9/17/87

Shaughnessy No.: 034401
Date out of EAB: SEP 17 1987

TO: I. Lachman
Product Manager 16
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 239-1633

Chemical Name: Naled

Type Product: Insecticide-Acaricide

Product Name: Dibrom 8E

Company Name: Chevron

Purpose: Review of laboratory volatility study required for reregistration of naled.

Action Code: 660 EAB # (s): 70927

Date Received: 9/1/87 Total Reviewing Time: 2 days

Date Completed: 9/14/87

Monitoring Study Requested: ____

Monitoring Study Volunteered: ____

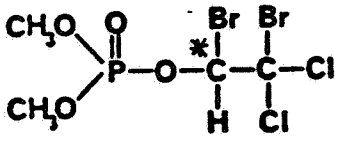
Deferrals to: ____ Ecological Effects Branch

____ Residue Chemistry Branch

____ Toxicology Branch

1. CHEMICAL:

chemical name: 1,2-dibromo-2,2-dichloroethyl dimethyl phosphate
common name: Naled
trade names: RE 4355, Bromex, Dibrom
structure:



physical/chemical properties:

physical state:	yellow liquid, slightly pungent odor
melting point:	26.5 - 27.5°C
boiling point:	110 °C
vapor pressure:	2 x 10^{-4} mm Hg at 20°C
solubility:	Practically insoluble in water. Freely soluble in aromatic and chlorinated hydrocarbons, ketones, alcohols. Sparingly soluble in petroleum solvents and mineral oils.

2. TEST MATERIAL:

[Ethyl-1-^{14}C] Naled with a specific activity of 20.3 mCi/mMole. The position of the ^{14}C label is shown by the asterisk. The formulated material was DIBROM 8E, an emulsifiable concentrate which contains 8 pounds naled per gallon.

3. STUDY/ACTION TYPE:

Review of laboratory volatility study required for reregistration of naled.

4. STUDY IDENTIFICATION:

Pack,D.E. Naled Volatility From Soil- Laboratory Study. Submitted and prepared by Chevron Chemical Company, Ortho Agricultural Chemicals Division, Richmond, CA. 1987. Received by EPA Sept. 1, 1987, no accession number.

5. REVIEWED BY:

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

Date: SEP 17 1987

6. APPROVED BY:

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

Date: SEP 17 1987

7. CONCLUSIONS:

This study does not meet EPA requirements for registering pesticides.

The trapping procedure used in this study is a poor method for trapping pesticides and does not afford the sensitivity required in these volatility studies.

An application rate of 2 lb ai/acre is more typical of an actual field application rate rather than the 1 lb ai/acre used in this study.

Only 80% of the applied radioactivity was accounted for.

8. RECOMMENDATIONS:

EAB recommends that the registrant repeat the study after first determining the best method for trapping naled and its degradates, especially DDVP. Perhaps, a polyurethane foam or an XAD resin would work better in this situation. References to these methods are given in the Guidelines. An initial methods verification study must be conducted to determine the best trapping method. The verification study, as well as a lab volatility protocol, should be submitted for EAB's review prior to repeating the laboratory volatility study.

9. BACKGROUND:

A. Introduction

In a previous review dated 8/5/86 (John Jordan), a question was raised by EAB concerning the trapping efficiency of the volatiles in the soil metabolism studies which were performed in 1980. A highly volatile degradate of naled, DDVP (vapor pressure of

1.2×10^{-2} at 20°C), was not trapped. The only volatile trapped in the ^{14}C-naled soil metabolism study was CO_2. This trapping procedure involved an ethanolamine:2-methoxyethanol trap and a 2-(2-ethoxyethoxy)ethanol trap.

Dr. Jordan commented in his review that it did not seem logical that only CO_2 was trapped and not DDVP since DDVP was a soil metabolite, was found in all soils at the 1.3 ppm level within 24 hours, and has a high vapor pressure.

Due to this question concerning the trapping methods used in the soil metabolism studies, the Agency required a methods verification for the volatiles trapping procedure as well as a laboratory volatility study. This review addresses the submitted laboratory volatility study.

B. Directions for Use

Naled is a nonsystemic insecticide-acaricide registered for use on field, vegetable, and orchard crops; livestock and poultry and their surroundings; greenhouses; forest and wasteland; agricultural, domestic, medical, and commercial establishments; and urban and rural outdoor areas (mosquito control). Of the naled applied in the United States, the major use sites are: fruit, nut, vegetable, and field crops (50%); mosquito control (35%); dog flea collars (10%); and livestock (5%). Naled is formulated into dusts, impregnated materials, emulsifiable concentrates, and ready-to-use liquids. Naled is applied by using aircraft and ground equipment including mist sprayers and foggers. Applicators need not be certified to apply naled.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

A. Study Identification

Pack,D.E. Naled Volatility From Soil- Laboratory Study. Submitted and prepared by Chevron Chemical Company, Ortho Agricultural Chemicals Division, Richmond, CA. 1987. Received by EPA Sept. 1, 1987, no accession number.

B. Materials and Methods

The formulated material used was DIBROM 8E, an emulsifiable concentrate which contains 8 pounds naled per gallon.

The [ethyl-1-^{14}C] naled was prepared by New England Nuclear, Boston, MA and had a specific activity of 20.3 mCi/mMole. Just before use, it was cleaned up by preparative thin-layer chromatography. The TLC purity check showed that the radiochemical purity of the ^{14}C-naled was 99.2%.

^{14}C-DDVP, ^{14}C-DCAA, and ^{14}C-DCE were used as HPLC reference standards. (see figure 1 for structures)

The soil was a sand soil from Florida.

% sand: 92	pH: 7.2
% silt: 6	CEC: 3.6 meq/100 g
% clay: 2	bulk density: 1.52 g/ml
% organic: 1.8	

The apparatus consisted of a source of compressed air, a flow meter, a water bubbler to saturate the air with water, a relative humidity meter, a 250 ml erlenmeyer flask containing the treated soil, a fritted glass bubbler containing 100 ml methanol and a second bubbler containing 100 ml of a 6:4 (v/v) mixture of 2-methoxyethanol and ethanolamine. The section of the system from the flow meter to the treated soil was kept in an incubator at 25°C.

Two soil samples of 50 g (dry weight) were treated with the naled formulation, in water, equivalent to about 400 ug labeled naled (4.28×10^7 dpm). This is equivalent to about 1 lb ai/acre. The system was then closed and the air flow started at 100 ml/min. The scrubber solutions were changed every 24 hours.

The study was terminated after 14 days when the amounts of radioactivity in the traps had decreased considerably. The scrubber solutions were removed for counting. The methanol solutions contained significant quantities of radioactivity and and were further analyzed.

All chemical analyses were done by HPLC with a radioactive flow detector.

C. Reported Results

Analysis of the scrubber solutions showed that in 14 days a total of 21% of the ^{14}C dose had been collected in the methanol scrubber and 59% in the CO_2 scrubber.

Analysis showed that none of the volatilized radioactivity was naled.

Analysis also showed that the two other known soil metabolites, DDVP and DCAA, were not detected in the scrubber solutions.

The non-CO_2 volatile radioactivity was shown to be DCE.

D. Study Author's Conclusions

No volatilization of naled was detected in this study. Thus, naled does not volatilize from soil. DDVP and DCAA also do not volatilize from soil.

E. Reviewer's Discussion and Interpretation of Study Results

The results of the study show that after 14 days a total of 21% of the ^{14}C dose was volatile organics and 59% was CO_2. The volatile organic metabolite was said to be 2,2-dichloroethanol. Naled was not detected.

Only 79.8% of the ^{14}C dose has been accounted for. Where is the remaining 20%? Could it be volatiles that were not trapped? Is it still in the soil?

The trapping procedure used in this study is of a concern to EAB. The liquid impinger traps used were a poor choice to trap DDVP and other pesticides. With this procedure, gas flow rates are limited and water tends to impede trapping. Perhaps, a polyurethane foam trap or an XAD resin would be advantageous in this situation. An initial method verification study was required by EAB and should be performed to determine the best trapping method before the actual laboratory volatility study is repeated.

When this study is repeated, it is suggested that a posttreatment soil sample be taken to confirm the application rate. Also, the soil should be sampled at the completion of the experiment in order to complete the material balance results.

11. COMPLETION OF ONE-LINER:

One-liner not amended.

12. CBI APPENDIX:

Not applicable.

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Figure 1

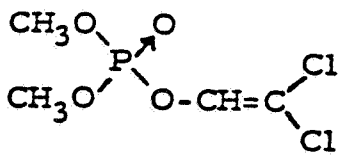
DV (Dichlorvos)		2, 2-Dichlorovinyl dimethyl phosphate
DCAA	$Cl_2CH\text{-}COOH$	Dichloroacetic acid
DCE	$Cl_2CH\text{-}CH_2OH$	2, 2-Dichloroethanol

TABLE 2

[ETHYL-1-^{14}C]NALED VOLATILITY

CO_2 AND ORGANIC VOLATILES

INTERVAL -- DAYS	CO_2 DPM	CO_2 SUM % OFF	ORGANIC DPM	ORGANIC SUM % OFF	TOTAL % DOSE OFF
1	6249228	14.6	3216932	7.5	22.1
2	5878763	28.3	2255807	12.8	41.1
3	4718955	39.4	1016435	15.2	54.5
4	3454366	47.4	583229	16.5	64.0
5	2472294	53.2	422905	17.5	70.7
6	1657448	57.1	317613	18.3	75.3
7	198614	57.5	247146	18.8	76.4
8	268868	58.2	187361	19.3	77.4
9	108236	58.4	209037	19.8	78.2
10	80253	58.6	124442	20.0	78.7
11	67177	58.8	119320	20.3	79.1
12	49148	58.9	26713	20.4	79.3
13	43609	59.0	85517	20.6	79.6
14	38904	59.1	73047	20.8	79.8

TABLE 3

[ETHYL-1-^{14}C]NALED VOLATILITY

TOTAL RADIOACTIVITY VOLATILIZED AS ORGANICS

INTERVAL DAYS	DPM FOUND	RATE OF LOSS ug/hr	RATE OF LOSS ug/cm^2/hr	RATE OF LOSS % OF DOSE PER HR	AIR CONC ug/m
1	3216932	1.13	0.0315	0.313	189
2	2255807	0.79	0.0221	0.220	132
3	1016435	0.36	0.0099	0.099	60
4	583229	0.21	0.0057	0.057	34
5	422905	0.15	0.0041	0.041	25
6	317613	0.11	0.0031	0.031	19
7	247146	0.09	0.0024	0.024	15
8	187361	0.07	0.0018	0.018	11
9	209037	0.07	0.0020	0.020	12
10	124442	0.04	0.0012	0.012	7
11	119320	0.04	0.0012	0.012	7
12	26713	0.01	0.0003	0.003	2
13	85517	0.03	0.0008	0.008	5
14	73047	0.03	0.0007	0.007	4
AVERAGE	634679	0.22	0.0062	0.062	37

Note: ug calculated as naled

Values in table are based on the following data:

Specific activity	118340	DPM/ug
Dose	42800000	DPM
=	361.7	ug
Soil area	36	cm^2
Treatment rate	10.0	ug/cm^2
Air flow	0.144	m^3/Day