

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

1. Chemical: Lindane
2. Test Material: Lindane 20% EC
3. Study/Action Type: Fish Static Acute Toxicity Test  
Bluegill Sunfish (Lepomis macrochirus)
4. Study Identification: Acute Toxicity of Lindane 20% EC, to  
Bluegill Sunfish (Lepomis macrochirus);  
Analytical Bio-Chemistry Laboratories,  
Inc., Report No. 34546. Submitted by  
Rhone-Poulenc, Inc. for CIEL. July 8,  
1986. EPA Accession No. 263947.

5. Reviewed by: Ann Stavola  
Aquatic Biologist  
EEB/HED

Signature: *Ann Stavola*  
Date: 9 Dec 86

6. Approved by: Doug Urban  
Supervisory Biologist  
EEB/HED

Signature: *Doug Urban*  
Date: 12/31/86

7. Conclusions:

The study is scientifically sound. Although the test material was a formulated product it meets EPA Guidelines requirements for acute toxicity testing with fish since we required testing with the formulation. With an LC<sub>50</sub> value of 280 (240-320) ug/L, Lindane 20% EC is highly toxic to warmwater fish.

8. Recommendations: N/A.

9. Background:

Submitted in response to data requirements of Lindane Registration Standard.

10. Materials and Methods:

- a. Test Animals: Bluegill sunfish (Lepomis macrochirus) obtained from Osage Catfisheries, Osage Beach, Missouri.

Weight =  $0.78 \pm 0.18$  g.  
Standard length =  $30 \pm 2.3$  mm.

- b. Dosage: Lindane 20% EC. Dilution water was soft reconstituted water. Concentration measured by GLC at 0 hour and 96 hours.
- c. Study Design: The test was conducted in 5-gallon glass vessels containing 15 liters of test solution. The nominal concentrations were 100, 180, 320, 560, and 1000 ug/L of the formulation. There were 10 fish per replicate concentration and duplicate controls. The test was conducted at 22 °C.
- d. Statistics: The raw data were analyzed by a computerized LC50 program developed by Stephan.

11. Reported Results:

Nominal Conc. (ug/L)	Measured Conc. (ug/L)		No. Dead			
	as formulation	as lindane	24 hr	48 hr	72 hr	96 hr
1000	800	160	20	20	20	20
560	450	90	13	19	19	19
320	260	52	4	6	7	8
180	140	29	0	0	0	0
100	80	16	0	0	0	0
Control	--	--	0	0	0	0

Time	LC <sub>50</sub> and 95% CI (ug/L)	
	as formulation	as lindane
24 hr	360 (310-430)	73 (63-85)
48 hr	300 (260-340)	60 (52-68)
72 hr	290 (250-332)	58 (50-67)
96 hr	280 (240-320)	57 (49-65)

D.O. levels were 8.7 mg/L at 0 hour and 4.7 to 5.3 mg/L at 96 hours; pH values were 7.3 at 0 hour and 6.3 to 7.0 at 96 hours.

The general symptoms of toxicity were dark discoloration, erratic swimming, excitability, and rapid respiration, and they were noticed at all test concentrations.

12. Study Author's Conclusions/QA Measures:

The 96-hour LC<sub>50</sub> value for Lindane 20% EC to warmwater fish was 280 (240-320) ug/L, measured formulation.

QA Statement: "In accordance with ABC Laboratories' intent that all studies conducted at our facilities are designed and function in conformance with good laboratory practice regulations and the protocols for individual laboratory studies, an inspection of the final report for Lindane 20% EC was conducted and found to be in acceptable form by a member of our Quality Assurance Unit...A procedure audit was conducted on June 16, 1986. No deviations were noted. A final inspection of all data and records on July 3, 1986 indicated that the report submitted to you is an accurate reflection of the study as it was conducted by ABC Laboratories."

13. Reviewer's Evaluation:

a. Test Procedures: The protocol used in this study follows Methods for Acute Toxicity Tests with Fish, Macroinvertebrates, and Amphibians, EPA-660/3-75-009. The test material was a formulated product as was required in the Registration Standard.

b. Statistics: The data were analyzed by EEB's Toxanal program, which is based on Stephan's program.

The 96-hour LC<sub>50</sub> values were computed to be 56.5 (49-65) ug/L as lindane and 282.2 (243.2-324.4 ug/L) measured formulation.

c. Discussion/Results: The reported LC<sub>50</sub> values are acceptable since they agree with the LC<sub>50</sub> values computed by EEB. The data indicate that the 20% EC formulation of lindane is highly toxic to warmwater fish.

Conclusions:

1. Category: Core.

2. Rationale: We required testing with this formulation.

STAVOLA LINDANE 20 EC BLUEGILL 11-24-86

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
800	20	20	100	9.536742E-05
450	20	19	95	2.002716E-03
260	20	8	40	25.17223
140	20	0	0	9.536742E-05
80	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 140 AND 450 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 283.2496

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
4	5.135013E-02		282.5777 237.6395 339.9556

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
7	.2043578	1	.9844898

SLOPE = 8.495148  
95 PERCENT CONFIDENCE LIMITS = 4.654835 AND 12.33546

LC50 = 282.2068  
95 PERCENT CONFIDENCE LIMITS = 243.1981 AND 324.3899

LC10 = 200.0185  
95 PERCENT CONFIDENCE LIMITS = 141.7536 AND 234.2629

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STAVOLA LINDANE 20 EC BLUEGILL 11-24-86

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
160	20	20	100	9.536742E-05
90	20	19	95	2.002716E-03
52	20	8	40	25.17223
29	20	0	0	9.536742E-05
16	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 29 AND 90 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 56.64991

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS		
4	5.135013E-02		57.01355	47.94671	68.59026

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.1956442	1	.9757281

SLOPE = 8.601584  
95 PERCENT CONFIDENCE LIMITS = 4.796958 AND 12.40621

LC50 = 56.54878  
95 PERCENT CONFIDENCE LIMITS = 49.01367 AND 64.9674

LC10 = 40.25095  
95 PERCENT CONFIDENCE LIMITS = 29.14996 AND 46.90898

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