

8-11-95

DATA EVALUATION RECORD
ALGAE EC₅₀ TEST
GUIDELINE 123-2 (TIER II)

1. CHEMICAL: Sulfentrazone (129081)
2. TEST MATERIAL: Sulfentrazone technical; 94.2 %
3. CITATION

Author: Ward, T.J., P.L. Kowalski, and R.L. Boeri
Title: Acute toxicity of sulfentrazone technical
to the freshwater alga, *Navicula
pelliculosa*
Date: 1995
Test Lab: T.R. Wilbury Laboratories, Inc.,
Marblehead, MA
Lab. Report #: 618-FM
Sponsor: FMC Corporation, Princeton, NJ
MRID #: 436510-04

4. REVIEWED BY:

William Erickson
Biologist
EEB/EFED/EPA

Signature:

Date:

W. Erickson
8/09/95

5. APPROVED BY:

Harry Craven
Section Head 4
EEB/EFED/EPA

Signature:

Date:

Harry Craven
8/11/95

6. STUDY PARAMETERS/RESULTS SYNOPSIS:

Test Duration: 120 hours
Type of Concentrations: Mean measured
EC₅₀: 42.1 µg/l
95% C.I.: 38.5-46.3 µg/l
NOEC: 7.5 µg/l

7. CONCLUSIONS: The study is scientifically sound and satisfies the guideline requirement (123-2) for a Tier 2 aquatic plant growth study with a freshwater diatom.
8. ADEQUACY OF THE STUDY: Core.
9. MAJOR GUIDELINE DEVIATIONS: None.
10. SUBMISSION PURPOSE: New chemical.

11. MATERIALS AND METHODS:

Test Organisms:

Guideline Criteria	Reported Information
<u>Species</u> <i>Skeletonema costatum</i> <i>Anabaena flos-aquae</i> <i>Selenastrum capricornutum</i> <i>Navicula pelliculosa</i>	<i>Navicula pelliculosa</i>
<u>Initial Number of Cells</u> 3,000 - 10,000 cells/ml	3,000 cells/ml
<u>Nutrients</u> Standard formula, e.g. 20XAAP	sterile synthetic media fortified with 20 mg/l silicone

Test System:

Guideline Criteria	Reported Information
<u>Solvent</u>	DMF
<u>Temperature</u> <i>Skeletonema</i> : 20°C Others: 24-25°C	24 ± 2°C
<u>Light Intensity</u> <i>Anabaena</i> : 2.0 Lux (±15%) Others: 4.0-5.0 Lux (±15%)	4100 lux
<u>Photoperiod</u> <i>Skeletonema</i> : 14 h light, 10 h dark or 16 h light, 8 h dark Others: Continuous	continuous
<u>pH</u> <i>Skeletonema</i> : approx. 8.0 Others: approx. 7.5	7.5

Test Design:

Guideline Criteria	Reported Information
<u>Dose range</u> 2X or 3X progression	2X
<u>Doses</u> at least 5	5

Guideline Criteria	Reported Information
<u>Controls</u> negative and/or solvent	negative and solvent
<u>Replicates per dose</u> 3 or more	3
<u>Duration of test</u> 120 hours	120 hours
<u>Daily observations</u> were made?	no observations reported except for cell counts at 72, 96, and 120 hours
<u>Method of Observations</u>	hemacytometer/microscope
<u>Maximum Labeled Rate</u>	n/a

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 120 h cell densities were measured?	yes
Control cell count at 120 hr >2X initial count?	yes
Initial chemical concentrations measured? (Optional)	yes
Raw data included?	yes

Dose Response:

Dose ($\mu\text{g ai/L}$)	Cell Density ($\times 10^4$ cells/ml)	% Inhibition	120-Hour pH
Control	356	N/A	10.0
Solvent Control	396	N/A	10.0
7.5	386	3	10.0
14.1	323.3	19	9.9
25.2	305.3	23	10.0
45.8	314.7	21	9.9
83.0	<0.3	100	7.6

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Other Findings: No insoluble material was observed in any test vessel during the study.

An initial screening test was performed with a control, solvent control, and concentrations of 0.01, 0.1, 1.0, 10, and 100 mg/l. After 120 hours there was <1% of control growth at the four highest concentrations and >100% of the control growth at 0.01 mg/l.

Statistical Results:

Methods: Binomial/nonlinear interpolation (EC_{50})
Bonferroni's t-test (NOEC)

EC_{50} : 106 $\mu\text{g ai/l}$
95% C.I.: 84.3-156
NOEC: 12.1 $\mu\text{g ai/l}$

13. VERIFICATION OF STATISTICAL RESULTS:

Methods: Moving average (EC_{50})
Williams' Test (NOEC)

EC_{50} : 42.1 $\mu\text{g/l}$
95% C.I.: 38.5-46.3 $\mu\text{g/l}$
NOEC: 7.5 $\mu\text{g/l}$

- 14. REVIEWER'S COMMENTS:** The study is scientifically sound and satisfies the guideline requirement (123-2) for a Tier 2 aquatic plant growth study with *Navicula pelliculosa*.

W. ERICKSON SULFENTRAZONE NAVICULA TOXICITY

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
83	100	100	100	0
45.8	100	21	21	0
25.2	100	23	23	0
14.1	100	19	19	0
7.5	100	3	3	0

THE BINOMIAL TEST SHOWS THAT 45.8 AND 83 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 54.53852

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
3	1.700977E-02		42.11475 38.57371
46.32389			

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
4	1.887498	27.01662
0		

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 2.714667
95 PERCENT CONFIDENCE LIMITS = -1.014913 AND 6.444247

LC50 = 42.59828
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 14.50651
95 PERCENT CONFIDENCE LIMITS = 0 AND 38.34553

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NAVICULA CELL COUNT DATA

SUMMARY STATISTICS

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT CONTROL	33820000	0.0004000000	0.0003926666	667
2	7.55 PPB	33640000	0.0004160000	0.0003860000	000
3	14.1 PPB	32920000	0.0003440000	0.0003233333	333
4	25.2 PPB	32820000	0.0003280000	0.0003053333	333
5	45.8 PPB	33040000	0.0003220000	0.0003146666	667
6	83.0 PPB	3	3000.000	3000.000	3000.000

SUMMARY STATISTICS

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SOLVENT CONTROL	8933333333.328	94516.313	54569.018
2	7.55 PPB	72400000000.000	269072.481	155349.069
3	14.1 PPB	76133333333.375	275922.694	159304.042
4	25.2 PPB	52933333333.313	230072.452	132832.392
5	45.8 PPB	8933333333.328	94516.313	54569.018
6	83.0 PPB	0.000	0.000	0.000

WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	SOLVENT CONTROL	3	3926666.667	3926666.667	3926666.667
2	7.55 PPB	3	3860000.000	3860000.000	3860000.000
3	14.1 PPB	3	3233333.333	3233333.333	3233333.333
4	25.2 PPB	3	3053333.333	3053333.333	3100000.000
5	45.8 PPB	3	3146666.667	3146666.667	3100000.000
6	83.0 PPB	3	3000.000	3000.000	3000.000

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT CONTROL	3926666.667				
7.55 PPB	3860000.000	0.427		1.78	k= 1, v=12
14.1 PPB	3233333.333	4.441	*	1.87	k= 2, v=12
25.2 PPB	3100000.000	5.295	*	1.90	k= 3, v=12
45.8 PPB	3100000.000	5.295	*	1.92	k= 4, v=12
83.0 PPB	3000.000	25.134	*	1.93	k= 5, v=12

s = 191195.072

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