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Data Evaluation Report on the Acute Toxicity of AE F130060 Technical to Sheepshead Minnow (*Cyprinodon Variegatus*)

PMRA Submission Number EPA MRID Number 45386301

Data Requirement:

PMRA DATA CODE	
EPA DP Barcode	D284719
OECD Data Point	
EPA MRID	45386301
EPA Guideline	§72-3a

1/9/04

Test material: AE F 130060 Technical **Purity:** 95.7% (w:w)
Common name: Mesosulfuron-methyl
Chemical name: IUPAC: Methyl 2-[3-(4,6-dimethoxyprimidin-2-yl)ureidosulfonyl]-4-methanesulfonamidomethylbenzoate
CA name: Methyl 2-[[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl-4-[[(methylsulfonyl)amino]methyl]benzoate
CAS No.: 208465-21-8
Synonyms: Code: AE F130060 00 1C95 0001

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Reference/Submission No.:

Company Code:
Active Code:
EPA PC Code: 122009

Date Evaluation Completed:

CITATION: Abedi, J., *et al.* 2001. 96 Hour Acute Toxicity to the Sheephead Minnow, *Cyprinodon variegatus*, in a Static System, AE F130060 Technical, 95.7% w/w. Unpublished study performed by Aventis CropScience, Pikeville, NC. Laboratory Study Identification CK99W506. Study submitted by Aventis CropScience, Research Triangle Park, NC. Study initiated June 1, 2000 and completed February 16, 2001.

limit test

EXECUTIVE SUMMARY:

In a 96-hour acute toxicity study, juvenile Sheepshead minnow (*Cyprinodon variegatus*) were exposed to AE F130060 Technical (Mesosulfuron-methyl) at mean-measured concentrations of 0 (negative control) and 105 ppm a.i. under static conditions. Nominal concentrations were 0 (negative control) and 100 ppm (limit concentration).

No mortality or signs of toxicity were observed in the control or test groups during the 96-hour study. The 96-hour LC_{50} is >105 ppm a.i., which categorizes AE F130060 Technical (Mesosulfuron-methyl) as practically non-toxic to juvenile Sheepshead minnow on an acute toxicity basis. The NOEC and LOEC observed for both mortality and sub-lethal effects were 105 and >105 ppm a.i., respectively, the only concentration tested.

Since the mean terminal fish weight of 0.307 g was less than the required initial weight range of 0.5 to 5 g, this study does not fulfill guideline requirements for an acute toxicity study with the Sheepshead minnow [§72-3(a)] and is classified SUPPLEMENTAL.

Results Synopsis

Test Organism Size/Age (mean Weight or Length):	Age not specified; 0.307 ± 0.091 g and 2.2 ± 0.20 cm (means of 30 control fish at study termination)
Test Type (Flow-through, Static, Static Renewal):	Static

96-Hour
LC_{50}: >105 ppm a.i.
NOEC: 105 ppm a.i.
LOEC: >105 ppm a.i.
Endpoints affected: None

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures outlined in the OECD Guideline No. 203 (1989), and the U.S. EPA Pesticide Assessment Guidelines, Series §72-3 (1982). Deviations from U.S. EPA FIFRA Guideline §72-3a include:

1. The wet fish weight (0.307 g) was determined from control organisms at study termination and was less than the recommended initial range of 0.5-5g.
2. Water hardness was not reported.

These deviations do not affect the validity of the study. However, this study does not fulfill guideline requirements.

COMPLIANCE: Signed and dated GLP, Confidentiality, and Quality Assurance statements were provided. This study was conducted in accordance with standards set forth in 40 CFR 160 with the following exceptions: routine dilution water and fish food contaminant screening analyses were not collected in accordance

with GLP procedures and an in-life inspection was not conducted for the contaminant analyses; and a range-finder test was conducted prior to the signed protocol (p. 3).

A. MATERIALS:

1. Test Material AE F 130060 Technical (Mesosulfuron-methyl)

Description: Light beige powder

Lot No./Batch No. : Pfl. 35316

Purity: 95.7% (w:w)

Stability of Compound Under Test Conditions: The stability of the test substance in the dilution water during the course of the study was demonstrated by analytical determination at 0 and 96 hours. Results are presented in Table 3, p. 19.

Storage conditions of test chemicals: 25 ± 5°C in the dark

OECD requires water solubility, stability in water and light, pK_a, P_{ow}, and vapor pressure of the test compound. OECD requirements were not reported.

2. Test organism:

Species: Sheepshead minnow (*Cyprinodon variegatus*)

Age at test initiation: Juvenile, not otherwise specified

Weight at test initiation: Initial weights were not reported. Mean terminal weights were 0.307 ± 0.091 g (mean of 30 control fish at study termination)

Length at test initiation: Initial lengths were not reported. Mean terminal lengths were 2.2 ± 0.20 cm (mean of 30 control fish at study termination)

Source: Aquatic Bio-Systems, Fort Collins, CO

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding Study: A 72-hour static range-finding study was conducted with Sheepshead minnow and AE F130060 Technical at nominal concentrations of 0 (negative control), 1, 10, and 100 ppm. After 72 hours, there were no mortalities observed in the control or treatment groups.

b. Definitive Study:

Table 1: Experimental Parameters

Parameter	Details	Remarks Criteria
Acclimation period: Conditions: (same as test or not) Feeding: Health: (any mortality observed)	14 days Same as test Rangen Salmon Starter and *Artemia nauplii* provided, *ad libitum*. No mortalities during the 14-day acclimation period.	*EPA requires: minimum 14 days; no feeding during test OECD requires minimum of 12 days.*
Duration of the test	96 hours	*EPA/OECD requires: 96 hours*
Test conditions static/flow through Type of dilution system- for flow through method. Renewal rate for static renewal	Static N/A N/A	*EPA: Must provide reproducible supply of toxicant, with a consistent flow rate of 5-10 vol/24 hours, and meter systems calibrated before study and checked twice daily during test period*
Aeration, if any	No aeration during testing.	*EPA requires: no aeration; OECD permits aeration*
Test vessel Material: (glass/stainless steel) Size: Fill volume:	Glass 20 L 15 L (19.0-cm depth)	*EPA requires: Size 19 L (5 gal) or 30 x 60 x 30 cm* *Fill volume: 15-30 L of solution*

Parameter	Details	Remarks Criteria
Source of dilution water	The dilution water was synthetic seawater prepared with synthetic sea salts (Lobster Life Systems, E. Rutherford, NJ) and well water.	Results of bi-weekly testing of the well water for nitrate, ammonia, salinity, pH, and DO are provided in Appendix 2, p. 35. Results of bi-annual testing of the well water for a broad range of contaminants and water quality parameters are provided in Appendix 2, pp. 36-39. *EPA 1975; Soft reconstituted water or water from a natural source, **not** de-chlorinated tap water;* *OECD permits de-chlorinated tap water.*

Parameter	Details	Remarks Criteria
Water parameters: Hardness	Not reported.	The water hardness was not reported.
pH	7.4-8.1	
Dissolved oxygen	78-112% saturation	
Total Organic Carbon	<1.0 mg/L (bi-annual analysis)	***Hardness and pH*** *EPA requires hardness of 40-48 mg/L as $CaCO_3$ and pH of 7.2-7.6; 8.0-8.3 for marine-stenohaline fishes, 7.7-8.0 for estuarine-euryhaline fishes; monthly range <0.8. OECD allows hardness of 10-250 mg/L as $CaCO_3$ and pH between 6 and 8.5.* ***Dissolved Oxygen*** *Renewal: ≥60% during 1st 48 hrs and ≥ 40% during 2nd 48 hrs* *Flow-through: ≥60% through out test. OECD requires at least 80% saturation value.* ***Temperature*** *EPA requires 22 ± 1 °C for estuarine/marine. OECD requires range of 21 - 25 °C for bluegill and 13-17 °C for rainbow trout.* ***Salinity*** *30-34 ‰ (parts per thousand) salinity for marine-stenohaline fishes; 10-17‰ for estuarine-euryhaline fishes, weekly range < 6 ‰* ***EPA water quality*** *measured at beginning of test and every 48 hours*
Total Organic Carbon	<1.0 mg/L (bi-annual analysis)	
Particulate Matter	<11.0 mg/L (TSS, bi-annual analysis)	
Metals	See Appendix 2, pp. 36-39	
Pesticides	Not detected	
Chlorine	Not reported	
Temperature	21.6-22.1°C	
Salinity	17‰	
Intervals of water quality measurement	DO, pH, salinity, and temperature were determined daily in all test tanks. The temperature was also measured continuously in the control chamber.	

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Parameter	Details	Remarks Criteria
Concentration of test material: nominal: measured:	0 (negative control) and 100 ppm 0 (negative control) and 105 ppm a.i.	This study was designed as a limit test. Recoveries were adjusted for the purity of the test material (Table 3, p. 19). *EPA/OECD requires: Control and five treatment levels. Each conc. should be 60% of the next highest conc., and should be in a geometric series*
Solvent (type, percentage, if used)	None used.	*EPA requires: Not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests; OECD requires solvent, exceed 100 mg/L.*
Number of fish/replicates: negative control: solvent control: treated:	30 fish, divided into three replicates containing 10 fish each N/A 30 fish, divided into three replicates containing 10 fish each	*EPA: ≥ 10/concentration; OECD requires at least 7 fish/concentration*
Biomass loading rate	0.205 g fish/L (instantaneous)	*Static: ≤ 0.8 g/L at ≤ 17°C, ≤ 0.5 g/L at > 17°C; flow-through: ≤ 1 g/L/day; OECD requires maximum of 1 g fish/L for static and semi-static with higher rates accepted for flow-through*
Lighting	16-hours light/8-hours dark	Light intensity was approximately 93 foot candles at the level of the test solution. *EPA requires: 16 hours light/8 hours dark); OECD requires 12 -16 hours photoperiod.*

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Parameter	Details	Remarks Criteria
Feeding	Animals were not fed during testing.	*EPA/OECD requires: No feeding during the study*
Recovery of chemical Level of Quantitation Level of Detection	104-109% of nominal 5 ppm Not reported	Based on matrix spikes analyzed concurrently with the samples on Days 0 and 4 (Table 2, p. 19).
Positive control {if used, indicate the chemical and concentrations}	N/A	
Other parameters, if any	N/A	

2. Observations:

Table 2: Observations

Criteria	Details	Remarks/Criteria
Parameters measured including the sublethal effects/toxicity symptoms	Mortality and sub-lethal effects	
Observation intervals	3, 6, 24, 48, 72, and 96 hours of exposure	*EPA/OECD requires: minimally every 24 hours*
Were raw data included?	Yes, sufficient	
Other observations, if any	N/A	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

No mortalities were observed in the control or 100 ppm treatment groups.

Table 3: Effect of AE F130060 Technical on Mortality of Bluegill Sunfish (*Lepomis macrochirus*).

Treatment, ppm, measured and (nominal conc.)	No. of fish at start of study	0-24 Hours		48-72 Hours		96 Hours	
		No Dead	% mortality	No Dead	% mortality	No Dead	% mortality
Negative control	30	0	0	0	0	0	0
105 (100)	30	0	0	0	0	0	0
NOEC (mortality)	100 ppm						
LC_{50} (95% C.I.)	>100 ppm						
Positive control, if used mortality: LC_{50}:	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B. NON-LETHAL TOXICITY ENDPOINTS:

No sublethal effects were observed during the study in the control or 100 ppm treatment groups.

C. REPORTED STATISTICS:

The 96-hour LC_{50} value, NOEC, and LOEC were visually determined, based on observed treatment-related mortality or sub-lethal effects. Nominal concentrations were reported.

96-Hour
LC_{50}: >100 ppm
NOEC: 100 ppm
LOEC: >100 ppm
Endpoints affected: None

D. VERIFICATION OF STATISTICAL RESULTS:

The 96-hour LC_{50} value, NOEC, and LOEC were visually determined, based on observed treatment-related mortality or sub-lethal effects. Mean-measured concentrations were reported.

96-Hour
LC_{50}: >105 ppm a.i.
NOEC: 105 ppm a.i.
LOEC: >105 ppm a.i.
Endpoints affected: None

E. STUDY DEFICIENCIES:

This study is scientifically valid. However, the mean fish weight of 0.307 g was determined from the 30 control fish at study termination, and was less than the required initial weight range of 0.5-5 g. As a result, this study does not fulfill guideline requirements for an acute toxicity study with the Sheepshead minnow [§72-3(a)] and is classified SUPPLEMENTAL.

F. REVIEWER'S COMMENTS:

The reviewer's conclusions are identical to those reported by the study authors.

G. CONCLUSIONS:

This study is scientifically sound, but does not satisfy the guideline requirements for an acute toxicity study with an estuarine fish (§72-3a) because the mean weight of the organisms, determined at study termination, was 0.307 g, which is less than the required initial weight range of 0.5 to 5 g. This study provides useful information, and is classified SUPPLEMENTAL. Based on the results of this study, AE F130060 Technical (Mesosulfuron-methyl) is categorized as practically non-toxic to juvenile Sheepshead minnow (*Cyprinodon variegatus*) on an acute toxicity basis.

96-Hour
LC_{50}: >105 ppm a.i.
NOEC: 105 ppm a.i.
LOEC: >105 ppm a.i.
Endpoints affected: None

III. REFERENCES:

Organization for Economic Co-operation and Development. 1989. *OECD Guideline for Testing of Chemicals*; Guideline No. 203: Fish Acute Toxicity Test.

U.S. Environmental Protection Agency (EPA). 1982. *Pesticide Assessment Guidelines. Subdivision E, Hazard Evaluation: Wildlife and Aquatic Organisms*. Guideline §72-3, EPA 540/9-82-024. Washington, DC.

U.S. Environmental Protection Agency (EPA). 1989. Federal Insecticide, Fungicide, Rodenticide Act (FIFRA), Federal Register Vol. 54, Good Laboratory Practice Standards, Final Rule (40 CFR Part 160). No. 158:34052-34074. Washington, DC.

Eddy, S. 1978. How to Know the Freshwater Fishes. Third Edition. Wm. C. Brown Company, Dubuque, IO.

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