034401

2/18/82

COPY

Date Out of EFB: FEB 18 1982

To: William Miller
Product Manager 16
Registration Division (TS-767)

From: Dr. Willa Garner, Chief
Review Section No. 1
Environmental Fate Branch
Hazard Evaluation Division (TS-769)

Attached please find the environmental fate review of:

Reg./File No.: 239-1633

Chemical: Naled

Type Product: Insecticide

Product Name: Dibrom

Company Name: Chevron

Submission Purpose: Review of Soil Metabolism Study

ZBB Code: other

ACTION CODE: 400

Date In: 11/2/81

EFB # 46

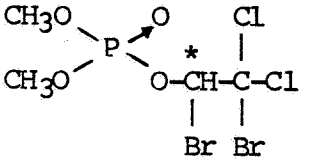
Date Completed: 2/14/82

TAIS (level II)	Days
60	3

1.0 INTRODUCTION

On October 2, 1981, Chevron submitted for review the following soil metabolism study, to bring its Naled data base "up to current technical standards for reregistration."

2.0 STRUCTURE



Naled: 1,2-dibromo-2,2-dichloroethyl dimethyl phosphate
(* = site of ^{14}C-radiolabel)

See Table 1 (appended to this review) for structures of possible degradates and metabolites identified by the registrant.

3.0 DIRECTIONS FOR USE

See previous reviews.

4.0 REVIEW OF:

Pack, D.E., B.V. Tucker and H.G. Franke. 1980. The Soil Metabolism of ^{14}C-Naled (DIBROM). Research and Development, Ortho Agricultural Chemicals Division, Ortho Agricultural Chemicals Division, Chevron Chemical Company. November 25, 1980. (Confidential)

4.1 Experimental

[Ethyl-1-^{14}C] naled was prepared with a specific activity of 2.67 mCi/mMole. Due to its known rapid rate of degradation, it was cleaned up by preparative TLC immediately prior to use. At that time, the radiopurity was estimated to have been >= 99%.

The soil used was an Oakley loamy sand. Characteristics are summarized in Table 2, appended to this review. Soil was stored in one-pint mason jars for about 2 months prior to fortification. If destined for the anaerobic portion of the study, the soil was flooded with distilled water, flushed with nitrogen, then stored sealed until needed.

Twenty-five gram aliquots of soil (dry weight basis) were brought to 80% of field moisture capacity. If destined for the anaerobic portion of the study, the soil was purged with nitrogen for 10 days prior to fortification.

The soils were fortified with 12 ppm (dry weight basis) ^{14}C-naled (4.67E6 dpm) in 28 ul acetone. The anaerobic soils were continuously purged with N_2 during fortification.

The vapor trapping system used is outlined schematically in figure 2, appended to this review. The adsorbant was 10 ml of ethanol/2-methoxyethanol (2:3 v/v), which was changed every 2-3 days during the first 2 months, then approximately weekly thereafter. Collection of radio-CO_2 was terminated after about 1 year. During all phases of the experiment, the temperature was maintained at 25°C.

At various times, duplicate soil samples were taken for analysis. Extraction consisted of blending with methanol, centrifugation, decantation, and reextraction (for a total of 3 times). Quantification was by LSC. Counting efficiency was estimated by have been about 81%.

The extracted soils were further processed by acidification, aqueous extraction, and LSC quantification.

Aliquots of each extract were subjected to two-dimensional TLC for identification of degradates and metabolites. Mobile phases were chloroform/acetic acid (4:1 v/v) followed by chloroform/acetic acid (1:1 v/v). Spots were locate by autoradiography utilizing Kodak type SB-5 film. Spots were scraped off, and subjected to LSC quantification. An idealized TLC plate is shown in figure 1I, appended to this review.

Some of the degradates/metabolites were further identified by GC/MS (Finnigan 4023/Incos data system)

4.2 Results and Discussion

The liberation of ^{14}C-CO_2 as a function of time is shown graphically in Figure 4, appended to this review. Approximately half the applied naled was liberated as CO_2 within 3 days under aerobic conditions, and within 6 days under anaerobic conditions. After about one week, the rate of CO_2 liberation decreased drastically, with only minor quantities being liberated up to the end of the experiment (1 year). No non-CO_2 volatiles were detected.

With time the percentage of soil-unextractables increased. In the anaerobic experiment, this level was significantly higher than in the aerobic experiment.

The major metabolite was identified as dichloroacetic acid in both experiments.

4.3 Conclusions

Under the conditions of the experiment, naled degraded rapidly both aerobically and anaerobically, with the liberation of CO_2. Half-degradation times were 3 and 6 days, respectively, with the major soil degradate being dichloroacetic acid. No other volatiles could be detected.

Naled, and its degradates quickly became tightly bound to the soil, and were mostly unextractable after the first few weeks. This would suggest extremely low potential for leaching, at least in this soil type.

5.0 CONCLUSIONS

The reporting of the soil residue data is confused, as is the material balance. However, the study did appear to have been done thoroughly and carefully. The reported half-degradation times should be valid.

6.0 RECOMMENDATION

This study is acceptable.

Emil Regelman
Chemist
EFB/HED (TS-769)
February 14, 1982

TABLE 1

Codes, Structures, Chemical Names and
TLC R_f's of Compounds Used in this Study

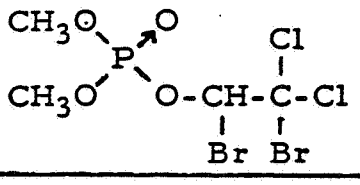
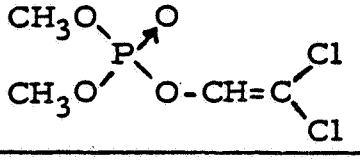
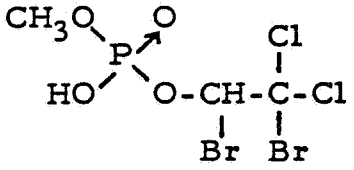
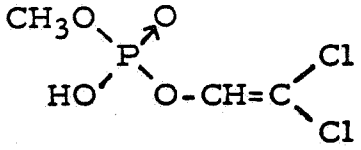
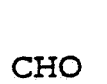
CODE	STRUCTURE	CHEMICAL NAME	TLC R_f's A*	B*
NA (Naled)		1, 2-Dibromo-2, 2-dichloroethyl dimethyl phosphate	0.89	0.90
DV (Dichlorvos)		2, 2-Dichlorovinyl dimethyl phosphate	0.81	0.82
DeMe-Na		1, 2-Dibromo-2, 2-dichloroethyl dimethyl phosphoric acid	0.15	0.56
DeMe-Dv		2, 2-Dichlorovinyl methyl phosphoric acid	0.10	0.52
DCAA	Cl_2CH-COOH	Dichloroacetic acid	0.22	0.51
DCA	Cl_2CH-CHO	Dichloroacetaldehyde	---	---
BDCA	$BrCl_2C$-CHO	Bromodichloroacetaldehyde	0.63	0.64
DCE	Cl_2CH-CH_2OH	2, 2-Dichloroethanol	---	---
OxA		Oxalic acid	0	0
GxA		Glyoxylic acid	0.07	0.20

TABLE 1 (cont.)

Codes, Structures, Chemical Names and
TLC R_f's of Compounds Used in this Study

CODE	STRUCTURE	CHEMICAL NAME	TLC R_f's	
			A*	B*
GcA	CH_2-OH | COOH	Glycolic acid	0.10	0.36
EG	CH_2-OH | CH_2-OH	Ethylene glycol	0.16	0.44

* TLC Solvent systems

A - Chloroform - Acetic Acid (4:1 v/v)
B - Chloroform - Acetic Acid (1:1 v/v)

TABLE 2

SOIL PROPERTIES

Source	Oakley, CA
Series	Oakley
Classification	Sandy loam
% sand	85
% silt	6
% clay	9
% organic matter	1.4
pH	7.3
Water Holding Capacty (%)	2.4
Cation Exch. Cap. (meq/100 g)	7.5

FIGURE 2

$^{14}CO_2$ Collection Apparatus

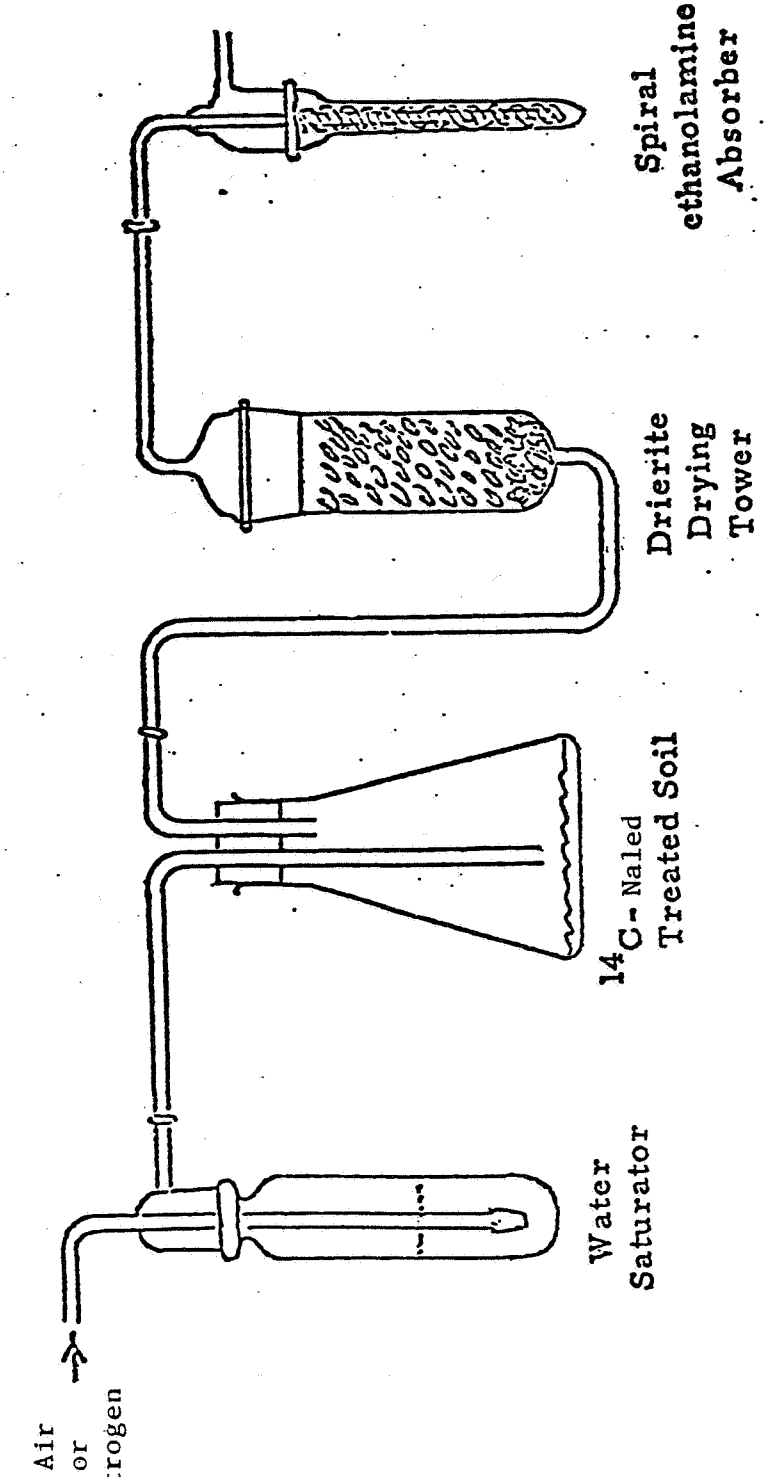


Figure 4

LIBERATION OF $^{14}CO_2$

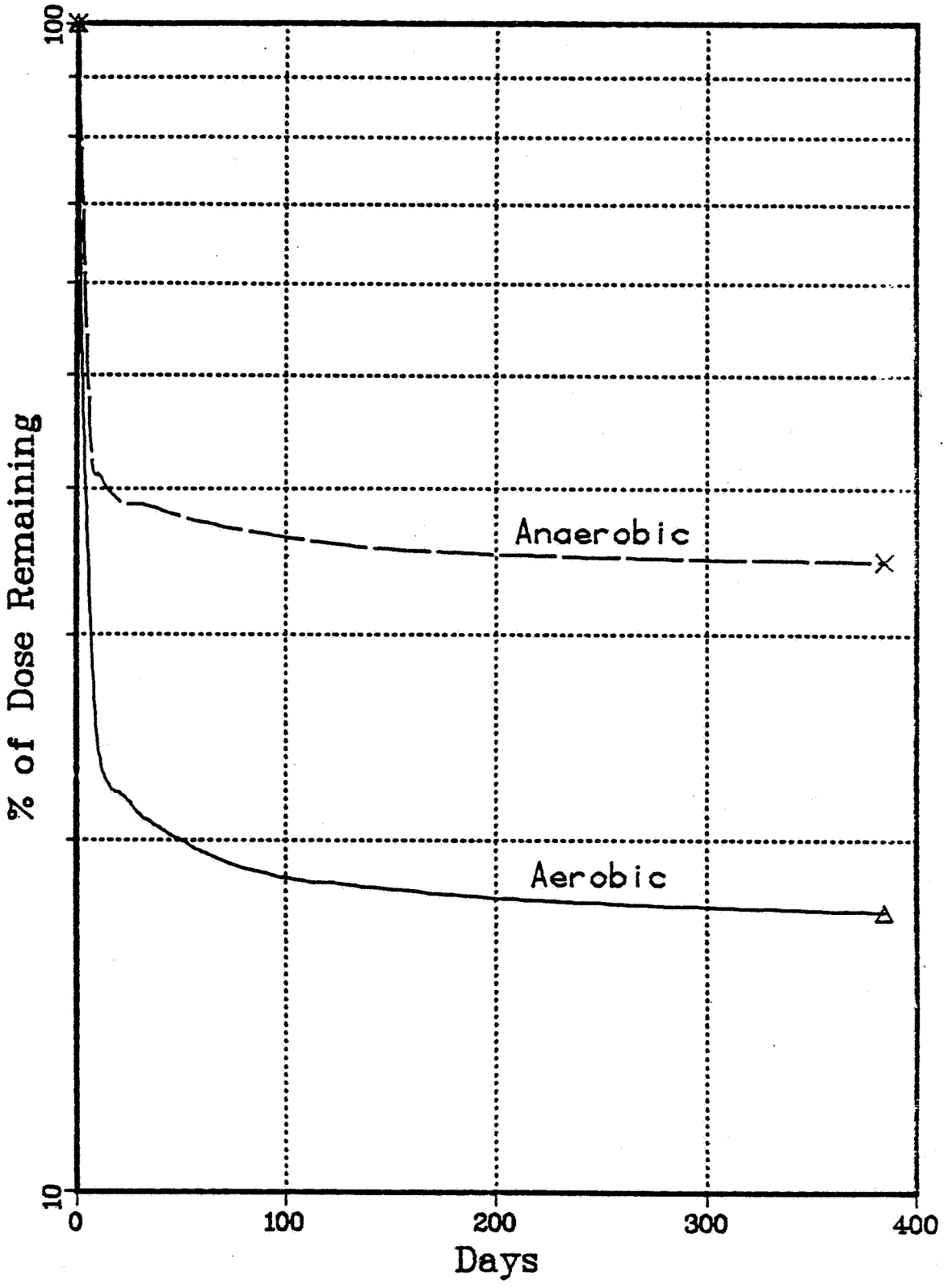


Figure 11

Idealized Composite Chromatogram