

US EPA ARCHIVE DOCUMENT

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TO: G. LaRocca
Product Manager 15
Registration Division (TS 767)

FROM: Emil Regelman, Supervisory Chemist
Review Section #3
Exposure Assessment Branch
Hazard Evaluation Division (TS 769C)



Attached, please find the EAB review of...

Reg./File # : 52904-C
Chemical Name: Lindane
Type Product : Insecticide
Product Name : n.a.
Company Name : Centre International d'Etudes du Lindane
Purpose : Review of laboratory volatility studies.

Action Code: 661

EAB # (s): 70465,70466,70467

Date Received: 3/31/87

Total Reviewing Time: 2 days

Date Completed: 11/3/87

Monitoring Study Requested:

Monitoring Study Volunteered:

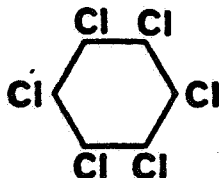
Deferrals to: Ecological Effects Branch
 Residue Chemistry Branch
 Toxicology Branch

1. CHEMICAL:

chemical name: gamma- 1,2,3,4,5,6-hexachlorocyclohexane

common name: Lindane

structure:



chemical/physical properties:

molecular weight: 290.85

melting point: 112.5°C

solubility: 10 ppm in water at 20°C

vapor pressure: 9.4×10^{-6} mm Hg at 20°C.

2. TEST MATERIAL:

- A. Lindane 20% Emulsifiable Concentrate (Prentiss)
- B. Lindane 25% Wettable Powder (Miller)
- C. Lindane 40% Flowable (Gustafson)

3. STUDY/ACTION TYPE:

Review of laboratory volatility studies submitted in response to the Lindane Registration Standard.

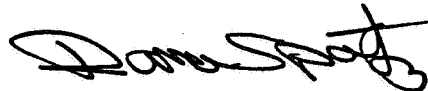
4. STUDY IDENTIFICATION:

- A. Agrisearch Incorporated, THE VOLATILIZATION OF LINDANE FROM SOIL, Lindane: 20% Emulsifiable Concentrate. Submitted by Rhoné Poulenc, Inc. Mornmouth Junction, NJ, acting on behalf of Centre International d'Etudes du Lindane (C.I.E.L.). November 6, 1986, accession number 400673-02.
- B. Agrisearch Incorporated, THE VOLATILIZATION OF LINDANE FROM SOIL, Lindane: 25% Wettable Powder. Submitted by Rhone Poulenc, Inc. Mornmouth Junction, NJ, acting on behalf of Centre International d'Etudes du Lindane (C.I.E.L.). November 6, 1986, accession number 400673-03.

C. Agrisearch Incorporated, THE VOLATILIZATION OF LINDANE FROM SOIL, Lindane: 40% Flowable. Submitted by Rhone Poulenc, Inc. Morrmouth Junction, NJ, acting on behalf of Centre International d'Etudes du Lindane (C.I.E.L.). November 6, 1986, accession number 400673-04.

5. REVIEWED BY:

Dana Spatz
Chemist, Review Section 3
EAB/HED/OPP



Date: NOV 6 1987

6. APPROVED BY:

Emil Regelman
Supervisory Chemist, Review Section 3
EAB/HED/OPP



Date: NOV 6 1987

7. CONCLUSIONS:

This laboratory volatility study does not meet EPA requirements for registering pesticides for the following reasons:

- a. The study was not carried out over a long enough period of time to clearly define the dissipation of lindane by volatilization.
- b. The rate of volatilization was incorrectly calculated and could not be determined given the information within the report.
- c. The conditions of the study; ie., sterile and anaerobic, do not closely compare to actual field conditions.
- d. The surface area of the soil was not reported.
- e. There was no data reported for the 0% humidity trials for the 25% WP or the 40% flowable.
- f. No sample gas chromatograms were included.
- g. All major formulation categories were not tested. Dust, wettable powder/dust, soluble concentrate, ready to use, and pressurized liquid must also be tested.
- h. The design of the experimental apparatus was not clearly explained.

8. RECOMMENDATIONS:

The registrant should repeat the laboratory volatility study, incorporating the above concerns into the new study.

9. BACKGROUND:

These laboratory volatility studies were submitted in response to the Lindane Registration Standard.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

I.

A. Study Identification

Agrisearch Incorporated, THE VOLATILIZATION OF LINDANE FROM SOIL, Lindane: 20% Emulsifiable Concentrate. Submitted by Rhone Poulenc, Inc. Monmouth Junction, NJ, acting on behalf of Centre International d'Etudes du Lindane (C.I.E.L.). November 6, 1986, accession number 400673-02.

B. Materials and Methods

1.21 to 1.60 ppm A.I. was applied to the test soil.

The test soil was a sandy loam from Frederick County, Maryland.

% sand: 63.2	% O.M.: 1.9
% silt: 20.0	pH: 7.5
% clay: 16.8	CEC: 6.1 meq/100g

Prior to use, the soil was air dried and sieved. The soil was sterilized by autoclaving to eliminate microbial activity.

A 200 ml capacity airless-ware cylindrical funnel fitted with a coarse frit and a sidearm stopcock served as the gas saturation vessel.

The studies were carried out in the dark at either 0% humidity or 100% humidity. For the study at 0% humidity, the dried soil was used without further preparation. For the studies at 100% humidity, the soil moisture content was raised to 75% field capacity.

Two hundred grams of soil (dry weight) was weighed into a sterile brown bottle and an appropriate volume of formulation was added to the soil. The bottle was sealed and placed on a roller mill for at least one hour.

The treated soil was transferred to the airless-ware cylindrical funnel and the relative humidity was adjusted. Fresh polyurethane foam plugs were used to trap lindane vapors. Two plugs were used; the second plug was utilized to check for breakthrough. Nitrogen gas flow was adjusted to 300ml/min. Temperature was controlled at $25 \pm 1^\circ\text{C}$.

The foam plugs were replaced with new ones each day.

The plugs were extracted with hexane and sonicated for 15 to 30 minutes.

Subsamples of hexane were removed for injection on the gas chromatograph.

Soil samples were extracted with a mixture of hexane/ethyl acetate 80/20 v/v. A subsample of the extraction solvent was diluted in hexane for injection by GC.

C. Reported Results

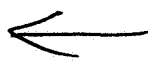
Analysis of the Prentiss Lindane 20% EC showed that the concentration was not 20% lindane a.i., but averaged 17.7% lindane.

Analyses of the polyurethane plugs and the residual soils are presented in table 1. At 100% relative humidity approximately 2-4% of the lindane dose was volatilized per day. The concentration of lindane in air was 11.9 to 28.9 $\mu\text{g}/\text{m}^3/\text{day}$ with a volatility of 1.19 to $2.89 \times 10^{-5} \mu\text{g}/\text{cm}^3/\text{hour}$.

No detectable lindane was found to volatilize from the soil through which nitrogen at 0% relative humidity was passed.

See table 2 for recovery data.

D. Study Author's Conclusions

Results of these studies parallel the results on the volatility previously reported by others in which volatility was shown to be an important mode of lindane dissipation from soil. The combined volatility results of all three formulations indicate that the volatility of lindane from the soil is independent of the formulation but is dependent on the moisture level in the soil. 

E. Reviewer's Discussion and Interpretation of Study Results

The results of this study indicate that lindane in the 20% EC formulation does volatilize to the extent of 2-4% per day during the 6-8 days the experiment was carried out. The question still remains as to how long this volatilization would continue, since there was no apparent decline in volatility during the length of the experiment. Also, the rate of

volatilization was incorrectly calculated by the author and could not be determined by EAB given the information within the report. Thirdly, the reported units for the air concentration are wrong: the (/day) cancels out when performing the calculations. For example: air concentration = $\text{ug}/\text{m}^3 = 5.16\text{ug recovered/day divided by } .432\text{m}^3 \text{ N}_2 \text{ passed/day} = 11.94 \text{ ug}/\text{m}^3$

II.

A. Study Identification

Agrisearch Incorporated, THE VOLATILIZATION OF LINDANE FROM SOIL, Lindane: 25% Wettable Powder. Submitted by Rhone Poulenc, Inc. Morrmouth Junction, NJ, acting on behalf of Centre International d'Etudes du Lindane (C.I.E.L.). November 6, 1986, accession number 400673-03.

B. Materials and Methods

0.77 to 1.43 ppm A.I. was applied. See 10 I. B.

C. Reported Results

Analysis of the Miller Lindane 25% WP showed that the concentration was not 25% lindane a.i., but was 13.7% lindane.

Analyses of the polyurethane plugs and the residual soils are presented in table 3. At 100% relative humidity approximately 2-4% of the lindane dose was volatilized per day. The concentration of lindane in air was 9.33 to 20.9 $\text{ug}/\text{m}^3/\text{day}$ with a volatility of 9.33×10^{-6} to $2.09 \times 10^{-5} \text{ ug}/\text{cm}^3/\text{hour}$.

No detectable lindane was found to volatilize from the soil through which nitrogen at 0% relative humidity was passed.

See table 4 for recovery data.

D. Study Author's Conclusions

Results of these studies parallel the results on the volatility previously reported by others in which volatility was shown to be an important mode of lindane dissipation from soil. The combined volatility results of all three formulations indicate that the volatility of lindane from soil is independent of the formulation but is dependent on the moisture level in the soil.

E. Reviewer's Discussion and Interpretation of Study Results

The results of this study indicate that lindane in the 25% WP formulation does volatilize to the extent of 2-4% per day during the 6 days the experiment was carried out. The question still remains as to how long this volatilization would continue, since there was no apparent decline in volatility

during the length of the experiment. Also, the rate of volatilization was incorrectly calculated by the author and could not be determined by EAB given the information within the report. Thirdly, the reported units for air concentration were wrong: the (/day) cancels out when performing the calculations. See sample calculation in sec. 10 I.E.

III.

A. Study Identification

Agrisearch Incorporated, THE VOLATILIZATION OF LINDANE FROM SOIL, Lindane: 40% Flowable. Submitted by Rhone Poulenc, Inc. Monmouth Junction, NJ, acting on behalf of Centre International d'Etudes du Lindane (C.I.E.L.). November 6, 1986, accession number 400673-04.

B. Materials and Methods

1.41 to 1.58 ppm A.I. was applied. See 10 I. B.

C. Reported Results

Analysis of the Gustafson Lindane 40% flowable showed that the concentration was not 40% lindane a.i., but was 32% lindane.

Analyses of the polyurethane plugs and the residual soils are presented in table 5. At 100% relative humidity approximately 2-4% of the lindane dose was volatilized per day. The concentration of lindane in air was 19.0 to 19.5 ug/m³/day with a volatility of 1.90 to 1.95 x 10⁻⁵ ug/cm³/hour.

No detectable lindane was found to volatilize from the soil through which nitrogen at 0% relative humidity was passed.

See table 6 for recovery data.

D. Study Author's Conclusions

Results of these studies parallel the results on the volatility previously reported by others in which volatility was shown to be an important mode of lindane dissipation from soil. The combined volatility results of all three formulations indicate that the volatility of lindane from soil is independent of the formulation but is dependent on the moisture level in the soil.

E. Reviewer's Discussion and Interpretation of Study Results

The results of this study indicate that lindane in the 40% flowable formulation does volatilize to the extent of 2-4% per day during the 6 days the experiment was carried out. The question still remains as to how long this volatilization would continue, since there was no apparent decline in volatility during the length of the experiment. Also, the rate of volatilization was incorrectly calculated by the author and could not be determined by EAB given the information within the report. Thirdly, the reported units for air concentration were wrong: the (/day) cancels out when performing the calculations. See sample calculation in sec. 10 I.E.

11. COMPLETION OF ONE-LINER:

Not applicable.

12. CBI APPENDIX:

Not applicable.