

8-11-95

DATA EVALUATION RECORD
AQUATIC INVERTEBRATE LIFE CYCLE TEST
GUIDELINE 72-4(B)

1. CHEMICAL: Sulfentrazone (129081)

2. TEST MATERIAL: Sulfentrazone technical; 94.2%

3. CITATION:

Authors: Boeri, R.L., P.L. Kowalski, and T.J. Ward
Title: Chronic toxicity of F6285 technical to the
daphnid, *Daphnia magna*
Date: 1994
Laboratory: T.R. Wilbury Laboratories, Inc., Marblehead,
MA
Lab. Report #: 309-FM
Sponsor: FMC Corporation, Princeton, NJ
MRID No.: 435886-05

4. REVIEWED BY:

William Erickson
Biologist
EEB/EFED

Signature:

Date:

W. Erickson
8/09/95

5. APPROVED BY:

Harry Craven
Section Head 4
EEB/EFED

Signature:

Date:

Harry Craven
8/11/95

6. STUDY PARAMETERS/RESULTS SYNOPSIS:

Age/size of Test Organism: <24 h old
Test Duration: 21 days
Study Method: flow-through
Concentrations: mean measured
Most sensitive endpoint: survival
NOEC: 0.20 mg/l
LOEC: 0.51 mg/l

7. CONCLUSIONS: The study is scientifically sound and fulfills the guideline requirement for a life-cycle study with a freshwater invertebrate.

8. ADEQUACY OF THE STUDY: Core.

9. **MAJOR GUIDELINE DEVIATIONS:** No major deviations. pH was slightly above that recommended, and daphnids were supplied with less than 10^8 algal cells per liter. These deviations likely did not affect the outcome of the study.

10. **SUBMISSION PURPOSE:** New chemical.

11. **MATERIALS AND METHODS:**

Test Organisms/Acclimation:

Guideline Criteria	Reported Information
Species <i>Daphnia magna</i>	<i>Daphnia magna</i> (<24 h old)
Source	in-house culture
Parental Acclimation Conditions Parental stock must be maintained separately from the brood culture in dilution water under test conditions.	yes
Parental Acclimation Period At least 21 days.	in-house culture
Age of Parental Stock At least 10-12 days old at the beginning of the acclimation period.	yes
Food Synthetic foods (trout chow), algae, or synthetic foods in combination with alfalfa yeast and algae.	<i>Selenastrum capricornutum</i>
Food Concentration 5 mg/L (dry wt.) of synthetic food or 10^8 cells/L of algae is recommended.	not reported
Were daphnids in good health during acclimation period?	yes

Test System:

Guideline Criteria	Reported Information
<u>Test Water</u> Unpolluted well or spring that has been tested for contaminants, or appropriate reconstituted water (see ASTM for details).	dechlorinated, filtered tap water tested for contaminants
<u>Water Temperature</u> 20°C ± 2°C. Must not deviate from 20°C by more than 5°C for more than 48 hours.	20 ± 2°C
<u>pH</u> 7.6 to 8.0 is recommended. Must not deviate by more than one unit for more than 48 hours.	8.0-8.7
<u>Total Hardness</u> 160 to 180 mg/L as CaCO ₃ is recommended.	160-180 mg/L as CaCO ₃
<u>Dissolved Oxygen</u> <u>Renewal</u> : must not drop below 50% for more than 48 hours. <u>Flow-through</u> : ≥ 60% throughout test.	yes
<u>Test Vessels or Compartments</u> 1. <u>Material</u> : Glass, No. 316 stainless steel, or perfluorocarbon plastics 2. <u>Size</u> : approx. 250 ml 3. <u>Fill volume</u> : 200 ml	glass beakers 270 ml beakers filled to depth of 5 cm
<u>Covers</u> <u>Renewal</u> : Test vessels should be covered with a glass plate. <u>Flow-through</u> : openings in test compartments should be covered with mesh nylon or stainless steel screen.	Nitex collars

Guideline Criteria	Reported Information
<u>Type of Dilution System</u> Must provide reproducible supply of toxicant. Intermittent flow proportional diluters or continuous flow serial diluters should be used.	intermittent-flow proportional diluter
<u>Flow Rate</u> Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period.	13 vol/24 hours
<u>Aeration</u> Dilution water should be vigorously aerated, but the test tanks should not be aerated.	dilution water was aerated
<u>Photoperiod</u> 16 hours light, 8 hours dark is recommended.	16 h light/8 h dark
<u>Solvents</u> Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests. Acceptable solvents are dimethylformamide, triethylene glycol, methanol, acetone and ethanol.	DMF (0.013 ml/l)

Test Design:

Guideline Criteria	Reported Information
<u>Duration</u> 21 days	21 days
<u>Nominal Concentrations</u> Control(s) and at least 5 test concentrations; dilution factor not greater than 50%.	negative and solvent controls and 5 test concentrations

Guideline Criteria	Reported Information
<u>Number of Test Organisms</u> 22 daphnids/level; 7 test chambers should contain 1 daphnid each, and 3 test chambers should contain 5 daphnids each.	40/level
<u>Test organisms randomly or impartially assigned to test vessels?</u>	yes
<u>Renewal</u> Parent daphnids in all beakers must be transferred to containers with fresh test solution (< 4 hours old) three times each week (e.g. every Monday, Wednesday and Friday).	n/a
<u>Water Parameter Measurements</u> 1. Dissolved oxygen must be measured at each concentration at least once a week. 2. pH, alkalinity, hardness, and conductance must be measured once a week in one test concentration and in one control. 3. Temperature	DO, pH, conductivity, and temp. were measured daily in each test chamber. Temp. in 1 test chamber also measured continuously. Hardness and alkalinity were measured weekly in the control and highest test concentration
<u>Chemical Analysis</u> Needed if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used.	yes, flow-through

12. REPORTED RESULTS:

General Results:

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	yes
<u>Control Mortality</u> ≤ 30%	17-20%

Guideline Criteria	Reported Information
Did daphnids in each control produce at least 40 young after 21 days?	yes
Were no ephippia produced in any of the controls?	not reported
Data Endpoints - Survival of first-generation daphnids, - Number of young produced per female, - Dry weight (required) and length (optional) of each first generation daphnid alive at the end of the test, - Observations of other effects or clinical signs.	survival of parental daphnids; sublethal effects; time to first brood; no. young per female; length and dry weight of surviving daphnids
Raw data included?	yes

Effects Data:

Toxicant Concentration (mg/L)		No. (%) Dead or Immobile (21 Days)	Young per Female per Repro. Day	Mean Length (mm)	Mean Dry Weight (mg)
Nominal	Measured				
control	-	7	50.4	4.6	0.30
solvent control	-	8	47.5	4.5	0.31
0.10	0.099	7	49.5	4.7	0.31
0.20	0.20	8	50.5	4.5	0.29
0.43	0.51	11	46.8	4.6	0.30
0.85	1.1	21	15.0	4.1	0.27
1.7	2.2	34	0.9	3.5	0.21

Toxicity Observations: Sublethal effects were noted in some daphnids at the two highest test concentrations. Affected daphnids were pale and lethargic on days 1-6 and visibly smaller than controls on days 11-21.

Statistical Results:

Most sensitive endpoint:

Endpoint	Method	NOEC (mg/l)	LOEC (mg/l)
Survival	Kruskal-Wallis test	1.1	2.2
Reproduction	Bonferroni's or Dunnett's test	0.51	1.1
Weight	Bonferroni's or Dunnett's test	0.51	1.1
Length	Bonferroni's or Dunnett's test	0.51	1.1

13. VERIFICATION OF STATISTICAL RESULTS:

Most sensitive endpoint:

Endpoint	Method	NOEC	LOEC
Survival	Williams test	0.20	0.51
Reproduction	Williams test	0.51	1.1
Weight	Williams test	0.51	1.1
Length	Williams test	0.51	1.1

14. REVIEWER'S COMMENTS: The study is scientifically sound and fulfills the guideline requirement.

STATISTICAL ANALYSES - TOXSTAT

SURVIVAL DATA:

SUMMARY STATISTICS

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT CONTROL	4	7.000	9.000	8.000
2	0.099 mg/l	4	8.000	9.000	8.250
3	0.20	4	8.000	8.000	8.000
4	0.51	4	7.000	8.000	7.250
5	1.1	4	4.000	5.000	4.750
6	2.2	4	1.000	2.000	1.500

SUMMARY STATISTICS

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SOLVENT CONTROL	0.667	0.816	0.408
2	0.099 mg/l	0.250	0.500	0.250
3	0.20	0.000	0.000	0.000
4	0.51	0.250	0.500	0.250
5	1.1	0.250	0.500	0.250
6	2.2	0.333	0.577	0.289

WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT CONTROL	4	8.000	8.000	8.125
2	0.099 mg/l	4	8.250	8.250	8.125
3	0.20	4	8.000	8.000	8.000
4	0.51	4	7.250	7.250	7.250
5	1.1	4	4.750	4.750	4.750
6	2.2	4	1.500	1.500	1.500

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT CONTROL	8.125				
0.099 mg/l	8.125	0.327		1.73	k= 1, v=18
0.20	8.000	0.000		1.82	k= 2, v=18
0.51	7.250	1.964	*	1.85	k= 3, v=18
1.1	4.750	8.510	*	1.86	k= 4, v=18
2.2	1.500	17.021	*	1.87	k= 5, v=18

s = 0.540

Note: df used for table values are approximate when v > 20.

NUMBER OF YOUNG PRODUCED:

SUMMARY STATISTICS		TABLE 1 of 2			
GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT CONTROL	4	353.000	435.000	404.000
2	0.099 mg/l	4	409.000	498.000	448.750
3	0.20	4	382.000	446.000	422.500
4	0.51	4	370.000	414.000	390.000
5	1.1	4	66.000	140.000	91.250
6	2.2	4	0.000	11.000	2.750

SUMMARY STATISTICS		TABLE 2 of 2		
GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SOLVENT CONTROL	1270.667	35.646	17.823
2	0.099 mg/l	1590.917	39.886	19.943
3	0.20	789.667	28.101	14.051
4	0.51	360.667	18.991	9.496
5	1.1	1110.250	33.320	16.660
6	2.2	30.250	5.500	2.750

WILLIAMS TEST (Isotonic regression model)				TABLE 1 OF 2	
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT CONTROL	4	404.000	404.000	426.375
2	0.099 mg/l	4	448.750	448.750	426.375
3	0.20	4	422.500	422.500	422.500
4	0.51	4	390.000	390.000	390.000
5	1.1	4	91.250	91.250	91.250
6	2.2	4	2.750	2.750	2.750

WILLIAMS TEST (Isotonic regression model)				TABLE 2 OF 2	
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT CONTROL	426.375				
0.099 mg/l	426.375	1.080		1.73	k= 1, v=18
0.20	422.500	0.893		1.82	k= 2, v=18
0.51	390.000	0.676		1.85	k= 3, v=18
1.1	91.250	15.093	*	1.86	k= 4, v=18
2.2	2.750	19.364	*	1.87	k= 5, v=18

s = 29.304

Note: df used for table values are approximate when v > 20.

LENGTH DATA:

SUMMARY STATISTICS

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT CONTROL	4	4.400	4.500	4.475
2	0.099 mg/l	4	4.600	4.700	4.650
3	0.20	4	4.300	4.600	4.525
4	0.51	4	4.200	4.800	4.575
5	1.1	4	3.900	4.400	4.100
6	2.2	4	3.300	3.600	3.475

SUMMARY STATISTICS

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SOLVENT CONTROL	0.002	0.050	0.025
2	0.099 mg/l	0.003	0.058	0.029
3	0.20	0.022	0.150	0.075
4	0.51	0.069	0.263	0.131
5	1.1	0.047	0.216	0.108
6	2.2	0.016	0.126	0.063

WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT CONTROL	4	4.475	4.475	4.563
2	0.099 mg/l	4	4.650	4.650	4.563
3	0.20	4	4.525	4.525	4.550
4	0.51	4	4.575	4.575	4.550
5	1.1	4	4.100	4.100	4.100
6	2.2	4	3.475	3.475	3.475

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT CONTROL	4.563				
0.099 mg/l	4.563	0.758		1.73	k= 1, v=18
0.20	4.550	0.649		1.82	k= 2, v=18
0.51	4.550	0.649		1.85	k= 3, v=18
1.1	4.100	3.247	*	1.86	k= 4, v=18
2.2	3.475	8.660	*	1.87	k= 5, v=18

s = .0163

Note: df used for table values are approximate when v > 20.

WEIGHT DATA:

SUMMARY STATISTICS

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT CONTROL	4	0.300	0.310	0.305
2	0.099 mg/l	4	0.300	0.330	0.310
3	0.20	4	0.250	0.310	0.285
4	0.51	4	0.290	0.300	0.298
5	1.1	4	0.260	0.280	0.273
6	2.2	4	0.180	0.230	0.210

SUMMARY STATISTICS

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SOLVENT CONTROL	0.000	0.006	0.003
2	0.099 mg/l	0.000	0.014	0.007
3	0.20	0.001	0.026	0.013
4	0.51	0.000	0.005	0.003
5	1.1	0.000	0.010	0.005
6	2.2	0.000	0.022	0.011

WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT CONTROL	4	0.305	0.305	0.308
2	0.099 mg/l	4	0.310	0.310	0.308
3	0.20	4	0.285	0.285	0.291
4	0.51	4	0.298	0.298	0.291
5	1.1	4	0.273	0.273	0.273
6	2.2	4	0.210	0.210	0.210

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT CONTROL	0.308				
0.099 mg/l	0.308	0.224		1.73	k= 1, v=18
0.20	0.291	1.230		1.82	k= 2, v=18
0.51	0.291	1.230		1.85	k= 3, v=18
1.1	0.273	2.907	*	1.86	k= 4, v=18
2.2	0.210	8.497	*	1.87	k= 5, v=18

s = 0.016

Note: df used for table values are approximate when v > 20.