Invalid

422770-01

MRID No. 110705

DATA EVALUATION RECORD

1. **CHEMICAL:** Permethrin. Shaughnessey Number: 109701.

2. **TEST MATERIAL:** Formulation JFU 5054; 24% emulsifiable concentrate of PP557; purity of 27.3% w/w; an amber liquid.

3. **STUDY TYPE:** 72-1. Freshwater Fish Static Acute Toxicity Test. Species Tested: Bluegill Sunfish (*Lepomis macrochirus*).

4. **CITATION:** Hill, R.W., B.G. Maddock, B. Hart, and S.K. Cornish. 1977. Acute Toxicity of JFU 5054 to Bluegill Sunfish (*Lepomis macrochirus*). Report No. BL/B/1832. Study performed by Imperial Chemical Industries, Brixham Laboratory. Submitted by Imperial Chemical Industries Limited, Plant Protection Division. EPA MRID No. 110705.

5. **REVIEWED BY:**

Rosemary Graham Mora, M.S.
Associate Scientist
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Signature: 422770-01 Rosemary Graham Mora
Date: 5/18/93

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.
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Signature: P. Kosalwat
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Henry T. Craven, M.S.
Supervisor, EEB/EFED
USEPA

Signature: C.E.T 6-17-93
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7. **CONCLUSIONS:** This study is scientifically sound and meets the guideline requirements for an acute toxicity study using bluegill. Based on mean measured concentrations, the 96-hour LC_{50} for *Lepomis macrochirus* exposed to JFU 5054 was 0.013 mg/l which classifies JFU 5054 as very highly toxic to *Lepomis macrochirus*. The ~~NOEC could not~~ be determined due to mortality at all test levels ~~in test~~ Series I.

8. **RECOMMENDATIONS:** 0.0

9. **BACKGROUND:**

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

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11. MATERIALS AND METHODS:

A. Test Animals: Bluegill sunfish (*Lepomis macrochirus*) were obtained from Dutchland Laboratory Animals Inc., Denver, PA. Prior to test initiation, the fish were held in stock tanks for 13 days at 23°C and for an additional 2 days in test vessels at 22 ±0.5°C.

The fish had a mean weight of 1.69 g (range of 1.19-2.49 g) and a mean length of 50 mm (range of 42-55 mm).

B. Test System: The test was conducted using a continuous flow-through system at a temperature of 22 ±0.5°C. The glass test vessels had a holding capacity of 20 l. The flow rate was 200 ml/minute which provided a theoretical replacement rate of 95% in 4.5 hours.

The dilution water was supplied from a 20,000-gallon reservoir. During the test, the dilution water had a total hardness of 51-52.5 mg/l as $CaCO_3$.

"Concentrated stock solutions were prepared by diluting a known weight of the formulation with test water. The formulation formed a stable cream coloured emulsion with water in all proportions tested." The stock solutions and freshwater were fed to the test system (via peristaltic pumps) and were mixed prior to introduction to the test vessels.

C. Dosage: Ninety-six-hour, flow-through test. Two series of test concentrations were selected for this study. Series I included the nominal test concentrations of 0.018, 0.024, 0.032, and 0.075 mg/l. Series II included the nominal test concentrations of 0.0075, 0.0135, and 0.0155 mg/l. A dilution water control was also included in each series.

D. Design: Twenty fish were exposed to each test treatment. Mortality was noted at 24, 48, 72, and 96 hours during the study.

Dissolved oxygen concentration, pH, and temperature were measured twice daily. Chemical analysis of each treatment was performed, using gas chromatography, on samples collected at 0, 48, 72, or 96 hours.

E. Statistics: The LC_{50} values and their 95% confidence intervals (C.I.) were determined using the probit method (Finney, 1971).

12. **REPORTED RESULTS:** Mean measured concentrations of Series I were 0.010, 0.0225, 0.024, and 0.066 mg/l which represent 56-94% of nominal concentrations. Mean measured concentrations of Series II were 0.0005, 0.0022, and 0.0034 mg/l which represent 7-22% of nominal (Table 7, attached).

No mortality was observed in the controls or the three lowest test concentrations (Series II) (Table 1, attached). Mortality in the remaining exposure concentrations ranged from 20 to 100%. The 96-hour LC_{50} (95% C.I.) for bluegill was 0.0205 (0.0192-0.0219) mg/l. The no effect level was 0.0075 mg/l, based on the lack of sublethal effects and mortality at this concentration.

During the study, the test solutions had a pH of 7.65-7.80, a temperature of 22 ±0.5°C, and a dissolved oxygen concentration of 89-94% of saturation.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:** No conclusions, other than those presented above, were included in the report.

No GLP compliance or quality assurance statements were included in the report.

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 deviations:

Inert control was not included in the study design.

The source of the dilution water was not reported and its characteristics were not fully described.

The age of the test fish was not given.

The report does not indicate whether food was withheld from the fish during testing as recommended.

The recommended photoperiod for a freshwater fish acute toxicity study is 16-hour light/8-hour dark with 15- to 30-minute transitions. The photoperiod was not reported.

The system used to maintain the test temperature was not reported. The temperature monitoring results were not reported.

Temperature was measured twice daily; temperature should be measured every six hours or continuously (hourly) for tests where solution temperature is maintained using a waterbath or room temperature, respectively.

B. **Statistical Analysis:** The reviewer used EPA's Toxanal computer program to determine the 96-hour LC_{50} using mean measured concentrations from Series I. The 96-hour LC_{50} (C.I.) was 0.013 (0.011-0.016) mg/l. The slope of the dose-response curve was 6.9.

C. **Discussion/Results:** Analytical results from Series II are not valid since the test material was not detected in the majority of the samples (Table 7, attached). Consequently, Series II test is invalid. The measured concentrations in Series I were generally consistent over the test period and were used to calculate the LC_{50}.

This study is scientifically sound and meets the guideline requirements for an acute toxicity study using bluegill. Based on mean measured concentrations, the 96-hour LC_{50} for *Lepomis macrochirus* exposed to JFU 5054 was 0.013 mg/l which classifies JFU 5054 as very highly toxic to *Lepomis macrochirus*. The NOEC could not be determined due to mortality in all test concentrations in Series I.

D. **Adequacy of the Study:**

(1) **Classification:** Core for a formulated product.

(2) **Rationale:** N/A.

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

15. **COMPLETION OF ONE-LINER FOR STUDY:** Yes; 5 May 1993.

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TABLE 1

Concentration Tested and Corresponding Observed Percentage Mortalities for Bluegill Sunfish (Lepomis macrochirus) exposed to JFU 5054

Concentration mg/l JFU 5054	24 hours	48 hours	72 hours	96 hours
0.075	100	100	100	100
0.032	30	95	100	100
0.024	5	55	85	90
0.013	0	5	10	20
0.0155	0	0	0	0
0.0135	0	0	0	0
0.0075	0	0	0	0
Control (Series 1)	0	0	0	0
Control (Series 2)	0	0	0	0

Twenty fish were tested in each concentration

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TABLE 7

Analytical Results JFU 5054 mg/l

Species : Bluegill Sunfish (Series I)

JFU 5054 mg/lx10^{3}

Nominal Exposure Concentration	Exposure time in minutes (Hours)	Concentration determined	Mean Results	Mean % Recovery
75	1440 (24) 2880 (48)	60,63,75 66,69,65	66	88.0
32	2880 (48) 4320 (72)	23,31,27 22,22,21	24	75.0
24	1440 (24) 2880 (48) 4320 (72) 5760 (96)	18.19,20 22,20,20 32,34,34 18,16,17	22.5	93.8
18	1440 (24) 5760 (96)	13,12,11 8, 8, 7	10.0	55.5
Control	4320 (72) 5760 (96)	Nil,Nil,Nil Nil,Nil,Nil	Nil	-

(Series II)

15.5	1440 (24) 2880 (48) 4320 (72) 5760 (96)	Nil,Nil,Nil 3.8,3.8,3.1 Nil,Nil,Nil 6.4,4.9,3.9	3.4	22.0
13.5	1440 (24) 2880 (48) 4320 (72) 5760 (96)	Nil,Nil,Nil 5.6,4.4,5.6 Nil,Nil,Nil 2.9,5.2,2.8	2.2	16.3
7.5	1440 (24) 4320 (72) 5760 (96)	Nil,Nil,Nil Nil,Nil,Nil 0.6,1.3,1.9	0.5	6.6
Control	2880 (48) 4320 (72)	Nil, Nil,	Nil	-
7.5 Feed/ + Chem App.	1440 (24) 4320 (72) 5760 (96)	1.10 0.27 0.35	0.58	84.0

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
.066	20	20	100	9.536742E-05
.024	20	20	100	9.536742E-05
.0225	20	18	90	2.012253E-02
.01	20	4	20	.5908966

THE BINOMIAL TEST SHOWS THAT .01 AND .0225 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 1.396778E-02

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
1	.1713618	1.396778E-02	1.140686E-02	1.660666E-02

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	.1321281	1	.4751488

SLOPE = 6.924568

95 PERCENT CONFIDENCE LIMITS = 4.407527 AND 9.441608

LC50 = 1.329086E-02

95 PERCENT CONFIDENCE LIMITS = .0110302 AND .0154921

LC10 = 8.712606E-03

95 PERCENT CONFIDENCE LIMITS = 6.096376E-03 AND 1.059175E-02

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0.0132

0.0087