DATA EVALUATION RECORD

1. Chemical: Lindane

2. Test Material: Lindane 40% Flowable

3. Study/Action Type: Fish Static Acute Toxicity Test
Bluegill (Lepomis macrochirus)

4. Study Identification: Acute Toxicity of Lindane 40% Flowable, to Bluegill Sunfish (Lepomis macrochirus); Analytical Bio-Chemistry Laboratories, Inc., Report No. 34553. Submitted by Rhone-Poulenc, Inc. for CIEL. July 7, 1986. EPA Accession No. 263947.

5. Reviewed by: Ann Stavola
Aquatic Biologist
EEB/HED
Signature: Ann Stavola
Date: 9Dec86

6. Approved by: Doug Urban
Supervisory Biologist
EEB/HED
Signature: Douglas J. 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_{50} value of 160 (140-180) ug/L, Lindane 40% Flowable 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 = 0.66 ± 0.17 g.
Standard length = 29 ± 2.2 mm.

b. Dosage: Lindane 40% Flowable. Dilution water was soft reconstituted water. Concentrations 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 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 LC_{50} program developed by Stephan.

11. Reported Results:

Nominal Conc. (ug/L)	Measured Conc. (ug/L) as formulation	Measured Conc. (ug/L) as lindane	No. Dead 24 hr	48 hr	72 hr	96 hr
1000	750	300	20	20	20	20
560	350	140	20	20	20	20
320	300	120	13	18	19	19
180	80	32	0	0	0	1
100	75	30	0	0	0	0
Control	--	--	0	0	0	0

Time	LC_{50} and 95% CI (ug/L) as formulation	as lindane
24 hr	240(80-350)	95(32-140)
48 hr	180 (80-300)	72(32-120)
72 hr	169(80-300)	68(32-120)
96 hr	160(140-180)	63(55-72)

D.O. levels were 10 ug/L at 0 hour and 6.0 to 8.2 ug/L at 96 hours; pH values were 7.4 at 0 hour and 5.1 to 6.9 at 96 hours.

The general symptoms of toxicity included surfacing, loss of equilibrum and fish on the bottom of the test vessels. No symptoms were noted in the control groups or the fish exposed to 75 ug/L.

12. Study Author's Conclusions/QA Measures:

The 96-hour LC_{50} value for Lindane 40% Flowable to warmwater fish was 160 (140-180) 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 (40% Flowable) was conducted and found to be in acceptable form by a member of our Quality Assurance Unit.., A procedure audit was conducted on June 6, 1986. Results were reported to management. A final inspection of all data and records on June 28, 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 Testing in 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 with EEB's Toxanal program, which is based on Stephan's program.

The 96-hour LC_{50} values were computed to be 63.2 (55.4-72.1) ug/L as lindane and 158 (138.6-180.3) ug/L measured formulation.

c. Discussion/Results: The reported LC_{50} values are acceptable since they agree with the LC_{50} values computed by EEB. The data indicate that the 40% flowable formulation of lindane is highly toxic to warmwater fish.

Conclusions:

1. Category: Core.

2. Rationale: We required testing with this formulation.

STAVOLA LINDANE 40 FLOWABLE BLUEGILL 11-24-86

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
300	20	20	100	9.536742E-05
140	20	20	100	9.536742E-05
120	20	19	95	2.002716E-03
32	20	1	5	2.002716E-03
30	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 32 AND 120 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 61.96772

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
3	3.250736E-02	63.23406	55.42783	72.12549

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	9.420079E-02	1	.7722716

SLOPE = 6.507725
95 PERCENT CONFIDENCE LIMITS = 4.510364 AND 8.505085

LC50 = 62.86942
95 PERCENT CONFIDENCE LIMITS = 50.22313 AND 78.97391

LC10 = 40.11316
95 PERCENT CONFIDENCE LIMITS = 29.28617 AND 50.21448

STAVOLA LINDANE 40 FLOWABLE BLUEGILL 11-24-86

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
750	20	20	100	9.536742E-05
350	20	20	100	9.536742E-05
300	20	19	95	2.002716E-03
80	20	1	5	2.002716E-03
75	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT 80 AND 300 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 154.9193

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS		
3	3.250736E-02		158.0852	138.5697	180.3137

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	9.420241E-02	1	.7722421

SLOPE = 6.507707
95 PERCENT CONFIDENCE LIMITS = 4.510335 AND 8.505079

LC50 = 157.1736
95 PERCENT CONFIDENCE LIMITS = 125.5576 AND 197.4354

LC10 = 100.2828
95 PERCENT CONFIDENCE LIMITS = 73.21503 AND 125.5364

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