

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD
ACUTE LC₅₀ TEST WITH AN ESTUARINE/MARINE FISH
§ 72-3(A)

1. **CHEMICAL:** spinosed PC Code No.: 110003

2. **TEST MATERIAL:** XDE-105, AGR 293707 Purity: 87.9%

3. **CITATION**

Authors: J. York
Title: Acute Toxicity of XDE-105 Insecticide to
the Sheepshead Minnow (Cyprindon
variegatus)

Study Completion Date: 1993

Laboratory: Environmental Toxicology and Chemistry
Research Laboratory (ESE, Inc.)


Sponsor: Dow Chemical Co.

Laboratory Report ID: 392302102003140

MRID No.: 43414540

DP Barcode: D209720

4. **REVIEWED BY:** Joanne S. Edwards, Entomologist, EEB, EFED

Signature: 

Date: 3/14/95

5. **APPROVED BY:** Leslie W. Touart, Section Head, EEB, EFED

Signature: 

Date: 3/24/95

6. **STUDY PARAMETERS**

Scientific Name of Test Organism:

Age or Size of Test Organism: 0.15 -0.48 g

Definitive Test Duration: 96 hours

Study Method: 24 hr static-renewal

Type of Concentrations: Mean measured

7. **CONCLUSIONS:**

Results Synopsis

LC₅₀: 7.87 ppm ai (moderately toxic)

95% C.I.: 4.87 - 10.6 ppm ai

8. **ADEQUACY OF THE STUDY**

A. **Classification:** Core

B. **Rationale:** N/A

C. Repairability: N/A9. **BACKGROUND:** New chemical; no previous EEB file.10. **Guideline Deviations**

See under Reviewer's Comments.

11. **SUBMISSION PURPOSE:** New chemical EUP.12. **MATERIALS AND METHODS****A. Test Organisms**

Guideline Criteria	Reported Information
Species Preferred species are the sheepshead minnow (<i>Cyprinodon variegatus</i>) or the Silverside (<i>Menidia sp.</i>).	<i>Cyprinodon variegatus</i>
Mean Weight 0.5 - 5 g	0.15 - 0.48 g at test termination
Mean Standard Length Longest not > 2x shortest	range: 17 -25 mm (report did not indicate when fish were measured and how many were measured)
Supplier	Aquatox Inc., Hot Springs, ARK
All fish from same source?	yes
All fish from the same year class?	yes

B. Source/Acclimation

Guideline Criteria	Reported Information
Acclimation Period minimum 14 days	14 days
Wild caught organisms were quarantined for 7 days?	N/A
Were there signs of disease or injury?	not reported

Guideline Criteria	Reported Information
If treated for disease, was there no sign of the disease remaining during the 48 hours prior to testing?	N/A
Feeding No feeding during the study	fish were not fed during the study
Pretest Mortality <3% mortality 48 hours prior to testing	not reported

C. Test System

Guideline Criteria	Reported Information
Source of dilution water Soft reconstituted water or water from a natural source, not dechlorinated tap water	filtered Atlantic Ocean water obtained near the Whitney laboratory, Marineland, FL, and diluted with water from a well located near the laboratory
Does water support test animals without observable signs of stress?	yes (based upon 0% mortality in control during study)
Salinity 30-34 ‰ salinity, weekly range < 6 ‰	20 - 22 ppt in dilution water
Water Temperature 22 ± 1 °C	21.2 - 22.7 °C during test
pH 8.0-8.3 for marine-stenohaline fishes, 7.7-8.0 for estuarine-uryhaline fishes, monthly range < 0.8	8.3 - 8.4 during test
Dissolved Oxygen Static: ≥ 60% during 1 st 48 hrs and ≥ 40% during 2 nd 48 hrs, flow-through: ≥ 60%	ranged 6.0 - 7.5 mg/L during test

Guideline Criteria	Reported Information
<p>Test Aquaria 1. <u>Material:</u> Glass or stainless steel 2. <u>Size:</u> Volume of 19 L (5 gal) or 30 x 60 x 30 cm 3. <u>Fill volume:</u> 15-30 L of solution</p>	<p>glass chamber filled to volume of 10 L 44 cm (l) x 24.5 cm (w) x 22.5 cm (h)</p>
<p>Type of Dilution System Must provide reproducible supply of toxicant</p>	<p>static 24 hr renewal (80% renewal)</p>
<p>Flow Rate Consistent flow rate of 5-10 vol/24 hours, meter systems calibrated before study and checked twice daily during test period</p>	<p>N/A</p>
<p>Biomass Loading Rate Static: ≤ 0.8 g/L at $\leq 17^\circ\text{C}$, ≤ 0.5 g/L at $> 17^\circ\text{C}$; flow-through: ≤ 1 g/L/day</p>	<p>not reported</p>
<p>Photoperiod 16 hours light, 8 hours dark</p>	<p>16 h light, 8 h dark with 15 min dawn/dusk transitions.</p>
<p>Solvents Not to exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests</p>	<p>none employed</p>

Comment: According to the study author, the test material was poorly soluble in water (measured solubility in 20 ppt filtered seawater of 2 mg/L). To enhance solubility, the pH was altered. As noted on pg 11 of the report, an aqueous stock containing a nominal concentration of 100 mg/L XDE-105 (corrected for purity) was prepared in 141 L of deionized water adjusted to a pH near 5 with 1 N HCl and mixed vigorously. This technique yielded a solubility of XDE-105 in the test system of approximately 12 mg/L.

D. Test Design

Guideline Criteria	Reported Information
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<p><u>Range Finding Test</u> If LC₅₀ >100 mg/L with 30 fish, then no definitive test is required.</p>	<p>yes; in a range-finding test, it was determined that the LC₅₀ was near 10 mg ai/L</p>
<p><u>Nominal Concentrations of Definitive Test</u> Control & 5 treatment levels; each conc. should be 60% of the next highest conc.; concentrations should be in a geometric series</p>	<p>0, 1.6, 2.6, 4.3, 7.2 and 12 mg ai/L</p>
<p><u>Number of Test Organisms</u> Minimum 10/level, may be divided among containers</p>	<p>20 (10 per treatment chamber)</p>
<p>Test organisms randomly or impartially assigned to test vessels?</p>	<p>yes, indiscriminate distribution</p>
<p>Biological observations made every 24 hours?</p>	<p>observations were made daily for mortality and behavioral changes</p>
<p><u>Water Parameter Measurements</u> 1. <u>Temperature</u> Measured constantly or, if water baths are used, every 6 hrs, may not vary > 1°C 2. <u>DO and pH</u> Measured at beginning of test and ever 48 h in the high, medium, and low doses and in the control</p>	<p>temperature, pH, salinity and DO were measured daily in each exposure chamber; temperature was continuously monitored in the water bath</p>
<p><u>Chemical Analysis</u> needed if solutions were aerated, if chemical was volatile, insoluble, or known to absorb, if precipitate formed, if containers were not steel or glass, or if flow-through system was used</p>	<p>in each exposure chamber at 0 hr, 24 hr (prior to renewal), and 96 hr</p>

13. REPORTED RESULTS

A. General Results

Guideline Criteria	Reported Information
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Quality assurance and GLP compliance statements were included in the report?	yes
Recovery of Chemical	88.6-113% (Table 1, attached); stock concentration was 95.7% of nominal at test initiation
Control Mortality Not more than 10% of control organisms may die or show abnormal behavior.	0%
Raw data included?	no
Signs of toxicity (if any) were described?	only mortality was described

Mortality

Concentration (ppm)		Number of Fish	Cumulative Number Dead			
Nominal	Mean Measured		Hour of Study			
			24	48	72	96
Control	-	20	0	0	0	0
1.6	1.80	20	0	0	0	0
2.6	2.95	20	1	1	1	1
4.3	4.87	20	0	0	0	0
7.2	7.38	20	0	4	5	7
12	10.6	20	4	19	20	20

Other Significant Results:

B. Statistical Results

Method: Binomial

96-hr LC₅₀: 7.87 ppm ai 95% C.I.: 4.87-10.6 ppm ai

Probit Slope: - NOEC: 1.8 ppm ai (based on no mortality)

14. VERIFICATION OF STATISTICAL RESULTS

Parameter	Result
Binomial Test LC ₅₀ (C.I.)	7.87 (4.87- 10.6) ppm ai
Moving Average Angle LC ₅₀ (95% C.I.)	cannot be used
Probit LC ₅₀ (95% C.I.)	results should not be used
Probit Slope	-

15. REVIEWER'S COMMENTS:

The following deviations were noted. None of these were found to affect the overall quality of the study:

- o Biological observations should include both behavioral and physical observations. Observations, other than mortality, were not reported.
- o The % mortality prior to the test was not reported.
- o The pH (8.3 - 8.4) and the salinity (20 - 22 ppt) values were higher than the recommended values, (7.7 - 8.0) and (10 - 17 ppt), respectively.
- o Biomass loading was not reported.
- o The weight of the test organisms (0.15 - 0.48 g) was lower than that recommended by the SEP (0.5 - 5 g). Also, the author did not indicate how many fish were weighed.
- o The range of the fish was reported as 17 -25 mm. The author did not indicate when the fish were measured and how many of them were measured.

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DER dated 3/24/95 (MRID 43414570)

Page 8 is not included in this copy.

Pages _____ through _____ are not included in this copy.

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.
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jedwards XDE-105 estuarine fish

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
10.6	20	20	100	9.536742E-05
7.38	20	7	35	13.1588
4.87	20	0	0	9.536742E-05
2.95	20	1	5	2.002716E-03
1.8	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 4.87 AND 10.6 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 7.867891

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES MOVING AVERAGE ANGLES THAT BRACKET 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
7	6.745981	16.38748

GOODNESS OF FIT PROBABILITY

0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001.

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

SLOPE = 7.628695
95 PERCENT CONFIDENCE LIMITS = -12.18534 AND 27.44273

LC50 = 7.426614
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY

LC10 = 5.061906
95 PERCENT CONFIDENCE LIMITS = 0 AND +INFINITY
