Tyniewicz 4057
128850

MRID No. 413961-10

DATA EVALUATION RECORD

1. **CHEMICAL:** Glufosinate.
Shaughnessey No. 128850.

2. **TEST MATERIAL:** HOE 039866 200 g/L Soluble Concentrate; Code #HOE 039866 OH SL18 A507; 18.5% active ingredient; a liquid.

3. **STUDY TYPE:** Estuarine Invertebrate Toxicity Test.
Species Tested: Mysidopsis bahia.

4. **CITATION:** Ward, G.S. 1989. Acute Toxicity of HOE 039866 200 g/L Soluble Concentrate (Code: HOE 039866 OH SL18 A507) to the Mysid Shrimp (Mysidopsis bahia). Prepared by Hunter/ESE, Gainesville, Florida. ESE Project No. 86-341. Report No. A34013. Submitted by Hoechst Celanese Corporation, Somerville, New Jersey. MRID No. 413961-10.

5. **REVIEWED BY:**

Kimberly D. Rhodes
Associate Scientist
KBN Engineering and
Applied Sciences, Inc.

Signature: Kimberly D. Rhodes
Date: June 1, 1990

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
Staff Toxicologist
KBN Engineering and
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Signature: P. Kosalwat
Date: 6/1/90

Henry T. Craven, M.S.
Supervisor, EEB/HED
USEPA

Signature: H.T. Craven
Date: 12/20/90

M. Rexrode 12/21/90

7. **CONCLUSIONS:** This study is scientifically sound and fulfills the guideline requirements for a 96-hour static acute toxicity test for estuarine shrimp. The 96-hour LC50 value for Mysidopsis bahia exposed to HOE 039866 200 g/L soluble concentrate was 43.2 mg/L, based on nominal concentrations. Therefore, HOE 039866 200 g/L soluble concentrate is classified as slightly toxic to mysid shrimp. The NOEC was determined to be 1.35 mg/L nominal concentration after 96 hours of exposure.

8. **RECOMMENDATIONS:** N/A.

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Postlarval (≤ 24 hours old) mysid shrimp (*Mysidopsis bahia*) were collected from cultures at the testing facility and were maintained for 3 to 4 days prior to testing. During holding, mysids were fed live brine shrimp (*Artemia salina*) nauplii daily. During the 3- to 4-day holding period, salinity was 20 to 21 parts per thousand (ppt) and water temperature was 23 to 24°C. No mortality of the mysids was observed during the holding period. No diseases were observed and no disease treatments were performed during holding.

B. **Test System:** The static test was conducted in 1.6-L glass test containers, each of which received a final volume of 1.0 L of test solution or control seawater at a depth of approximately 4 centimeters (cm). All test concentrations and the control were duplicated. The test was conducted at 21-22°C under fluorescent lighting on a 14-hour light and 10-hour dark photoperiod. No aeration was provided during the test.

The saltwater used for culture and testing of the mysid shrimp was filtered (5-μm) natural seawater. The dilution water was collected at Marineland, Florida, and diluted to a salinity of 20 ppt with well water. Prior to addition to the test containers, seawater was sterilized by ultraviolet light. At test initiation, the dilution water control was characterized as having a salinity of 20 ppt, a dissolved oxygen concentration of 7.5 mg/L, and a pH of 8.1.

C. **Dosage:** 96-hour static acute test.

D. **Design:** Based on the results of a 96-hour range-finding test, a control, and six nominal HOE 039866 200 g/L soluble concentrate concentrations of 1.35, 2.70, 5.40, 10.8, 21.6 and 43.2 mg/L (as whole material) were selected for the definitive test. Ten mysid shrimp were added to each replicate (twenty mysids per concentration) within 15 minutes following addition of test material. All concentrations were observed once every 24 hours for mortality and abnormal effects.

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The dissolved oxygen concentration and pH were measured and recorded at each 24-hour interval in all replicates for all test concentrations and the control throughout the exposure. The salinity was measured in one seawater control test container at each 24-hour interval during the exposure. The temperature was measured and recorded in one seawater control every 24 hours and in one replicate of each concentration at 72 and 96 hours of the exposure.

E. **Statistics:** The concentration of test substance lethal to 50 percent of the test population (LC50) was determined by the computer program developed by Stephan (1982).

12. **REPORTED RESULTS:** The nominal test concentrations with the corresponding mortality rates during each 24-hour interval are shown in Table 3-2 (attached). HOE 039866 200 g/L soluble concentrate was acutely toxic to mysid shrimp at concentrations $\geq$10.8 mg/L. After 96 hours of exposure, mortality ranged from 0 percent in test concentrations $\leq$5.40 mg/L to 50 percent in 43.2 mg/L. There was no mortality in the seawater control. The 96-hour LC50 was 43.2 mg/L. One to nine mysids per test treatment exhibited a sublethal response to the test substance in test concentrations $\geq$2.70 mg/L. Therefore, the no-observed-effect concentration (NOEC) was 1.35 mg/L.

Water quality parameters remained within acceptable limits throughout the test. Dissolved oxygen concentrations remained $\geq$ 4.7 mg/L (>62% of saturation) and pH ranged from 8.1 to 8.4 in all test containers throughout the test. Test salinity was 20 ppt and temperature ranged from 21 to 22°C. The mean temperature was 21.8°C.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** No conclusions were made by the author.

Quality Assurance and Good Laboratory Practice Regulation Statements were included in the report, indicating that the study was conducted in accordance with the FIFRA Good Laboratory Practice Standards.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures were generally in accordance with protocols recommended by the Guidelines, but deviated from the SEP as follows:

o The SEP states that the mysids must be randomly assigned to the test containers. This toxicity report did not state whether mysids were randomly distributed among the test containers. However, the test protocol attached as Appendix C states that the mysids would be impartially distributed to each test container.

o The SEP states that natural or reconstituted seawater of 10 to 17 ppt salinity should be used when testing euryhaline shrimp species. The natural seawater used during the toxicity study had a salinity of 20 ppt.

o The SEP states that temperature should be recorded every six hours in at least one test vessel during the entire study period if the temperature is controlled by a water bath. During the study, the test temperature was measured and recorded every 24 hours.

o The SEP recommends a 16-hour light and an 8-hour dark photoperiod with a 15- to 30-minute transition period between light and dark. The photoperiod during this toxicity test was 14 hours of light and 10 hours of darkness. The report did not state whether 15- to 30-minute transition periods between light and dark were maintained.

o The SEP states that each designated treatment group should be exposed to a concentration of toxicant that is at least 60% of the next highest concentration. Each designated treatment group for the test was only 50% of the next highest concentration.

o There is a discrepancy in the report involving the percent saturation of the dissolved oxygen concentration. The author determined the percent saturation for the lowest dissolved oxygen concentration (4.7 mg/L) to be 62 percent. However, the reviewer determined the percent saturation for the lowest dissolved oxygen concentration to be 54 percent at 20 ppt and 22°C.

B. **Statistical Analysis:** The reviewer used the Toxanal computer program to calculate the 96-hour LC50 value and 95 percent confidence interval. These calculations are attached. The moving average method provided a 96-hour LC50 value of 43.2 mg/L nominal concentration with a 95 percent confidence interval of 34.7 to 77.8 mg/L which is the same as that reported by the author. The NOEC was determined to be 1.35 mg/L nominal

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concentration.

C. **Discussion/Results:** This study appears to be scientifically valid. The 96-hour LC50 value based upon nominal concentrations of HOE 039866 200 g/L soluble concentrate was determined to be 43.2 mg/L. Therefore, HOE 039866 200 g/L soluble concentrate is classified as slightly toxic to the mysid (Mysidopsis bahia). The NOEC was determined to be 1.35 mg/L nominal concentration after 96 hours of exposure.

D. **Adequacy of the Study:**

(1) **Classification:** Core.

(2) **Rationale:** Although the test procedures deviated from the guidelines, the deviations probably did not significantly affect the toxicity results.

(3) **Repairability:** N/A.

15. **COMPLETION OF ONE-LINER FOR STUDY:** Yes, 05-17-90.

16. **REFERENCES:**

Stephan, C.E. 1982. Methods for Calculating an LC50. U.S. Environmental Protection Agency, Duluth, Minnesota.

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Shaughnessey No. 128850 Chemical Name Glufosinate Chemical Class ____ Page ____ of ____

HOE-039866 200 g/L soluble concentrate

Study/Species/Lab/ Accession	Chemical % a.i.	Results	Reviewer/ Date	Valid Stat
14-Day Single Dose Oral LD_{50}		LD50 = . mg/kg (95% C.L.) Contr. Mort.(%)=		
Species	____	Slope= # Animals/Level= Age(Days)= Sex =		
Lab		14-Day Dose Level mg/kg/(% Mortality) ( ), ( ), ( ), ( ), ( )		
Acc.		Comments:		
14-Day Single Dose Oral LD_{50}		LD50 = mg/kg. (95% C.L.) Contr. Mort.(%)=		
Species	____	Slope= # Animals/Level= Age(Days)= Sex =		
Lab		14-Day Dose Level mg/kg/(% Mortality) ( ), ( ), ( ), ( ), ( )		
Acc.		Comments:		
8-Day Dietary LC_{50}		LC50 = ppm (95% C.L.) Contr. Mort.(%)=		
Species		Slope= # Animals/Level= Age(Days)= Sex =		
Lab	____	8-Day Dose Level ppm/(%Mortality) ( ), ( ), ( ), ( ), ( )		
Acc.		Comments:		
8-Day Dietary LC_{50}		LC50 = ppm (95% C.L.) Contr. Mort.(%)=		
Species		Slope= # Animals/Level= Age(Days)= Sex =		
Lab	____	8-Day Dose Level ppm/(%Mortality) ( ), ( ), ( ), ( ), ( )		
Acc.		Comments:		
48-Hour LC_{50}		LC50 = pp__ (95% C.L.) Contr. Mort.(%)= Sol. Contr. Mort.(%)=		
Species		Slope= # Animals/Level= Temperature =		
Lab	____	48-Hour Dose Level pp /(%Mortality) ( ), ( ), ( ), ( ), ( )		
Acc.		Comments:		
96-Hour LC_{50}		LC50 = pp__ (95% C.L.) Con. Mor.(%)= Sol. Con. Mor.(%)=		
Species		Slope= # Animals/Level= Temp.=		
Lab	____	96-Hour Dose Level pp /(%Mortality) ( ), ( ), ( ), ( ), ( )		
Acc.		Comments:		
96-Hour LC_{50}		LC50 = 43.2 ppm (95% C.L. 34.7-77.8) Con. Mort.(%)= 0 Sol. Con. Mort.(%)= N/A	K.R. 5/17/90	Core
Species Mysidopsis bahia	18.5%	Slope= N/A # Animals/Level= 20 Temp.= 21-22°C		
Lab Hunter/ESE		96-Hour Dose Level ppm/(%Mortality) 1.35(0) 2.7(0) 5.4(0) 10.8(15) 21.6(5) 43.2(50)		
Acc. 413961-10		Comments: Based on nominal concentrations of whole test material.		

KIMBERLY RHODES HOE-039866 200 G/L SOLUBLE CONCENTRATE MYSIDOPSIS BAHIA 05-17-90

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
43.2	20	10	50	58.80985
21.6	20	1	5	2.002716E-03
10.8	20	3	15	.1288414
5.4	20	0	0	9.536742E-05
2.7	20	0	0	9.536742E-05
1.35	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 0 AND +INFINITY 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 43.20001

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	* LC50	95 PERCENT CONFIDENCE LIMITS
1	.3484687	43.20001	(34.73212 - 77.84682)

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.2867164	1	.1883385

SLOPE = 2.300773
95 PERCENT CONFIDENCE LIMITS = 1.068803 AND 3.532743

LC50 = 50.97386
95 PERCENT CONFIDENCE LIMITS = 33.70608 AND 145.3663

LC10 = 14.30076
95 PERCENT CONFIDENCE LIMITS = 6.726639 AND 20.63643

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Table 3-2. Mortality of Mysid Shrimp (Mysidopsis bahia) Exposed to HOE 039866 200 g/L Soluble Concentrate

Nominal Concentration (mg/L; ppm)	Cumulative Mortality (%)			
	24 hr	48 hr	72 hr	96 hr
Control	0	0	0	0
1.35	0	0	0	0
2.70	0	0	0	0*
5.40	0	0	0	0*
10.8	0	0	0	15†
21.6	0	0	0	5†
43.2	20	30	30	50**

*One mysid exhibiting a partial loss of equilibrium.
†Nine mysids exhibiting a partial loss of equilibrium.
**Seven mysids exhibiting a partial loss of equilibrium.

Source: ESE, 1986.