

8-11-95

DATA EVALUATION RECORD
EC₅₀ TEST WITH *LEMNA GIBBA*
GUIDELINE 123-2 (TIER II)

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

Authors: Ward, T.J., P.L. Kowalski, and R.L. Boeri
Title: Toxicity of sulfentrazone technical to the
duckweed, *Lemna gibba* G3
Date: 1995
Laboratory: T.R. Wilbury Laboratories, Inc.,
Marblehead, MA
Lab. Report #: Wilbury Study No. 620-FM
Sponsor: FMC Corporation, Princeton, NJ
MRID No.: 436510-05

4. REVIEWED BY:

William Erickson
Biologist
EEB/EFED/EPA

Signature:

W. Erickson

Date:

8/09/95

5. APPROVED BY:

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Section Head 4
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Signature:

Harry Craven

Date:

8/11/95

6. STUDY PARAMETERS/RESULTS SYNOPSIS:

Definitive Test Duration: 14 days
Type of Concentrations: Mean measured
EC₅₀: 28.8 µg/l
95% C.I.: 18.9-37.5 µg/l
NOEC: 18.9 µg/l

7. CONCLUSIONS: The study is scientifically sound and fulfills the guideline requirement for a Tier 2 aquatic plant growth toxicity test with *Lemna gibba*.
8. ADEQUACY OF THE STUDY: Core.
9. GUIDELINE DEVIATIONS: The study followed guideline procedures except for the following:

Only 3 plants with 4 fronds each (= 12 fronds) were used per concentration; the guidelines require 5 plants with at least 3 fronds each (= 15 fronds) per concentration.

10. SUBMISSION PURPOSE: New chemical.

11. MATERIALS AND METHODS:

Test Organism:

Guideline Criteria	Reported Information
<u>Species</u> <i>Lemna gibba</i>	<i>Lemna gibba</i> G3
<u>Number of Plants/Fronds</u> 5 plants/rep; 3 fronds per plant.	3 plants/rep. and 4 fronds per plant = 12 fronds per replicate
<u>Nutrients</u> Standard formula, e.g. 20XAAP	sterile enriched media (M-Hoagland's w/out sucrose or EDTA)

Test System:

Guideline Criteria	Reported Information
<u>Solvent</u>	DMF
<u>Temperature</u> 25°C	25 ± 2°C
<u>Light Intensity</u> 5.0 Lux (±15%)	550 footcandles
<u>Photoperiod</u> Continuous	continuous
<u>pH</u> Approximately 5.0	5.1
<u>Test System</u> Static or renewal	static

Test Design:

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

Guideline Criteria	Reported Information
<u>Replicates per dose</u> 3 or more	3
<u>Duration of test</u> 14 days	14 days
Observations made at least every 3 days?	yes
<u>Maximum Labeled Rate</u>	n/a

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 14 day frond count?	yes
Control frond count at 14 day $\geq 2X$ initial count?	yes
Initial chemical concentrations measured? (Optional)	yes
Raw data included?	yes

Dose Response for Frond Counts:

Dose ($\mu\text{g ai/L}$)	Plant/Frond density	% Inhibition	14-day pH
control	274	-	5.8
solvent control	250	-	5.8
4.7	272	0	5.8
8.2	265	0	5.7
18.9	258	0	5.7
37.5	26	90	5.5
81.3	0	100	5.3

Statistical Results for Frond Counts:

Methods: Nonlinear regression (EC_{50})
Dunnett's test (NOEC)

EC₅₀: 39.8 µg/l
95% C.I.: 33.3-47.5 µg/l
NOEC: 27.4 µg/l

Other Findings: The total oven-dried weight of fronds was also determined for each level at the conclusion of the test. The EC₅₀ for biomass was reported to be 48.4 µg/l (37.1-63.1 µg/l).

13. **VERIFICATION OF STATISTICAL RESULTS:** (results for frond counts attached)

Methods: Binomial (EC₅₀)
Williams Test (NOEC)

EC₅₀: 28.8 µg/l
95% C.I.: 18.9-37.5 µg/l
NOEC: 18.9 µg/l

14. **REVIEWER'S COMMENTS:** The study is scientifically sound and fulfills the guideline requirement for an aquatic plant growth toxicity test with *Lemna gibba*.

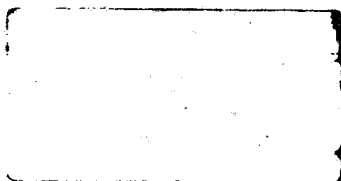
W. ERICKSON SULFENTRAZONE LEMNA TOXICITY

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
81.3	100	100	100	0
37.5	100	90	90	0
18.9	100	0	0	0
8.2	100	0	0	0
4.7	100	0	0	0

THE BINOMIAL TEST SHOWS THAT 18.9 AND 37.5 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 28.8384

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.



LEMNA FROND COUNT DATA

SUMMARY STATISTICS

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	SOLVENT CONTROL	3	228.000	269.000	249.667
2	4.74 PPB	3	238.000	297.000	272.000
3	8.28 PPB	3	219.000	299.000	265.333
4	18.9 PPB	3	216.000	296.000	257.667
5	37.5 PPB	3	13.000	39.000	26.333
6	81.3 PPB	3	0.000	0.000	0.000

SUMMARY STATISTICS

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	SOLVENT CONTROL	424.333	20.599	11.893
2	4.74 PPB	931.000	30.512	17.616
3	8.28 PPB	1720.333	41.477	23.947
4	18.9 PPB	1608.333	40.104	23.154
5	37.5 PPB	169.333	13.013	7.513
6	81.3 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	249.667	249.667	262.333
2	4.74 PPB	3	272.000	272.000	262.333
3	8.28 PPB	3	265.333	265.333	262.333
4	18.9 PPB	3	257.667	257.667	257.667
5	37.5 PPB	3	26.333	26.333	26.333
6	81.3 PPB	3	0.000	0.000	0.000

WILLIAMS TEST (Isotonic regression model)

TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
SOLVENT CONTROL	262.333				
4.74 PPB	262.333	0.545		1.78	k= 1, v=12
8.28 PPB	262.333	0.545		1.87	k= 2, v=12
18.9 PPB	257.667	0.345		1.90	k= 3, v=12
37.5 PPB	26.333	9.617	*	1.92	k= 4, v=12
81.3 PPB	0.000	10.751	*	1.93	k= 5, v=12

s = 28.441

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