

US EPA ARCHIVE DOCUMENT

9/1/94

MRID No. 421449-06

DATA EVALUATION RECORD

1. **CHEMICAL:** Chlorpyrifos.
Shaughnessey No. ~~038011.~~
2. **TEST MATERIAL:** Chlorpyrifos Technical; Lot No. 489205; 95% active ingredient; a tan crystalline solid.
3. **STUDY TYPE:** Estuarine Shrimp Flow-Through Acute Toxicity Test. Species Tested: Mysid (*Mysidopsis bahia*).
4. **CITATION:** Surprenant, D.C. 1989. Acute Toxicity of Chlorpyrifos Technical to Mysid Shrimp (*Mysidopsis bahia*) Under Flow-Through Conditions. Project No. 89-3-2946. Prepared by Springborn Life Sciences, Inc., Wareham, MA. Submitted by Makhteshim-Agan (America) Inc., New York, NY. EPA MRID No. 421449-06.
5. **REVIEWED BY:**

Darlene R. Lintott Aquatic Toxicologist Toxikon Environmental Sciences	Signature: <i>D. Lintott</i> Date: 3/30/92
	<i>William S. Rabert</i> 8/5/94
6. **APPROVED BY:**

Louis M. Rifici, M.S. Associate Scientist KBN Engineering and Applied Sciences, Inc.	Signature: <i>P. Kosalwat</i> Date: <i>for L.M. Rifici</i>
Henry T. Craven, M.S. Supervisor, EEB/EFED USEPA	Signature: <i>H. Craven</i> Date: 9 1 94
7. **CONCLUSIONS:** This study is scientifically sound and meets the guideline requirements for a flow-through acute toxicity study using mysid shrimp. The 96-hour LC₅₀ value was 45 ng/l mean measured concentration. Therefore, Chlorpyrifos Technical is classified as very highly toxic to mysids. The NOEC was 31 ng/l mean measured concentration.
8. **RECOMMENDATIONS:** N/A.
9. **BACKGROUND:**
10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A.

11. MATERIALS AND METHODS:

- A. **Test Animals:** Juvenile mysids (*Mysidopsis bahia*) were obtained from in-house cultures. Adult mysids used in culture were fed newly-hatched brine shrimp nauplii supplemented with Selco^R two times daily and Hatchfry Encapsulon^R three times weekly.

Mysids were cultured in water from the same source as the dilution water. The cultures were maintained on a photoperiod of 16-hours light and 8-hours darkness with an intensity of 70-110 footcandles. Temperature was maintained at 25 ±1°C.

- B. **Test System:** The test was conducted using an intermittent-flow proportional diluter. The test chambers were 39 x 20 x 25 cm with self starting siphon drains. Each test aquarium contained 2 mysid retention chambers (10-cm diameter glass petri-dishes with 15-cm high Nitex screen collars). Test aquaria were impartially positioned in a water bath designed to maintain 25 ±1°C. The flow rate to each test aquarium was equivalent to 7 volume additions every 24 hours. The laboratory environment was maintained on a 16-hour light photoperiod with a light intensity of 35 to 65 footcandles.

Natural filtered (5 µm) seawater collected from Cape Cod Canal, Bourne, Massachusetts was used as dilution water.

A stock solution (1.77 mg a.i./ml) was prepared by diluting 0.1868 g of test material to 100 ml with acetone. The test stock solution (17.7 µg ai/ml) was formulated by diluting 1.0 ml of the 1.77 mg/ml stock to 100 ml with acetone. Approximately 0.034 ml of the stock solution was delivered by syringe during each diluter cycle to a mixing cell containing 2.515 l of dilution water. This solution served as the highest test concentration and was subsequently diluted to prepare the lower concentrations.

- C. **Dosage:** Ninety-six-hour static test. Based on the results of a preliminary test, five nominal concentrations (43, 66, 100, 160, and 240 ng a.i./l), a dilution water control, and a solvent control (14 µl/l of acetone) were used.

- D. **Design:** Mysids (<24 hours old) were impartially selected and equally distributed to each retention chamber, two chambers per concentration, for a total of 20 mysids per concentration. The mysids were fed newly-hatched brine shrimp twice daily during the test. Biomass loading was <3 mg of biomass per liter of solution at any given time during the test.

Observations of mortality and sublethal responses were made at test initiation and every 24 hours thereafter. Dead mysids were removed at each observation interval. The dissolved oxygen concentration, pH, salinity, and temperature were recorded in each test chamber daily or when 100% mortality was observed. The temperature of one aquarium was recorded continuously.

Water samples from each replicate test solution were collected at test initiation and termination. The concentration of Chlorpyrifos technical in the samples was determined using gas chromatography.

- E. **Statistics:** The 96-hour LC₅₀ value and associated 95% confidence interval (C.I.) were determined using a computer program developed by Stephan (1983).

12. **REPORTED RESULTS:** No insoluble material was observed at any concentration. The mean measured concentrations were 31, 38, 70, 110, and 200 ng/l or 58-83% of nominal concentrations (Table 2, attached).

The responses of the mysid shrimp are presented in Table 3 (attached). The 96-hour LC₅₀ value was 45 ng/l mean measured concentration (95% C.I. = 38-70 ng/l). The no observed effect concentration (NOEC) was 31 ng/l.

Dissolved oxygen concentrations ranged from 5.3 to 7.8 mg/l. The salinity was 32 parts per thousand (ppt). The temperature was 24-25°C. The pH was 7.9 to 8.0.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** Based on EPA criteria, the test material would be classified as very highly toxic to mysid shrimp.

Quality Assurance and Good Laboratory Practice Statements were included in the report, indicating that the study was conducted in accordance with EPA Good Laboratory Practice Regulations set forth in 40 CFR Part 160. The dates of quality assurance audits were also presented.

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

- A. Test Procedure: The test procedures were generally in accordance with the SEP, except for the following:

The salinity of the seawater used in the test (32 ppt) was greater than the salinity recommended (10-17 ppt) for estuarine shrimp.

A 15-30 minute transitional period between light and dark should have been used. If the transitions were used they were not reported.

Observations of the cultures and pretest mortality were not reported.

- B. Statistical Analysis: The reviewer used EPA's Toxanal program to calculate the 96-hour LC₅₀ and obtained the same results as the author (see attached printout). The slope of the concentration-response curve was not determined by the binomial probability method.

- C. Discussion/Results: This study is scientifically sound and meets the guideline requirements for a flow-through acute toxicity study using mysid shrimp. The 96-hour LC₅₀ value was 45 ng/l mean measured concentration. Therefore, Chlorpyrifos Technical is classified as very highly toxic to mysids. The NOEC was 31 ng/l mean measured concentration.

- D. Adequacy of the Study:

- (1) Classification: Core.
- (2) Rationale: N/A.
- (3) Repairability: N/A.

15. COMPLETION OF ONE-LINER FOR STUDY: Yes, 03-24-92.

Page _____ is not included in this copy.

Pages 5 through 6 are not included.

The material not included contains the following type of information:

- Identity of product inert ingredients.
- Identity of product impurities.
- Description of the product manufacturing process.
- Description of quality control procedures.
- Identity of the source of product ingredients.
- Sales or other commercial/financial information.
- A draft product label.
- The product confidential statement of formula.
- Information about a pending registration action.
- FIFRA registration data.
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The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

Scott Ward Chlorpyrifos Mysidopsis bahia 03-26-92

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
200	20	20	100	0
110	20	20	100	0
70	20	20	100	0
38	20	5	25	0
31	20	0	0	0

THE BINOMIAL TEST SHOWS THAT 38 AND 70 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 44.78748

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.

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