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Data Evaluation Report on the acute toxicity of Mesosulfuron-methyl to aquatic vascular plants *Lemna gibba*

PMRA Submission #: {.....}

EPA MRID#: 45386310

Data Requirement: PMRA Data Code: {.....}
EPA DP Barcode: D284719
OECD Data Point: {.....}
EPA MRID: 45386310
EPA Guideline: 123-2

Test material: Mesosulfuron-methyl Technical Purity: 95.3%
Common name: Mesosulfuron-methyl
Chemical name: IUPAC: methyl-2-[3-(4,6-dimethoxyprimidin-2-yl) ureidosulfonyl]-4-methanesulfonamidomethylbenzoate
CAS name: Not reported
CAS No.: Not reported
Synonyms: AE F130060

Primary Reviewer: Rebecca Bryan
Staff Scientist, Dynamac Corporation

Signature: *Rebecca Bryan*
Date: 9/26/03

QC Reviewer: Teri Myers, Ph.D.
Staff Scientist, Dynamac Corporation

Signature: *Teri Myers*
Date: 9/26/03

Leo LaSota
Primary Reviewer: Tim Bargar
{EPA/OECD/PMRA}

11/09/04
Date: {.....} *Leo LaSota*

Secondary Reviewer(s): {.....}
{EPA/OECD/PMRA}

Date: {.....}

Company Code {.....} [For PMRA]
Active Code {.....} [For PMRA]
EPA PC Code 122009

Date Evaluation Completed: {dd-mmm-yyyy}

CITATION: Sowig, P. and Weller, O. 2000. Duckweed (*Lemna gibba* G3) Growth Inhibition Test, AE F130060, Substance, technical, 95.3%. Unpublished study performed by Aventis CropScience GmbH, Frankfort, Germany. Laboratory Study Identification No. CE97/029. Study submitted by Aventis CropScience, Research Triangle Park, NC. Experimental start date August 7, 1998 and experimental termination date August 14, 1998. The final report issued July 20, 2000.



2013009

EXECUTIVE SUMMARY:

In a 7-day acute toxicity study, freshwater floating aquatic vascular plants Duckweed, *Lemna gibba* G3, were exposed to Mesosulfuron-methyl at mean measured concentrations of 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L under static-renewal conditions. Nominal concentrations were 0.1, 0.18, 0.32, 0.56, and 1.0 µg/L. Mean frond number decreased as test concentrations increased, when compared to the dilution water control; frond number was significantly reduced at treatment groups equal to and greater than 0.34 µg/L. Mean percent inhibition was 0, 0, 31, 47, and 67% in the 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L treatment groups, respectively. By day 7, the mean dry weights were 16.9, 16.7, 16.4, 12.2, 9.4, and 7.7 mg in the 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L treatment groups, respectively. The 0.34, 0.59, and 1.1 µg/L treatment groups were significantly different from the dilution water control for dry weight, and frond number and biomass growth rates. By day 7, yellow-colored fronds were observed in the 0.34, 0.59, and 1.1 µg/L treatment groups. Frond number was the most sensitive endpoint; the NOEC was 0.19 µg/L and the EC₅₀ was 0.64 µg/L.

This toxicity study is scientifically sound and satisfies the U.S. EPA Guideline Subdivision J, §123-2 for an aquatic vascular plant study with *Lemna gibba*. As a result, this study is classified as Core.

Results Synopsis

Test Organism: *Lemna gibba* G3

Test Type: Static-renewal

Number of fronds:

NOEC: 0.19 µg/L

EC₀₅: 0.11 µg/L 95% C.I.: 0.072-0.16 µg/L

EC₅₀: 0.64 µg/L 95% C.I.: 0.56-0.73 µg/L

Slope: 2.13±0.184

Dry Weight:

NOEC: 0.19 µg/L

EC₀₅: 0.085 µg/L 95% C.I.: 0.044-0.17 µg/L

EC₅₀: 0.80 µg/L 95% C.I.: 0.66-0.97 µg/L

Slope: 1.69±0.210

Biomass:

NOEC: 0.19 µg/L

EC₀₅: 0.084 µg/L 95% C.I.: 0.044-0.16 µg/L

EC₅₀: 0.71 µg/L 95% C.I.: 0.58-0.86 µg/L

Slope: 1.78±0.215

Endpoint(s) Affected: Frond number (most sensitive), dry weight, and biomass growth rate

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The test was based on the following guidelines: OECD Guideline no. 201, US-EPA Subdivision J, §123-2, and American Society for Testing and Materials Guide E 1415-91. The following deviations from U.S. EPA Guideline 123-2 are noted:

1. The pretest health of the test organism was not reported.
2. The number of plants tested (3-5 plants) ranged lower than the required 5 plants; therefore, there were 12 fronds per replicate, instead of the 15 fronds per replicate that is recommended.
3. The storage conditions of the test chemical, carbon source of the growth medium, and some dilution water characteristics were not reported.

These deviations did not affect the acceptability or the validity of the study.

COMPLIANCE: Signed and dated GLP, Quality Assurance and No Data Confidentiality statements were provided.

A. MATERIALS:

1. Test Material Mesosulfuron-methyl (AE F130060)

Description: Light beige powder

Lot No./Batch No.: AE F 130060 00 1C95 0001

Purity: 95.3%

Stability of Compound

Under Test Conditions: Measured concentrations (days 0, 3, and 5) for new test solutions ranged from 97.6 to 138.9% of nominal concentrations and measured concentrations (days 3, 5, and 7) of old test concentrations ranged from 85.7 to 127.8% of nominal concentrations, showing that the test material was stable under test conditions. OECD requirements were not reported.

(OECD requires water solubility, stability in water and light, pKa, Pow, vapor pressure of test compound)

Storage conditions of test chemicals: Not reported.

2. Test organism:

Name: Duckweed, *Lemna gibba* EPA requires a vascular species: *Lemna gibba*.

Strain, if provided: G3

Source: AgrEvo USA Company, Pikeville, NC (original supplier: Plant Hormone Laboratory, USDA, Beltsville, MD)

Age of inoculum: 6 weeks

Method of cultivation: 20X AAP culture medium

B. STUDY DESIGN:

a) Range-finding Study: No range-finding study was reported.

b) Definitive Study

Table 1 . Experimental Parameters

Parameter	Details	Remarks
		Criteria
Acclimation period: culturing media and conditions: (same as test or not)	Approximately 6 weeks 20X AAP medium; same as test.	
health: (any toxicity observed)	Not reported.	
Test system static/static renewal/ renewal rate for static renewal:	Static-renewal	<i>EPA expects the test concentrations to be renewed every 3 to 4 days (one renewal for the 7 day test. 3-4 renewals for the 14 day test).</i>
Incubation facility	Environmental chamber-water bath	
Duration of the test	7 days	<i>EPA requires a duration of 14 days. Seven day studies will be accepted for review by the Agency.</i>
Test vessel material: (glass/polystyrene) size: fill volume:	Glass Erlenmeyer-flasks 300 mL 150 mL	
Details of growth medium name: pH at test initiation: pH at test termination: Chelator used: Carbon source:	20X AAP medium 7.5 7.6-7.7 Na ₂ EDTA•2H ₂ O NaHCO ₃	<i>EPA recommend the following culture media: Modified hoagland's E- or 20X-AAP. Chelators are not recommended.</i>
If non-standard nutrient medium was used, detailed composition provided (Yes/No)	Not applicable	

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Parameter	Details	Remarks
		Criteria
Dilution water source/type: pH: water pretreatment (if any): Total Organic Carbon: particulate matter: metals: pesticides: chlorine:	Reagent grade water 7.5±0.1 Deionized water which is additionally filtered by an ultrafiltration, ion exchange and a charcoal unit. Not reported Not reported Not reported Not reported Not reported	EPA recommends a pH of ~5.0. A solution pH of 7.5 is acceptable if type 20X-AAP nutrient media is used.
Indicate how the test material is added to the medium (added directly or used stock solution)	Stock solution	
Aeration or agitation	Not reported	
Sediment used (for rooted aquatic vascular plants) origin: textural classification (% sand, silt and clay): organic carbon (%): geographic location:	Not applicable	
Number of replicates control: solvent control: treatments:	3 N/A 3	
Number of plants/replicate	3-5 plants per replicate	The number of plants (3-5 plants) ranged lower than the required 5 plants. EPA requires 5 plants.
Number of fronds/plant	12 fronds per replicate at test initiation	There were probably three fronds per plant. EPA requires 3 fronds per plant.

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Parameter	Details	Remarks
		Criteria
Test concentrations nominal: measured:	0.1, 0.18, 0.32, 0.56, and 1.0 µg/L 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L	Mean measured concentrations were reviewer-calculated from mean fresh water and mean aged water values. <i>EPA requires at least 5 test concentrations with a dose range of 2X or 3X progression.</i>
Solvent (type, percentage, if used)	N/A	
Method and interval of analytical verification	HPLC; new test solutions at 0, 3, and 5 days and old test solutions at 3, 5 and 7 days.	
Test conditions temperature: photoperiod: light intensity and quality:	24.3-24.8°C continuous light 59.0-61.0 µE*m ⁻² *s ⁻¹ , white fluorescent lighting	<i>EPA temperature: 25°C EPA photoperiod: continuous EPA light: 5.0 Klux (±15%)</i>
Reference chemical (if used) name: concentrations:	None	
Other parameters, if any	None	

2. Observations:

Table 2: Observation parameters

Parameters	Details	Remarks/Criteria
Parameters measured (eg: number of fronds, plant dry weight or other toxicity symptoms)	Number of fronds, dry weights, growth rates, and toxicity symptoms (yellow-colored fronds)	
Measurement technique for frond number and other end points	Direct counts	
Observation intervals	3, 5, and 7 days.	
Other observations, if any	None	

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Indicate whether there was an exponential growth in the control	Yes	
Were raw data included?	Replicate data provided	

II. RESULTS and DISCUSSION:

A. INHIBITORY EFFECTS:

Mean frond number decreased as test concentrations increased, when compared to the dilution water control. Mean percent inhibition was 0, 0, 31, 47, and 67% in the 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L treatment groups, respectively. By day 7, the mean dry weights were 16.9, 16.7, 16.4, 12.2, 9.4, and 7.7 mg in the 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L treatment groups, respectively. The 0.34, 0.59, and 1.1 µg/L treatment groups were significantly different from the dilution water control based on mean frond number, frond number growth rate, and biomass.

The mean doubling times were 1.842, 1.844, 1.858, 2.142, 2.423, and 3.163 days in the 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L treatment groups, respectively. The mean biomass growth rates were 15.7, 15.5, 15.2, 11.0, 8.2, and 6.5 in the 0.1, 0.19, 0.34, 0.59, and 1.1 µg/L treatment groups, respectively.

By day 7, yellow-colored fronds were observed in the 0.34, 0.59, and 1.1 µg/L treatment groups.

Table 3: Effect of Mesosulfuron-methyl on frond number of Duckweed, *Lemna gibba*

Treatment ¹ (estimated measured and nominal concentration) µg/L	Initial frond number/test solution	Mean frond number at ²				Mean Growth Rate at Day 7	Mean Dry Weight of Fronds (biomass) (mg) ²
		3 days	5 days	7 days	% inhibition at 7 days ³		
Negative control (dilution water)	12	38	79	167	---	0.376	16.9
0.1 (0.10)	12	39	81	167	0	0.376	16.7
0.19 (0.18)	12	37	79	163	0	0.373	16.4
0.34 (0.32)	12	35	81	116	31*	0.324*	12.2*
0.59 (0.56)	12	28	67	89	47*	0.286*	9.4*
1.1 (1.00)	12	23	50	56	67*	0.219*	7.7 *
Reference chemical (if used)	Not applicable						

¹ Mean measured concentrations of Mesosulfuron-methyl were reviewer-calculated. Nominal concentrations are in parentheses.

² Mean frond number and dry weights were reviewer-calculated from replicate data.

³ % inhibition was determined by comparing the treatment groups to the dilution water control.

* Significantly different from dilution water control.

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Table 4: Statistical endpoint values.

Statistical Endpoint ^a	frond No.	growth rate	dry weight (biomass)
NOEC or EC ₀₅ (µg/L)	0.18	0.18	0.18
LOEC (µg/L)	0.32	0.32	0.32
IC ₅₀ or EC ₅₀ (µg/L) (95% C.I.)	Not reported	>1.0	0.62 (0.56-1.0)
other (IC ₂₅ /EC ₂₅)	Not reported	Not reported	Not reported
Reference chemical NOAEC IC ₅₀ /EC ₅₀	Not applicable	Not applicable	Not reported

^a Statistical data based on nominal test concentrations.

B. REPORTED STATISTICS: The formulas used for growth rates, doubling time, and mean percent inhibitions on found on pages 18 and 19. The NOEC was verified using Analysis of Variance, General Linear Models with DUNCAN's Multiple Range Test Procedures (SAS 1989). The EC₅₀ was determined using binomial regression method.

Biomass:

NOEC: 0.19 µg/L
 EC₅₀: 6.2 µg/L 95% C.I.: 0.56-1.0 µg/L
 Slope: N/A

Growth Rate:

NOEC: 0.19 µg/L
 EC₅₀: >1.0 µg/L 95% C.I.: N/A
 Slope: N/A

C. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Frond number, dry weight, and biomass growth rate data satisfied the assumptions of ANOVA, so this test, followed by William's multiple comparison test was used to determine the NOEC via TOXSTAT statistical software. The EC₀₅ and EC₅₀ values were determined using the Probit method via Nuthatch statistical software.

Number of fronds:

NOEC: 0.19 µg/L
 EC₀₅: 0.11 µg/L 95% C.I.: 0.072-0.16 µg/L
 EC₅₀: 0.64 µg/L 95% C.I.: 0.56-0.73 µg/L
 Slope: 2.13±0.184

Dry Weight:

NOEC: 0.19 µg/L

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EC₀₅: 0.085 µg/L 95% C.I.: 0.044-0.17 µg/L
EC₅₀: 0.80 µg/L 95% C.I.: 0.66-0.97 µg/L
Slope: 1.69±0.210

Biomass:

NOEC: 0.19 µg/L
EC₀₅: 0.084 µg/L 95% C.I.: 0.044-0.16 µg/L
EC₅₀: 0.71 µg/L 95% C.I.: 0.58-0.86 µg/L
Slope: 1.78±0.215

Endpoint(s) Affected: Frond number (most sensitive), dry weight, and biomass growth rate

D. STUDY DEFICIENCIES:

The deviations, including the reduced replicate size, were not considered to have impacted the study results, so they did not affect the acceptability or validity of the study.

E. REVIEWER'S COMMENTS:

The reviewer's conclusions were similar to the study authors'; however, the reviewer's toxicity calculations were based on the mean measured concentrations, while the study authors based calculations on the nominal concentrations. In addition, the reviewer determined toxicity values for frond number, as well as the EC₀₅ values for all endpoints, and these are reported in the Executive Summary and Conclusions sections. Based on the reviewer's conclusions, frond number was the most sensitive endpoint, with an EC₅₀ value of 0.64 µg/L.

F. CONCLUSIONS: This toxicity study is scientifically sound and satisfies the U.S. EPA Guideline Subdivision J, §123-2 for an aquatic vascular plant study with *Lemna gibba*. As a result, this study is classified as Core.

Number of fronds:

NOEC: 0.19 µg/L
EC₀₅: 0.11 µg/L 95% C.I.: 0.072-0.16 µg/L
EC₅₀: 0.64 µg/L 95% C.I.: 0.56-0.73 µg/L
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Dry Weight:

NOEC: 0.19 µg/L
EC₀₅: 0.085 µg/L 95% C.I.: 0.044-0.17 µg/L
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Biomass:

NOEC: 0.19 µg/L
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EC₅₀: 0.71 µg/L 95% C.I.: 0.58-0.86 µg/L
Slope: 1.78±0.215

Endpoint(s) Affected: Frond number (most sensitive), dry weight, and biomass growth rate

III. REFERENCES:

- Organization of Economic Co-operation and Development, Draft OECD Guideline for Testing of Chemicals Guideline: *Lemna*, Growth Inhibition Test, April 1997.
- U.S. Environmental Protection Agency (EPA), 1982 Pesticide Assessment Guidelines, Subdivision J. Hazard Evaluation: Nontarget Plants: Tier 2 of nontarget area testing; §123-2 Growth and reproduction of aquatic plants.
- U.S. Environmental Protection Agency (EPA), April 1996, Ecological Effects Test Guidelines; OPPTS 850.4400 Aquatic Plant Toxicity Test Using *Lemna* spp., Tiers I and II; EPA 712-C-96-156, Public Draft.
- ASTM (1991). Standard Guide for Conducting Static Toxicity Test With *Lemna gibba* G3. American Society for Testing and Materials. E 1415-91
- U.S. Environmental Protection Agency (EPA). 1983. Toxic Substances Control; Good Laboratory Practice Standards; Final Rule (40 CFR Part 792) Fed. Reg., Vol. 48, No. 230, Nov. 23, 1983, pp. 53922-53944.
- SAS Institute Inc., 1989. Release 6.08 TS 407. Cary, North Carolina 27511.

APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL RESULTS:

frond number

File: 6310fn

Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	33460.000	6692.000	286.804
Within (Error)	12	280.000	23.333	
Total	17	33740.000		

Critical F value = 3.11 (0.05, 5, 12)

Since $F > \text{Critical } F$ REJECT H_0 : All groups equal

frond number

File: 6310fn

Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2

H_0 : Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	167.333	167.333		
2	0.1	166.667	166.667	0.169	
3	0.19	163.333	163.333	1.014	
4	0.34	115.667	115.667	13.100	*
5	0.59	89.333	89.333	19.777	*
6	1.1	55.667	55.667	28.313	*

Dunnett table value = 2.50 (1 Tailed Value, $P=0.05$, $df=12,5$)

frond number

File: 6310fn

Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2

H_0 : Control < Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	3			

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EC10	0.16	0.11	0.22	0.069	0.71
EC25	0.31	0.25	0.39	0.047	0.60
EC50	0.64	0.56	0.73	0.026	0.88

Slope = 2.13 Std.Err. = 0.184

!!!Poor fit: p = 0.0011 based on DF= 3.0 12.

6310FN : frond number

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. - Pred.	Pred. %Control	%Change
0.00	3.00	167.	173.	-5.44	100.	0.00
0.100	3.00	167.	165.	1.33	95.7	4.30
0.190	3.00	163.	150.	13.1	86.9	13.1
0.340	3.00	116.	125.	-8.92	72.1	27.9
0.590	3.00	89.3	91.7	-2.36	53.1	46.9
1.10	3.00	55.7	53.4	2.26	30.9	69.1

dry weight

File: 6310dw

Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	247.347	49.469	216.969
Within (Error)	12	2.733	0.228	
Total	17	250.080		

Critical F value = 3.11 (0.05, 5, 12)
 Since F > Critical F REJECT Ho: All groups equal

dry weight

File: 6310dw

Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
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1	control	16.933	16.933	
2	0.1	16.733	16.733	0.513
3	0.19	16.433	16.433	1.282
4	0.34	12.200	12.200	12.141 *
5	0.59	9.367	9.367	19.408 *
6	1.1	7.733	7.733	23.598 *

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

dry weight

File: 6310dw

Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 2 OF 2

H₀:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	3			
2	0.1	3	0.975	5.8	0.200
3	0.19	3	0.975	5.8	0.500
4	0.34	3	0.975	5.8	4.733
5	0.59	3	0.975	5.8	7.567
6	1.1	3	0.975	5.8	9.200

dry weight

File: 6310dw

Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model)

TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	3	16.933	16.933	16.933
2	0.1	3	16.733	16.733	16.733
3	0.19	3	16.433	16.433	16.433
4	0.34	3	12.200	12.200	12.200
5	0.59	3	9.367	9.367	9.367
6	1.1	3	7.733	7.733	7.733

dry weight

File: 6310dw

Transform: NO TRANSFORM

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WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	16.933				
0.1	16.733	0.513		1.78	k= 1, v=12
0.19	16.433	1.283		1.87	k= 2, v=12
0.34	12.200	12.147	*	1.90	k= 3, v=12
0.59	9.367	19.417	*	1.92	k= 4, v=12
1.1	7.733	23.609	*	1.93	k= 5, v=12

s = 0.477

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

Estimates of EC₅

Parameter	Estimate	95% Bounds		Std.Err.	Lower Bound /Estimate
		Lower	Upper		
EC5	0.085	0.044	0.17	0.14	0.51
EC10	0.14	0.081	0.24	0.11	0.58
EC25	0.32	0.23	0.45	0.071	0.71
EC50	0.80	0.66	0.97	0.039	0.82

Slope = 1.69 Std.Err. = 0.210

!!!Poor fit: p < 0.001 based on DF= 3.00 12.0

6310DW : dry weight

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. -Pred.	Pred. %Control	%Change
0.00	3.00	16.9	17.5	-0.611	100.	0.00
0.100	3.00	16.7	16.4	0.298	93.7	6.32
0.190	3.00	16.4	15.0	1.44	85.5	14.5
0.340	3.00	12.2	12.9	-0.710	73.6	26.4
0.590	3.00	9.37	10.3	-0.975	58.9	41.1
1.10	3.00	7.73	7.17	0.563	40.9	59.1

!!!Warning: EC5 not bracketed by doses evaluated.

biomass growth rate

File: 6310b

Transform: NO TRANSFORMATION

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ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	247.347	49.469	216.969
Within (Error)	12	2.733	0.228	
Total	17	250.080		

Critical F value = 3.11 (0.05,5,12)
 Since F > Critical F REJECT Ho:All groups equal

biomass growth rate
 File: 6310b Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	15.733	15.733		
2	0.1	15.533	15.533	0.513	
3	0.19	15.233	15.233	1.282	
4	0.34	11.000	11.000	12.141	*
5	0.59	8.167	8.167	19.408	*
6	1.1	6.533	6.533	23.598	*

Dunnett table value = 2.50 (1 Tailed Value, P=0.05, df=12,5)

biomass growth rate
 File: 6310b Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	3			
2	0.1	3	0.975	6.2	0.200
3	0.19	3	0.975	6.2	0.500
4	0.34	3	0.975	6.2	4.733
5	0.59	3	0.975	6.2	7.567
6	1.1	3	0.975	6.2	9.200

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Data Evaluation Report on the acute toxicity of Mesosulfuron-methyl to aquatic vascular plants *Lemna gibba*

PMRA Submission #: {.....}

EPA MRID#: 45386310

biomass growth rate

File: 6310b Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	3	15.733	15.733	15.733
2	0.1	3	15.533	15.533	15.533
3	0.19	3	15.233	15.233	15.233
4	0.34	3	11.000	11.000	11.000
5	0.59	3	8.167	8.167	8.167
6	1.1	3	6.533	6.533	6.533

biomass growth rate

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WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	15.733				
0.1	15.533	0.513		1.78	k= 1, v=12
0.19	15.233	1.283		1.87	k= 2, v=12
0.34	11.000	12.147	*	1.90	k= 3, v=12
0.59	8.167	19.417	*	1.92	k= 4, v=12
1.1	6.533	23.609	*	1.93	k= 5, v=12

s = 0.477

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

Estimates of EC_x

Parameter	Estimate	95% Bounds		Std.Err.	Lower Bound /Estimate
		Lower	Upper		
EC5	0.084	0.044	0.16	0.13	0.52
EC10	0.14	0.079	0.23	0.11	0.59
EC25	0.30	0.21	0.42	0.071	0.71
EC50	0.71	0.58	0.86	0.039	0.82

Slope = 1.78 Std.Err. = 0.215

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!!!Poor fit: $p < 0.001$ based on DF= 3.00 12.0

6310B : biomass growth rate

Observed vs. Predicted Treatment Group Means

Dose	#Reps.	Obs. Mean	Pred. Mean	Obs. - Pred.	Pred. %Control	%Change
0.00	3.00	15.7	16.3	-0.603	100.	0.00
0.100	3.00	15.5	15.3	0.260	93.5	6.51
0.190	3.00	15.2	13.8	1.42	84.6	15.4
0.340	3.00	11.0	11.7	-0.681	71.5	28.5
0.590	3.00	8.17	9.09	-0.926	55.7	44.3
1.10	3.00	6.53	6.00	0.532	36.7	63.3

!!!Warning: EC5 not bracketed by doses evaluated.

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