9-12-86
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DATA EVALUATION RECORD

1. Chemical: PP 321 = Lambda Cyhalothrin

2. Test Material: Technical, 96.5% ai

3. Study/Action Type: Aquatic Invertebrate Acute Toxicity Test - Daphnia magna

4. Study ID: PP 321: Toxicity to first instar Daphnia magna, E. Farrelly, M.J. Hamer and I.R. Hill, ICI, August 6, 1984, EPA Accession No. 259807.

5. Reviewed By: Ann Stavola
Aquatic Biologist
EEB/HED
Signature: Ann Stavola
Date: Sept. 5, 1986

6. Approved By: Doug Urban
Supervisory Biologist
EEB/HED
Signature: Douglas J. Urban
Date: 9/12/86

7. Conclusions:

The study is scientifically sound and meets EPA Guidelines requirement requirement for acute toxicity testing with freshwater invertebrates. It shows that with an EC_{50} value of 0.36 ug/L technical PP 321, 96.5% ai, is very highly toxic to freshwater invertebrates.

8. Recommendations: N/A.

= mean value for two tests
lowest value entered into database
EC_{50} = 0.23 ppb

9. Background:

This study was submitted to support the EUP application for Karate 1 EC Insecticide.

BJW

10. Materials and Methods:

a. Test Animals: First instar Daphnia magna less than 24 hour old. Cultures maintained on a diet of yeast and Chlorella vulgaris at 20 °C on a 16-hour day.

b. Dosage: PP 321, 96.5% ai. Stock solution prepared with acetone as solvent. Dilution water was reconstituted hard water. Concentrations measured by GC.

c. Study Design: The test method is based upon the procedures recommended by EPA in Methods for Acute Toxicity Tests With Fish, Macroinvertebrates and Amphibians, EPA 660-/3-75-009 and ASTM (1980). The test was conducted with 250 mL glass beakers containing 200 mL of test solution. There were triplicate beakers per concentration, and each beaker contained 10 Daphnia magna. The test was conducted at 20 °C with a 16 light and 8 dark photoperiod. The Daphnia magna were not fed during the test. Two separate consecutive tests were run.

d. Statistical Analysis: The EC_{50} values and 95% ci were calculated using the weighted linear regression of log concentration plotted against logit transformation of the Daphnia magna response. The EC_{50} of the combined runs was calculated by taking the log mean of the EC_{50}'s of the individual runs.

11. Reported Results:

Nominal Conc. (ug/L)	Measured Conc. ug/L		% Mortalities Test 1		Test 2	
	Test 1	Test 2	24h	48h	24h	48h
32	19.3	15.1	80	100	66.7	100
16	8.62	8.09	76.7	100	46.7	100
8	4.13	4.04	63.3	96.7	33.3	96.7
4	2.23	2.28	33	83.3	33.3	93.3
2	1.05	1.01	16.7	73.3	33.3	86.7
1	0.49	0.55	6.7	50	10	86.7
0.5	0.31	0.23	3.3	26.7	0	60
0.25	0.20	0.14	0	13.3	0	36.7
0.125	0.10	0.06	0	6.7	0	6.7
0.0625	-	0.04	-	-	0	0
Control	0	0	0	0	0	0

EC_{50} Values (ug/L) (based on measured concentrations and 95% ci)

Test 1	24h	48hr
1	3.78 (2.87-5.13)	0.57 (0.45-0.73)
2	6.72 (4.60-11.1)	0.23 (0.18-0.29)
Mean 1 and 2	5.04	0.36

DO levels remained above 7.6 mg/L (82% saturation) throughout both tests. The pH ranged from 8.0 to 8.6 except for the control in Test 1.

12. Study Author's Conclusions/QA Measures:

The 48-hr EC_{50} of technical PP 321 to Daphnia magna is 0.36 ug/L.

"During the conduct of this study the Quality Assurance Unit carried out the following audits in accordance with ICI Plant Protection Division's Policy of Good Laboratory Practices."

13. Reviewer's Evaluation:

a. Test Procedures: The protocol is acceptable since it follows the procedures recommended by EPA.

b. Statistical Analysis: The data were analyzed using EEB's "Aquatox Program." The 48-hr EC_{50} values for Test 1 and Test 2, respectively, were 0.58 (0.46-0.73) ug/L and 0.24 (0.19-0.31) ug/L. These EC_{50} values were computed by probit analysis.

c. Discussion/Results: The data indicate that technical PP 321 is very highly toxic to freshwater invertebrates.

d. Conclusions:

1. Category: Core.

2. Rationale: The study is scientifically sound and meets EPA Guidelines requirement for acute toxicity testing with freshwater invertebrates.

ETHANOL 88321 DAPHNIA 48 HR ACUTE Test I - Measured Conc.

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
19.3	30	30	100	9.31323E-08
8.52	30	30	100	9.31323E-08
4.13	30	29	96.66666	2.8871E-06
2.23	30	25	83.33333	1.624571E-02
1.05	30	22	73.33334	.8062400
.49	30	15	50	57.22322
.31	30	8	26.66667	.8062400
.2	30	4	13.33333	2.973107E-03
.1	30	2	6.666666	4.339945E-05

THE BINOMIAL TEST SHOWS THAT .31 AND 1.05 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 .49

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
6	3.877718E-02	.6023583	.4753361	.7662344

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
4	.0435125	1	.9527976

SLOPE = 2.082593
95 PERCENT CONFIDENCE LIMITS = 1.648163 AND 2.517002

LC50 = .5794304
95 PERCENT CONFIDENCE LIMITS = .4599848 AND .7295159

LC10 = .1422924
95 PERCENT CONFIDENCE LIMITS = 9.086399E-02 AND .1959929

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Sta Sla FP331 DAPHNIA 48 HR ACUTE Test II - Measured Conc.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. PERCENT
15.1	30	30	100	9.313226E-10
8.08	30	30	100	9.313226E-08
4.04	30	28	96.66666	2.8871E-06
2.02	30	28	93.33334	4.339964E-05
1.01	30	26	86.66666	2.972907E-03
.55	30	26	86.66666	2.972907E-03
.28	30	18	60.00001	18.07973
.14	30	11	36.66667	10.02442
.06	30	2	6.666666	4.339964E-05
.04	30	0	0	9.313226E-10

THE BINOMIAL TEST SHOWS THAT .06 AND .55 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 .1860354

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
7	2.911605E-02	.2689372	.2092129	.3307422

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	4.103451E-02	1	.1970825

SLOPE = 1.977392

95 PERCENT CONFIDENCE LIMITS = 1.576932 AND 2.377852

LC50 = .2399504

95 PERCENT CONFIDENCE LIMITS = .1868322 AND .3065227

LC10 = 5.468414E-02

95 PERCENT CONFIDENCE LIMITS = 3.401471E-02 AND 7.704818E-02