

US EPA ARCHIVE DOCUMENT

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

1. **CHEMICAL:** Metolachlor
Shaughnessey No.: 108801

2. **TEST MATERIAL:** Metolachlor technical
Purity: 97.3%

3. **CITATION:**

Authors: Hoberg, J.R.
Title: Metolachlor technical - toxicity to
the marine diatom, *Skeletonema costatum*
Date: 1994
Laboratory: Springborn Laboratories, Inc., Wareham,
MA
Sponsor: Ciba Crop Protection, Greensboro, NC
Lab. Report No.: 94-7-5382
MRID No.: 434871-06

4. **REVIEWED BY:**

William Erickson
Biologist
EEB/EFED

Signature: *W. Erickson*

Date: 1/26/95

5. **APPROVED BY:**

Harry Craven
Section Head 4
EEB/EFED

Signature: *Harry Craven*

Date: 2/15/95

6. **CONCLUSION:** The study is scientifically sound and fulfills the guideline requirement for a Tier 2 aquatic plant growth study with a marine diatom. The 120-h EC₅₀ value is 0.061 mg ai/l, which classifies technical metolachlor as very highly toxic to *Skeletonema costatum*.

7. **ADEQUACY OF THE STUDY:** Core.

8. **MAJOR GUIDELINE DEVIATIONS:** None.

9. **MATERIALS AND METHODS:**



2044733

A. Test Organisms:

Guideline Criteria	Reported Information
Species: <i>Skeletonema costatum</i> <i>Anabaena flos-aquae</i> <i>Selenastrum capricornutum</i> <i>Navicula pelliculosa</i>	<i>Skeletonema costatum</i>
Number of Cells: 3,000 - 10,000	10,000
Nutrients:	AES

B. Test System:

Guideline Criteria	Reported Information
Solvent used:	None
Site of test: Growth Chamber	Environmental chamber
Temperature: 20° C for <i>Skeletonema</i> sp.; others are 24-25°C	19-20 °C
Light Intensity: 2.0 Lux for <i>Anabaena</i> sp.; others are 4-5.0	3.2-4.8
Photoperiod:	continuous illumination
pH: 7.5-8.0	8.1

C. Test Design:

Guideline Criteria	Reported Information
Dose range: 2X or 3X	3X
Doses: at least 5	7
Controls: negative and/or solvent	Negative
Three or more replicates per dose:	3
Duration of test: 120 hours	120 h
Daily Observations?	Yes
Method of Observations:	Compound microscope
Maximum Labeled Rate:	Not reported

10. REPORTED RESULTS:

Guideline Criteria	Reported Information
Initial and 120 hours Cell Measurements?	Yes
Control cell count at 120 hr from initial increase $\geq 2X$?	Yes
Measured Initial Chemical Concentrations? Optional	Yes
Raw data included? (Y/N)	Excerpted
Quality Assurance Measures?	Yes

Dose Response:

doses→ mg ai/l	control	0.0017	0.0048	0.014	0.043	0.15	0.56	1.7
inhibit %		-2	20	26	55	56	83	92
120 hr pH	8.5	8.5	8.4	8.4	8.0	8.3	8.0	7.8

Observations: Cell fragments and bloated cells were observed at the three highest concentrations. Thin cell walls also were observed at the two highest test concentrations.

Statistical Results:

Method: Linear Regression (EC_{50}) and Williams' Test (NOEC)

EC_{50} : 0.0093 mg ai/l 95% C.L.: 0.0028-0.030 mg ai/l

NOEC: 0.0017 mg ai/l

11. REVIEWER'S DISCUSSION/INTERPRETATION:

Test Procedures: Test procedures met guideline criteria.

Statistical Analysis:

Method: EPA Toxanol program (EC_{50}); Williams' Test (NOEC)

EC_{50} : 0.061 mg ai/l 95% C.L.: 0.049-0.076 mg ai/l

NOEC: 0.0017 mg ai/l

Discussion: The study is scientifically sound and fulfills the guideline requirement for a Tier 2 aquatic plant growth study with a marine diatom.

12. COMPLETION OF STUDY ONE-LINER: 1/26/95.

W. ERICKSON METOLACHLOR SKELETONEMA TOXICITY

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
1.7	100	92	92	0
.56	100	83	83	0
.15	100	56	56	0
.043	100	55	55	0
.014	100	26	26	0
.0048	100	20	20	0
.0017	100	0	0	0

THE BINOMIAL TEST SHOWS THAT .014 AND .043 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 3.565843E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
6	1.001462E-02		6.123163E-02
4.915391E-02		7.666621E-02	

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
4	.1003167	3.651154
2.642334E-03		

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

SLOPE = .9827709
 95 PERCENT CONFIDENCE LIMITS = .6714999 AND 1.294042

LC50 = 6.097744E-02
 95 PERCENT CONFIDENCE LIMITS = 3.142891E-02 AND .1222098

LC10 = 3.111032E-03
 95 PERCENT CONFIDENCE LIMITS = 6.803341E-04 AND 7.568381E-03

SKELETONEMA CELL DENSITIES

File: A:SKELETON.DAT

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	0	3	91.000	104.000	99.000
2	0.0017	3	95.000	107.000	101.000
3	0.0048	3	76.000	81.000	79.000
4	0.014	3	65.000	78.000	73.333
5	0.043	3	41.000	48.000	44.333
6	0.15	3	37.000	49.000	43.667
7	0.56	3	9.000	21.000	16.667
8	1.7	3	7.000	9.000	8.000

SKELETONEMA CELL DENSITIES

File: A:SKELETON.DAT

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	0	49.000	7.000	4.041
2	0.0017	36.000	6.000	3.464
3	0.0048	7.000	2.646	1.528
4	0.014	52.333	7.234	4.177
5	0.043	12.333	3.512	2.028
6	0.15	37.333	6.110	3.528
7	0.56	44.333	6.658	3.844
8	1.7	1.000	1.000	0.577

SKELETONEMA CELL DENSITIES

File: A:SKELETON.DAT

Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	0	3	99.000	99.000	100.000
2	0.0017	3	101.000	101.000	100.000
3	0.0048	3	79.000	79.000	79.000
4	0.014	3	73.333	73.333	73.333
5	0.043	3	44.333	44.333	44.333
6	0.15	3	43.667	43.667	43.667
7	0.56	3	16.667	16.667	16.667
8	1.7	3	8.000	8.000	8.000

SKELETONEMA CELL DENSITIES

File: A:SKELETON.DAT

Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
	0	100.000			
v=16	0.0017	100.000		1.75	k= 1,
v=16	0.0048	79.000	*	1.83	k= 2,
v=16	0.014	73.333	*	1.86	k= 3,
v=16	0.043	44.333	*	1.87	k= 4,
v=16	0.15	43.667	*	1.88	k= 5,
v=16	0.56	16.667	*	1.89	k= 6,
v=16	1.7	8.000	*	1.89	k= 7,

s = 5.470

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

