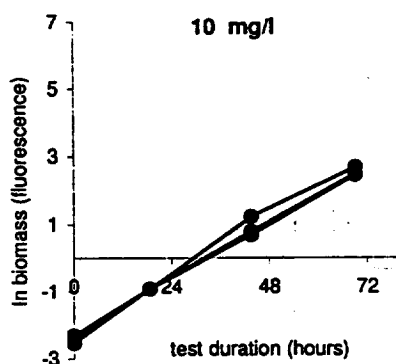
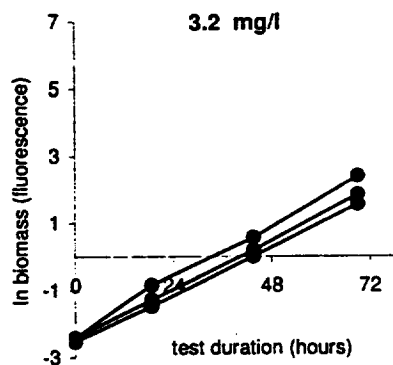
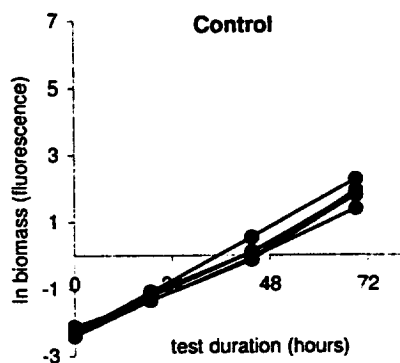
0	0.10	0.3	1	7	1.45	0.998
3.2	0.09	0.3	1	7	1.52	0.999
10	0.09	0.4	3	13	1.72	0.999
32	0.10	0.3	2	9	1.56	0.999
100	0.10	0.3	1	5	1.38	0.988
320	0.07	0.0	0	0	0.00	
1000	0.09	0.0	0	0	0.00	
Reference subst.	0.08	0.13	0.2	0.2	0.32	0.969

The result of the reference substance (22% inhibition) is within the range normally found (20-80%)

GROWTH CURVES: Growth inhibition test with *Skeletonema costatum*

Test substance: FC-603 EF Light Water TM ATC TM 3%

Lab. ref.: 99312-4



Inhibition of the growth of *Skeletonema costatum*
with:

mg/l (FC-603 EF Light Water TM ATC TM 3%)

Experimental data:

Concentration in FC-603 EF Light Water TM ATC TM 3%	Growth rate	Inhibition in percent
Control 1	1.22	-
Control 2	1.59	-
Control 3	1.42	-
Control 4	1.48	-
Control 5	1.46	-
Control 6	1.51	-
Control mean :	1.45	0
3.20	1.67	0.0
3.20	1.48	0.0
3.20	1.42	1.8
10.00	1.81	0.0
10.00	1.69	0.0
10.00	1.66	0.0
32.00	1.57	0.0
32.00	1.57	0.0
32.00	1.52	0.0
100.00	1.42	1.8
100.00	1.33	8.1
100.00	1.39	3.9
320.00	0.00	100.0
320.00	0.00	100.0
320.00	0.00	100.0
1000.00	0.00	100.0
1000.00	0.00	100.0
1000.00	0.00	100.0

TEST FOR TOXICITY

Marine herbivore: *Acartia tonsa*

TEST REPORT

ACUTE TOXICITY TEST WITH THE MARINE COPEPOD *Acartia tonsa*

TEST SUBSTANCE: "FC-603 EF Light Water™ ATC™ 3%"

TEST RESULT:

The 48 hours LC₅₀ was calculated to 280 mg/l.

The test substance was supplied by Novatech, and the test results relate to this product.

TEST DETAILS:

METHOD: ISO/DIS 14669 - 1997: Water quality - Determination of acute lethal toxicity to marine copepods (Copepoda, Crustacea).

TEST ORGANISM: *Acartia tonsa* (Dana), supplied by the Marine Biological Laboratory, University of Copenhagen.

CULTIVATION: The test organisms were supplied as eggs, and were cultivated in accordance with the "Paris Commission - Ring Test Protocol" (VKI). Large copepodites and adults were used in the test.

PREPARATIONS: Natural seawater (salinity: 34 ‰) from an unpolluted site in Byfjord was used as basis for the dilution water. The water was filtered through a GF/C filter prior to use.

Test solutions were prepared from a stock solution. A stock solution of 1000 mg/l was prepared by stirring 1.0002 grams of the product in 1 litre of dilution water. Other concentrations were prepared from this stock solution.

INCUBATION: The test was run in glass containers (28 ml rolled rim vials) each containing 25 ml of test solution and 5 animals, 4 replicates for each concentration. The vials were kept under a 16h/8h light/dark photoperiod at a temperature of 20 ± 1 °C. pH and oxygen measurements were performed as indicated on the data sheet.

DATA ANALYSIS:

CALCULATIONS: The effect on the survival of *Acartia tonsa* is expressed as the concentration of a product lethal to 50% of the test animals (LC₅₀). The combined mortality per test concentration were used for calculation. The 24 hours and 48 hours LC₅₀ values and the 95% confidence limit were calculated by using the standard procedure PROBIT Analysis, National Swedish Environmental Protection Board (Version 2.3, 1990). This programme also calculate test concentrations lethal to 10% and 90% of the test animals.

NOEC: Calculation of NOEC (No Observed Effect Concentration) is done by single-factor ANOVA followed by Bonferronis procedure for comparing each concentration mean with the control mean.

TEST RESULTS: Table 1. LC and NOEC values obtained with "FC-603 EF Light Water™ ATC™ 3%".

<i>Acartia tonsa</i>	24 hours	48 hours
LC ₁₀	280 (130 – 380)	89 (54 – 120)
LC ₅₀	610 (490 – 790)	280 (220 – 360)
LC ₉₀	>1000	880 (620 – 1500)
NOEC:	320	180

Values indicate 10%, 50% and 90% lethality after 24 and 48 hours. Units in mg/l. Values are calculated by PROBIT analysis, and 95% confidence intervals are indicated. NOEC are calculated by the computer programme GraphPad InStat 3.0.

VALIDATION: The validity criteria given in the test protocol are fulfilled, in that the dissolved oxygen concentration at the end of the test was greater than or equal to 4 mg/l, the percentage mortality in the controls was less than 10%, and the 48 hours LC₅₀ of 3,5-dichlorophenol (reference) was in the range normally found.

Lab. ref. no.: 99312-4
Sample received.: 20.09.99
Test period: 10-12.11.99
Report date: 07.01.2000

Elin Horve
Elin Horve
Engineer
Analytical technician

Åge Molversmyr
Åge Molversmyr
Senior Research Scientist
Quality Assurance

Enclosed: Data sheets

PRIMARY DATA: Acute toxicity test with *Acartia tonsa*

Test substance: "FC-603 EF Light Water™ ATC™ 3%"

Lab. ref.: 99312-4

Start date: 10.11.99

Measurement: Number of dead

Concentration (mg/l)	Total number Specimen pr. conc.	Number of specimen pr. vessel A C E B D F	NUMBER OF DEAD								
			24 hours						48 hours		
			A B	C D	E F	Total			A B	C D	E F
Control	30	5 5 6 4 5 5	0 0 0 0 0 0	0			0 0 1 0 0 0	1			
32	20	5 5 5 5	0 0 0 0	0			0 0 0 0	0			
56	20	5 5 5 5	0 0 0 0	0			0 0 1 0	1			
100	20	5 5 5 5	0 0 0 1	1			1 1 1 1	4			
180	20	5 5 5 5	0 0 0 0	0			2 1 2 1	6			
320	20	5 6 5 4	0 1 1 1	3			0 2 4 2	8			
560	21	6 5 4 6	2 1 3 3	9			5 3 3 5	16			
1000	20	5 5 5 5	4 5 4 3	16			5 5 5 5	20			

Reference substance (3,5-dichlorophenol):

1.0 mg/l	30	5 5 5 6 4 5	1 1 0 0 0 1	3	3 3 1 0 1 1	9
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The result with the reference substance is within the range normally found.

Test substance: "FC-603 EF Light Water TM ATC TM 3%"

Lab. ref.: 99312-4

Start date: 10.11.99

Measurements of oxygen and pH.

Concentration (mg/l)	Start		24 hours		48 hours	
	Oxygen (mg/l)	pH -	Oxygen (mg/l)	pH -	Oxygen (mg/l)	pH -
Control	7.3	8.2			7.4	8.2
32	7.6	8.1			7.1	8.2
56	7.7	8.1			7.1	8.2
100	7.8	8.2			7.1	8.2
180	7.7	8.2			6.8	8.2
320	7.7	8.2			6.8	8.2
560	7.6	8.2			6.5	8.1
1000	7.6	8.2			6.4	8.1

Reference substance (3,5-dichlorophenol):

1.0 mg/l	7.3	8.2		7.4	8.2
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TEST FOR TOXICITY

Marine Amphipode: *Corophium volutator*

TEST REPORT

ACUTE TOXICITY SEDIMENT TEST WITH THE MARINE AMPHIPOD *Corophium volutator*

TEST SUBSTANCE: "FC-603 EF Light Water TM ATC TM 3%"

TEST RESULT:

The 10d LC₅₀ was calculated to >3060 mg kg⁻¹ dry weight sediment.

The test substance was supplied by Novatech, and the test results relate to this product.

TEST DETAILS:

METHOD: ASTM E1367-90, Standard Guide For Conducting 10 day Static Sediment Toxicity Tests with Marine and Estuarine Sediments.

TEST ORGANISM: *Corophium volutator*, from an unpolluted site near Trondheim.

CULTIVATION: The test organisms were supplied as adults (4-8 mm in size) and were held in aerated seawater at 15°C. A small amount of natural seaweed was used for feeding.

PREPARATION: Natural seawater (salinity: 34 ‰) from an unpolluted site in Byfjorden outside Stavanger was used for dilution water. Sediment collected at an unpolluted site was used for preparing test sediments. The sediment is a muddy sand and was analysed for organic content and proportion silt for each test.

Each test concentration was prepared by adding the product in 600 grams of damp sediment in a plastic bucket. 150 ml of seawater was added and the bucket was shaken for 3 hours. The sediment was divided into three beakers, 400 ml of seawater was added to each, and the beakers were aerated over night. 10 animals were then randomly selected for each beaker. A sample of the damp sediment was analysed for water content, and all concentrations are calculated as mg kg⁻¹ sediment dry weight.

INCUBATION: The test was run in glass containers (600 ml) each containing 200 g of test sediment, app. 400 ml of seawater and 10 animals, 3 replicates for each concentration. The beakers were kept under continuous aeration at a temperature of 15 ± 1°C. pH and oxygen measurements were performed as indicated on the data sheet.

DATA ANALYSIS:

CALCULATIONS: The effect on the survival of *Corophium volutator* is expressed as the concentration of a product lethal to 50% of the test animals (LC₅₀). The combined mortality per test concentration were used for calculation. The 10 day LC₅₀ value and the 95% confidence limit are calculated by using the standard PROBIT Analysis, National Swedish Environmental Protection Board (Version 2.3, 1990). This programme also calculate test concentrations lethal to 10% and 90% of the test animals.

NOEC: Calculation of NOEC (No Observed Effect Concentration) is done by single-factor ANOVA followed by Bonferronis procedure for comparing each concentration mean with the control mean.

TEST RESULTS: Table 1. LC and NOEC values obtained with "FC-603 EF Light Water™ ATC™ 3%"

<i>Corophium volutator</i>	10 days
LC ₁₀	99 (- 760)
LC ₅₀	>3060
LC ₉₀	>3060
NOEC:	3060

Values indicate 10%, 50% and 90% lethality after 10 days. Units in mg kg⁻¹ sediment dry weight. Values are calculated by PROBIT analysis, and 95% confidence intervals are indicated. NOEC are calculated by the computer programme GraphPad InStat 3.0.

VALIDATION: The validity criteria given in the test protocol are fulfilled, in that the dissolved oxygen concentration at the end of the test was greater than or equal to 60 %, the percentage mortality in the controls were less than 15%. The percentage mortality in a reference substance of 20.9 mg Fluoranthene kg⁻¹ dry weight sediment was 16.7%. The sediment used is found to be within accepted limits for organic content but the silt fraction is recommended higher. We have observed a significant mortality in one concentration (1060mg kg⁻¹ dry weight sediment) but the mortality in the highest concentration was not significant.

Table 2. Characteristics of the sediment used for testing

Organic content (%)	Silt fraction (%)
0.7	0.8

Lab. ref. no.: 99312-4
Sample received.: 20.09.99
Test period: 0-10.12.99
Report date: 07.01.2000

Elin Horve
Elin Horve
Engineer
Analytical technician

Åge Molversmyr
Åge Molversmyr
Senior Research Scientist
Quality Assurance

Enclosed: Data sheets

PRIMARY DATA: Acute toxicity test with *Corophium volutator*

Test substance: "FC-603 EF Light Water™ ATC™ 3%"

Lab. ref.: 99312-4

Start date: 17.12.99

Measurement: Number of dead

Concentration (mg/kg dry weight)	Total number	Number of specimen pr. vessel	NUMBER OF DEAD									
			5 days				10 days					
	Specimen pr. conc.	A B	C D	E F	A B	C D	E F	Total	A B	C D	E F	Total
Control	60	10 10	10 10	10 10					0 0	0 0	0 0	0
222	30	10	10	10					0	1	2	3
457	30	10	10	10					2	0	2	4
1060	30	10	10	10					2	3	2	7
3060	30	10	10	10					3	2	0	5

Reference substance (fluoranthene):

20.9	30	10 10 10				1 2 2	5
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Test substance: "FC-603 EF Light Water TM ATC TM 3%"

Lab. ref.: 99312-4

Start date: 17.12.99

Measurements of oxygen and pH.

Concentration (mg/kg dry weight)	Start		5 days		10 days	
	Oxygen (%)	pH -	Oxygen (%)	pH -	Oxygen (%)	pH -
Control	94	8.1	90	8.1	97	8.1
222	96	8.1	92	8.1	94	8.0
457	97	8.1	93	8.1	97	8.1
1060	92	8.0	62	7.7	96	8.1
3060	100	8.1	93	8.0	96	8.1

Reference substance (fluoranthene):

20.9	95	8.1	92	8.1	83	8.0
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DATA SHEETS

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HMS-DATABLAD (Helse-, Miljø- og Sikkerhetsdatablad)

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Dokumentnr.: 07-7297-0 Utgitt : 03/11/98 Versjon : 03.00
Erstatter : 24/04/97 Skrevet ut : 11/11/98 Side 1 av 11

HMS-databladet er utarbeidet av Miljøavdelingen ved 3M Norge A/S.
Telefon: 63 84 75 00 / Telefax: 63 84 17 88

1 IDENTIFIKASJON AV KJEMIKALIET OG ANSVARLIG FIRMA

Importør: 3M Norge A/S

Handelsnavn:

FC-603EF LIGHT WATER (TM) ATC 3% AR-AFFF

Deklarasjonsnummer, Produktregisteret:

Telefon, Giftinformasjonssentralen:
22 59 13 00

2 OPPLYSNINGER OM KJEMISK SAMMENSETNING

Informasjon om enkeltkomponenter, faresymbol(er) og risikosetninger

STOFFNAVN	CAS-nr	VEKT-PROSENT
VANN	7732-18-5	52 - 56
1,2-ETANDIOL	107-21-1	= 22.5
Faresymboler/risikosetninger: Xn; R:22		
2-(2-BUTOKSYETOKSY)-ETANOL / (DIETYLENGLYKOLMONOBUTYLETER)	112-34-5	= 10
Faresymboler/risikosetninger: Xi; R:36		
SYNTETISK OVERFLATEAKTIVT STOFF	Trade Secret	4 - 6
FLUORALKYL OVERFLATEAKTIVE STOFFER	Trade Secret	1 - 5
FLUORKJEMISK AKRYLAT	Trade Secret	1 - 3
TRITANOLAMIN	102-71-6	= 1
TYKNERE	Trade Secret	1 - 3
RESTER AV ORGANISKE FLUORKJEMIKALIER	Trade Secret	Ikke kjent

FC-603EF LIGHT WATER (TM) ATC 34 AR-AFFF

3 VIKTIGSTE FAREMOMENTER.

Viktigste skadevirkninger

Helsefare:

Kan være farlig ved svelging. Kan irritere øynene.

Sikkerhet:

-

Miljøfare:

Spesialavfall.

4 FØRSTERJELPSTILTAK.

Tiltak øyne:

Skyll straks øynene med rikelige mengder vann. Kontakt lege umiddelbart.

Tiltak hud:

Skyll straks huden med såpe og rikelige mengder vann. Fjern tilsølt tøy. Hvis symptomer oppstår, kontakt lege. Vask tilsølt tøy før det brukes igjen og kast tilsølt skotøy.

Tiltak innånding:

Hvis symptomer oppstår, bring vedkommende bort fra eksponeringskilden. Sørg for frisk luft. Hvis symptomene vedvarer, kontakt lege.

Tiltak svelging:

Kontakt lege umiddelbart. Fremkall brekninger kun i samråd med medisinsk personell. Gi aldri noe gjennom munnen til en bevisstløs person.

5 TILTAK VED BRANNSLUKNING.

Egnet brannslukningsmiddel:

Produktet er et brannslukkingsmiddel.

Ikke egnet brannslukningsmiddel:

-

Eksponeringsrisiko ved brann:

-

FC-603EF LIGHT WATER (TM) ATC 3% AR-AFFF

Forbrenningsprodukter ved brann:
-

Prosedyrer ved slukking av brann:
-

6 TILTAK VED UTILSIKTET UTSLIPP.

Personlige vernetiltak:

Se vernetiltak under andre punkter i dette HMS-databladet.

Tiltak ved utilsiktet utslipp:

Ventiler området. Spill avgrenses umiddelbart. Dekk til med et absorberende materiale. Spill samles opp umiddelbart. Rengjør området med vann. Plasseres i en egnet beholder med lokk.

Fjerning av kjemikalieavfall:

Se punkt 13, Fjerning av kjemikalieavfall.

7 HÅNDTERING OG OPPBEVARING.

Betingelser for sikker oppbevaring:

Må ikke lagres i områder hvor produktet kan komme i kontakt med mat eller legemidler. Lagres ved temperatur under 49 grader celsius. Lagres ved temperaturer over 0 grader celsius. Hold beholderen tett lukket når produktet ikke er i bruk.

Uforenelige materialer:
-

Ventilasjon:

Oppbevar emballasjen på et godt ventilert sted.

Sikkerhetstiltak for å forhindre brann:
-

Sikkerhetstiltak for å forhindre eksplosjon:

Ikkebrennbar.

Sikkerhetstiltak for å forhindre statisk elektrisitet:
-

Forholdsregler ved bruk:

Hold emballasjen tett lukket. Røyking forbudt: Under bruk av produktet kan røyking forårsake forurensning av tobakken og/eller

FC-603EF LIGHT WATER (TM) ATC 3% AR-AFFF

8 EKSPONERINGSKONTROLL OG PERSONLIG VERNEUTSTYR.

Øyevern:

Unngå å få damp, spray eller tåke i øynene. Bruk tette vernebriller med ventiler.

Håndvern:

Bruk egnede vernehansker av hensiktsmessig materiale ved håndtering av produktet. Vernehansker av følgende materiale(r) anbefales: Butylgummi.

Annet hudvern enn håndvern:

Unngå hudkontakt.

Åndedrettsvern:

Unngå innånding av luftbåret materiale. Basert på konsentrasjonen av luftforurensninger i arbeidsatmosfæren velges en av følgende type(r) godkjent åndedrettsvern: halvmaske med filter mot organiske damper og væskeformige partikler: A/P2SL.

Svelging:

Det må ikke spises, drikkes eller røykes under arbeid med produktet. Vask utsatte områder grundig med såpe og vann. Vask hendene etter håndtering og før spising.

Anbefalt ventilasjon:

Hvis utsugningsventilasjon ikke er tilstrekkelig, må egnet godkjent åndedrettsvern benyttes. Sørg for tilstrekkelig ventilasjon slik at dampkonsentrasjonene holdes under anbefalte administrative normer og/eller kontroller spray eller tåke.

Adm. normer for forurensning i arbeidsatmosfære, Februar 1996:

VANN (7732-18-5)

Anmerkninger: Ingen adm. norm.

1,2-ETANDIOL (107-21-1)

8-timers verdi ppm: - (støv)
8-timers verdi mg/m³: 10 (støv)
Takverdi ppm: 25 (damp)
Takverdi mg/m³: - (damp)

2-(2-BUTOKSYETOKSY)-ETANOL / (DIETYLENGLYKOLMONOBUTYLETER) (112-34-5)

8-timers verdi ppm: 35
Anmerkninger: Amerikansk grenseverdi anbefalt av produsenten.
(Ingen norsk adm. norm).

SYNTEISK OVERFLATEAKTIVT STOFF (Trade Secret)

Anmerkninger: Ingen adm. norm.

FC-603EF LIGHT WATER (TM) ATC 3: AR-AFFF

~~FLUORKJEMISK AKRYLAT (Trade Secret)~~

Anmerkninger: Ingen adm. norm.

TRIETANOLAMIN (102-71-6)

8-timers verdi ppm: -

8-timers verdi mg/m³: 5

TYKNERE (Trade Secret)

Anmerkninger: Ingen adm. norm.

RESTER AV ORGANISKE FLUORKJEMIKALIER (Trade Secret)

8-timers verdi mg/m³: 0,1 Grenseverdi anbefalt av 3M.

9 FYSISKE OG KJEMISKE EGENSKAPER.

Tilstandsform, farge, lukt:	Gul/brun væske.
pH:	7.5 - 8.5
Kokepunkt/-intervall:	< 150 C
Smeltepunkt/-intervall:	Ikke relevant
Flammepunkt:	Ingen (Setaflash)
Selvantennelighet:	Ikke kjent
Ekspljosjonsgrenser, nedre:	Ikke relevant
Ekspljosjonsgrenser, øvre:	Ikke relevant
Damptrykk:	ca. 15.8 mmHg (Kalkulert v/20C)
Løselighet i vann:	Fullstendig
Spesifikk vekt:	ca. 1.06 (vann=1)
Damptetthet:	ca. 0.88 (luft=1) (Kalkulert v/20C)
Flyktige organiske forbindelser (VOC):	= 355 g/l SCAQMD (Kalkulert v/20C)
Fordampningshastighet:	Ikke kjent
Viskositet:	< 5000 centipoise

FC-603EF LIGHT WATER (TM) ATC 34 AR-AFFF

10 STABILITET OG REAKTIVITET.

Forhold som skal unngås:

Materialer som skal unngås:
Ikke kjent.

Farlige spaltningsprodukter:

Karbonmonoksid og karbondioksid. Hydrogenfluorid. Giftige damper, gasser eller partikler. Dekomponering av bruksferdig blanding forventes ikke å representere noen risiko.

Stabilitet og reaktivitet:

Stabilt. Farlig polymerisasjon vil ikke forekomme.

11 OPPLYSNINGER OM HELSEFARE.

Effekter øyne:

Mild øyeirritasjon: symptomer kan være rødhet, hevelse, smerter og tårer.

Effekter hud:

Mild hudirritasjon (etter langvarig eller gjentatt kontakt): symptomer kan være rødhet, hevelse og kløe.

Langvarig eller gjentatt eksponering kan føre til:

Allergisk hudreaksjon: symptomer kan være rødhet, hevelse, blemmer og kløe.

Effekter innånding:

En enkelt overeksponering som overstiger anbefalte administrative normer, kan føre til:

Påvirkning av sentralnervesystemet: symptomer kan være hodepine, ørhet, søvnighet, manglende koordinasjonsevne, nedsatt reaksjonsevne, sløret tale, svimmelhet og i ekstreme tilfeller bevisstløshet.

Irritasjon (øvre luftveier): symptomer kan være sårhet i nese og svelg, hosting og nysing.

Effekter svelging:

Dyreforsøk utført med organiske fluorkjemikalier, som finnes i dette produktet, viser effekter som leverforstyrrelser, vekttap, manglende appetitt, sløvhets samt effekter som påvirker neurologi, bukspytt, binyre og hematologi. Det foreligger ingen kjente

FC-603EF LIGHT WATER (TM) ATC 3: AR-AFFF

veiledning.

Svelging kan føre til:

Påvirkning av nyrene: symptomer kan være redusert urinmengde, blod i urinen og ryggsmarter.

Aspirasjonspneumoni (Lungebetennelse som skyldes at fremmedlegemer kommer ned i lungene. En alminnelig årsak til tilstanden er oppkast.): symptomer kan være hosting, pustevansker, gisping, hoste opp blod og lungebetennelse som kan være livstruende.

Informasjon om allergi, overfølsomhet:

Kreftfremkallende egenskaper:

Arvestoffskadelige egenskaper:

Reproduksjonsskadelige egenskaper:

Andre skadevirkninger, helse:

Dette produktet inneholder en eller flere organiske fluorkjemikalier, som muligens kan absorberes og lagres i kroppen over lengre tid, enten som utgangsmolekylet eller som nedbrytningsstoffer (metabolitter), og kan akkumuleres ved gjentatte eksponeringer. Det foreligger ingen kjente helseeffekter for mennesker fra eksponering overfor organiske fluorkjemikalier når de brukes som forutsatt og i henhold til veiledning.

Forekomsten av organiske fluorkjemikalier i blodet til den generelle befolkningen og underpopulasjoner som arbeidere, har vært publisert siden 1970 årene. 3Ms epidemiologiske studier av egne arbeidere viser ingen skadelige effekter.

12 OPPLYSNINGER OM MILJØFARE.

Persistens/Biologisk nedbrytbarhet:

Dette stoffet er ikke lett biologisk nedbrytbart, men brytes delvis ned i tester for lett biologisk nedbrytbarhet.

Dette produktet inneholder en eller flere organiske fluorkjemikalier som muligens ikke er nedbrytbare og forblir i miljøet (persistente).

Økotoxikologiske data:

Dette stoffet er minimalt giftig overfor akvatiske organismer (100 mg/l < laveste LC50 7050, 11100, 7050, 11100, 1000 mg/l)

FC-603EF LIGHT WATER (TM) ATC 3: AR-AFFF

Andre skadevirkninger, miljø:

Data om biologisk nedbrytbarhet:

COD (Chemical Oxygen Demand): 740000 mg/kg;
BOD 5 dagers (Biochemical Oxygen Demand): 216000 mg/kg;
BOD 10 dagers: 376000 mg/kg;
BOD 20 dagers: 446000 mg/kg;
BOD 28 dagers: 602000 mg/kg.

Akvatisk giftighet:

96 timers EC50 for fisk (Fathead Minnow (*Pimephales promelas*)): > 1000 mg/l;
48 timers EC50 daphnia (Water Flea (*Daphnia magna*)): 480 mg/l;
30 minutters EC50 Microtox: 124 mg/l;
24 timers EC50 Alge (*Selenastrum capricornutum*)): 170 mg/l.

Behandling i renseanlegg:

3 timers EC50, Activated Sludge Respiration Inhibition: > 1000 mg/l.

Sørg for avfallshåndtering iht. gjeldende forskrifter.

13 FJERNING AV KJEMIKALIEAVFALL.

Metoder for fjerning av kjemikalieavfall:

Spesialavfall. Lever avfall til en offentlig godkjent innsamler, mottaks- eller behandlingsanlegg for spesialavfall.

Anbefalte avfallsgrupper:

HOVEDKATEGORI 07: AVFALL FRA ORGANISKE PROSESSER.

UNDERKATEGORI 07 06: Avfall fra PBDB av fettstoffer, såpe, rengjøringsmidler, desinfeksjonsmidler og kosmetikk.

EAK-kode 07 06 03: Halogenerte organiske løsemidler, vaskevasker og moderlut.

Avfallstoffsnummer: 7151 Organisk avfall med halogen.

Spesielle komponenter: inneholder fluorforbindelser.

14 OPPLYSNINGER OM TRANSPORT.

ADR-klasse:

-

siffer:

-

FC-603EF LIGHT WATER (TM) ATC 3% AR-AFFF

bokstav: -
margnummer: -
CEFIC-kort: -
UN-nummer: -
ICAO-klasse: -
IMDG-klasse: -
IMDG-side: -
EMS-nr.: -
MFAG: -

Øvrige opplysninger:
Ikke transportfarlig gods.

15 OPPLYSNINGER OM LOVER OG FORSKRIFTER.

Merkeetikett:

Symbol(er):
HELSESKADELIG (Xn)

Inneholder:
Etylenglykol 22,5 %, 2-(2-butoksyetoksy)-etanol 10 %,
Trietanolamin 1%

R-setninger:
Farlig ved svelging.

S-setninger:
Unngå innånding av damp/sprøytetåke. Unngå kontakt med huden og øynene. Får man stoffet i øynene; skyll straks grundig med store mengder vann og kontakt lege. Får man stoff på huden, vaskes straks med store mengder såpe og vann. Ved svelging, kontakt lege omgående og vis denne beholderen eller etiketten.

YL-gruppe:
00

Korr. yrkeshyg. luftbehov:
-

Øvrige opplysninger om merkeetiketten:
Ovennevnte merking er basert på tidligere merkeforskrifter og vil

FC-603EF LIGHT WATER (TM) ATC 3: AR-AFFF

reviderte merkeforskrifter av januar 1998.

Symbol: Ingen

Inneholder: 1,2-etandiol, 2-(2-butoksyetoksy)-etanol,
Trietanolamin

Kan være farlig ved svelging. Kan irritere øynene. Unngå innånding av damp/sprøytetåke. Unngå kontakt med huden og øynene. Får man stoffet i øynene; skyll straks grundig med store mengder vann og kontakt lege. Får man stoff på huden, vaskes straks med store mengder såpe og vann. Ved svelging, kontakt lege omgående og vis denne beholderen eller etiketten.

YL-gruppe:
00

Spesielle lover og bestemmelser:

1. Forskrift om utarbeidelse og distribusjon av Helse-, Miljø- og Sikkerhetsdatablad for farlige kjemikalier.
2. Forskrift om klassifisering og merking av farlige kjemikalier.
3. Forskrift om klassifisering, merking m.v. av stoff som kan medføre miljøfare.
4. Forskrift om stoffkartotek.
5. Forskrift om spesialavfall.
6. Etc.

16 ANDRE OPPLYSNINGER AV BETYDNING FOR BRUKERNES SIKKERHET OG HELSE.

Anvendelsesområder:

Filmdannende skumkonsentrat for slukking av brann.

Viktigste kilde(r) ved utarbeidelsen av HMS-databladet:

Datablad fra 3M General Offices, St. Paul, Minnesota, USA.

Årsak til oppdatering:

Hele databladet er revidert. Tilpasset nye merke- og HMS-databladforskrifter, fastsatt i januar 1998. Etc.

Egne opplysninger:

Informasjonen på dette HMS-databladet er i henhold til våre nåværende opplysninger og beste oppfatning angående riktig bruk og håndteringen av dette produktet under normale forhold. Enhver bruk av produktet som ikke er i samsvar med dette HMS-databladet, eller som medfører bruk av produktet i kombinasjon med andre produkter eller enhver annen prosess er brukerens ansvar.

FC-603EF LIGHT WATER (TM) ATC 3% AR-AFFF

FØLGENDE PRODUKTER DEKKES AV DETTE HMS-DATABLADET:

- 3M ID-nr. : XF-0008-0223-1
3M AFFF/ATC FC-603EF Brannslukn
ingsskum Produksjon
- 3M ID-nr. : XF-0008-0209-0
3M Light Water3/3%AFFF/ATC Fire
Fighting Foam, FC-603EF, 1000 L
- 3M ID-nr. : XF-0008-0208-2
3M Light Water3/3%AFFF/ATC Fire
Fighting Foam, FC-603EF, 200 L
- 3M ID-nr. : XF-0008-0207-4
3M Light Water3/3%AFFF/ATC Fire
Fighting Foam, FC-603EF, 20 L