

NOV 04 1980

FILE COPY

To: Chief, Ecological Effects Branch
Hazard Evaluation Division

Thru: Chief, Review Section No. 1
Environmental Fate Branch, HED

From: Review Section No. 1
Environmental Fate Branch, HED

Samuel Creeger (Acting Chief)

Reinert

Attached find environmental fate information and/or EEC(s) requested for:

Chemical: thiodicarb

Product Name: Larvin 500

Use Pattern for EEC Calculations: cotton/soybeans

Date in: 10/15/80

Date out: NOV 04 1980

EEC/EFPP#: 35

Environmental Fate Information

Aqueous Solubility. 35 ppm at 25°C.

Photodegradation. In a pH 6 buffered solution, thiodicarb at 5 ppm had a photolytic half-life of 80 days. Methomyl was the principal photoproduct. On the soil surface, thiodicarb at a concentration equivalent to 1 lb/A had a half-life of 5 days, with methomyl and methomyl oxime the principal photodegradates.

soil metabolism/dissipation. The half-life of thiodicarb in soil at 25°C is less than one-half week under both aerobic or anaerobic conditions. Methomyl is the main degradate.

octanol-water partition coefficient. $K_{ow} = 45$ at 25°.

aquatic metabolism/dissipation, forest ecosystem, fish accumulation.

no information on file.

Aquatic EECs

The following assumptions were made. Thiodicarb was applied 10 times at the maximum rate of 0.9 lb ai/A/appl. at 14 day intervals. Soon after the final application a severe runoff event occurred, draining 100 A of treated fields into the aquatic matrices. Both spray drift and runoff are considered in the calculations. The pond and stream hydrosols were assumed to contain 2% OM. Calculations were made both for parent thiodicarb (TD) and for the principal degradate methomyl (M). The following first order degradation rate constants were used in the calculations:

	<u>k (day⁻¹)</u>
TD (terrestrial)	
TD (aquatic)	0.14
M (foliage)	0.0028
M (soil)	5.54
M (aquatic)	0.023
	0.1

Soil-water partition coefficients, accumulated residues, lake EECs, and EXAMS inputs for stream calculations were calculated with the HR59-EEC program. Stream EECs were generated by EXAMS.

max. EECs in a 3A x 4 ft. lake (ppm)

	<u>water</u>	<u>hydrosoil</u>
TD	0.03	0.5
M	0.008	0.001

max. EECs in a small (10CFS) stream (ppm)

	<u>water</u>	<u>hydrosoil</u>
TD	0.001	0.02
M	0.0005	0.00007

J C Reinert

UNITED STATES ENVIRONMENTAL PROTECTIC

AGENCY

10/15/80

ALVARO YAMHURE

557-0320

DATE:

Request for Estimated Environmental Concentration(s) and Fate Data

SUBJECT:

for: LARVIN INSECTICIDE OR:DIMETHYL N-N'-[ETHIOBIS[CMETHYLIMINO) CARBOXYLOXY]]
BIS[ETHANETHIOBIS[CMETHYLIMINO) CARBOXYLOXY]]

FROM:

Chief, Ecological Effects Branch

TO:

Chief, Environmental Fate Branch

The Registration Division (RD) has requested the Ecological Effects Branch (EEB) to review LARVIN 95% TECHNICAL AND LARVIN 500 for use on: FORMULATIVE USE ONLY AND COTTON/SOYBEANS. The product name(s) and registration number(s) are: SEE ABOVE - REG. NO. - 264846.

In order to complete this review EEB requires certain environmental fate data and (an) Estimated Environmental Concentration(s) (EEC's) from the Environmental Fate Branch (EFB) for the parent compound(s) (and major degradates/metabolites, when appropriate). 1/ Specifically, EEB requires the following data for the proposed pesticide(s) and use pattern(s):

A. Physical - Chemical Properties1. Structure

Structure of the parent compound(s) and major metabolites/degradates. _____

2. Solubility

Solubility of the pesticide(s) (i.e., active ingredient(s) and formulation(s)) in water and other solvents. _____ ✓

3. Volatility

The vapor pressure of the pesticide(s) (i.e., active ingredient(s) and formulation(s)). _____

4. Specific Gravity

Specific gravity of the formulation(s) proposed for registration. _____

B. Degradation/Metabolism/Field Dissipation1. Hydrolysis

Half-life results or estimates for parent compound (and degradates, if possible) under acidic, neutral, and basic conditions. Identification of hydrolysis products.

P.S. PLEASE GIVE ONLY CIRCLED DATA.

2. Photodegradation (Pls. give clearly in days and include pH, temperature etc).

Half-life results or estimates for parent compound (and degradates, if possible) in water, soil, and vapor phase; identification of photoproducts in water, soil, and vapor phase. ✓

3. Soil Metabolism/Field Dissipation

Brief description of dissipation of parent compound (and degradates/metabolites, if possible) in soils (aerobic and anaerobic conditions) under typical field use situations. Identification of residues, decline curves, accumulation, half-life results, → only. metabolites/degradates, and mobility characteristics from laboratory and/or field studies.

4. Aquatic Metabolism/Field Dissipation

Brief description of dissipation of parent compound (and degradates/metabolites, if possible) in aquatic sites (aerobic and anaerobic conditions) likely to be exposed under typical field use situations. Identification of residues, decline curves, accumulation, half-life results, metabolites/degradates, and mobility characteristics from laboratory and/or field studies. ✓

5. Microbial

Identification of organisms responsible for degradation and degree (where possible); identification of effects of pesticides on microbes.

6. Animal Metabolism

Brief description of major metabolic pathways in animals. Identification of location of stored residues, rate of residue elimination, metabolites, and accumulation, if any.

7. Activated Sludge

Determination if pesticide is expected to disrupt treatment process; determination if pesticide is likely to be discharged in effluent.

8. Forest Ecosystem

Brief description of dissipation of parent compound (and degradates/metabolites, if possible) in forests under typical use conditions. Identification of residues, decline curves, accumulation, half-life results, metabolites/degradates, and mobility characteristics in appropriate forest environments. ✓

C. Mobility

1. Leaching/Runoff/Volatility

Categorization of the pesticide (parent compound, formulation, and/or degradates/metabolites) as having low, medium, or high potential to leach, runoff, or volatilize under typical use conditions. Identification of degradates/metabolites occurring from leaching, runoff, or volatilization.

2. Adsorption/Desorption

Soil/water partition coefficient results at various concentrations.

3. Water Dispersal

Identification of residues, including extent and duration, in water at selected distances from sites of application.

D. Accumulation

1. Rotational/Irrigated Crops and Nontarget Plants

Brief description of residue uptake in crops and/or nontarget plants. Identification of residues, accumulation, decline curves, and metabolites.

2. Fish Accumulation

(If Available)

Brief description of fish accumulation results. Identification of organism(s) tested and test conditions; identification and quantification of residues in water and organism(s) (whole body, edible tissue, viscera) exposed; determination of time of maximum accumulation and occurrence of plateaus, if any; description of withdrawal results.

3. Octanol/Water

Partitioning coefficient results or equivalent from chromatographic method.

E. Estimated Environmental Concentration(s)

1. Estimated Residues in Terrestrial Environment

a. Foliar Residues

Estimated foliar residue(s) for the parent compound(s) (and major degradates/metabolites, when appropriate) in/on the following mammalian or avian food items likely to be exposed to application(s) of the pesticide(s):2/ (Also, determination of the extent and duration (including frequency of occurrence) of such residue(s).)

- i. Short Grasses
- ii. Long Grasses
- iii. Leaves and Leafy Items
- iv. Dense Foliage
- v. Pods Containing Seeds
- vi. Grain and Seeds
- vii. Fruit
- viii. Nuts

~~_____~~ *no.*

b. Soil Residues

Estimated residue(s) for the parent compound(s) (and major degradates/metabolites, when appropriate) in soils found under typical use situations. Also, determination of the extent and duration (including frequency of occurrence) of such residue(s) and identification of soil type.

- 0.1 Inch Soil Depth
- 1.0 Inch Soil Depth
- 1.1-3.0 Inch Soil Depth
- >3.0 Inch Soil Depth

2. EEC's in Aquatic Environment

a. EEC's in Water ✓

(P/s. CONCENTRATE ON THIS AREA CAREFULLY).

EEC's for the parent compound(s) (and major degradates/metabolites, when appropriate) in the following aquatic sites likely to be exposed to application(s) of the pesticide(s): (Also, determination of the extent and duration (including frequency of occurrence) of such EEC's.)

i. Lentic Situations

- (1) Small Pond (<1 Acre; _____ Depth)
- (2) Larger Pond (1-5 Acres; ☒ _____ Depth) *4-6ft.*
- (3) Lake (>5 Acres; _____ Depth) _____

ii. Lotic Situations^{3/}

- (1) Small Stream (2 CFS)
(2) Larger Stream (CFS)
(3) River (CFS)

10
OR 898 cpm

✓ B. Residues in Hydrosol

Estimated residues for the parent compound(s) (and major degradates/metabolites, when appropriate) in hydrosols associated with the aquatic sites of (2)(a)(i) and (ii) above. Also, determination of extent and duration (including frequency of occurrence) of such residue(s) and identification of composition of hydrosol. ✓

In closing, note that EEB began review on 10/9/80 and expects to complete the review by approximately 11/9/80. Your projected completion date is requested to permit any needed amendment to our projected completion date.

Norman Cook for CB 10-15-80
Clayton Bushong

C.C. A. Yarnhouse
N. Cook

Footnotes

- 1/ EEB will require EEC's for the major metabolites/degradates from EFB when EEB determines that these compounds may be toxicologically significant to nontarget organisms. In such cases, EEB will notify EFB that such EEC's are required to complete a review.
- 2/ The mammalian and avian food items include but are not limited to the following (Collins, 1959; Crawford et. al., 1969; Gusey and Maturgo, 1972; Hoerger and Kenaga, 1972; Leopold, 1933; Martin et. al., 1951):
 - i. Short Grasses: range grasses, short turf grasses;
 - ii. Long Grasses: pasture/hay grasses;
 - iii. Leaves and Leafy Items: apple leaves, bean leaves, pear leaves, cabbage, lettuce;
 - iv. Dense Foliage: alfalfa, trefoil, clover;
 - v. Pods Containing Seeds: beans, peas;
 - vi. Grain and Seeds: barley, wheat, oats, rice, ragweed, pigweed, lespedeza;
 - vii. Fruits: holly, grape, blueberry, chokeberry;
 - viii. Nuts: acorns, pecans, beech nuts.
- 3/ When possible, EEB will provide EFB with average flow rates (in cfs) per day.

Bibliography

Collins, Henry Hill, Jr., Complete Field Guide To American Wildlife: East, Central and North, Harper and Row, Publishers, New York, 1959, 683 p.

Crawford, Hewlette S., et. al., Ozark Range and Wildlife Plants, Agric. Handbook No. 356, USDA, Forest Service, January, 1969, 236 p.

Gusey, William F., and Zenaida D. Maturgo, Wildlife Utilization of Croplands; Environmental Conservation Dept., Shell Oil Company, Houston, Texas, November, 1972, 278 p.

Hoerger, F.D., and E.E. Kenaga, Pesticide Residues on Plants. Correlation of Representative Data as a Basis for Estimation of Their Magnitude in the Environment, Environmental Quality, Academic Press, New York, I: 9-28, 1972.

Leopold, Aldo, Game Management, Charles Scribner's Sons, N.Y., 1933, 481 p.

Martin, Alexander C., et. al., American Wildlife and Plants: A Guide to Wildlife Food Habits, Dover Publ., Inc., N.Y., 1951, 500 p.

TD-3A prod

CLR
CLR

35.	STO	9
35.		
359.	STO	10
359.		
0.02	STO	11
0.02		
0.02	RCL	9
35.		
35.	x	
1000.	=	
35000.		
35000.	÷	
35000.	RCL	10
359.		
359.	=	
97.49303621		
97.49303621	LOG	
1.988973596		
1.988973596	x	
0.56	=	
1.113825214		
-1.113825214	+	
4.	=	
2.886174786		
2.886174786	STO	12
2.886174786		
10.	yx	
10.	RCL	12
2.886174786		
2.886174786	=	
769.4400472		
769.4400472	x	
769.4400472	RCL	11

11

359.	=
97.49303621	
97.49303621	LOG
1.988973596	
1.988973596	x
0.56	=
1.113825214	
-1.113825214	+
4.	=
2.886174786	
2.886174786	STD
	12
2.886174786	
10.	yx
10.	RCL
	12
2.886174786	
2.886174786	=
769.4400472	
769.4400472	x
769.4400472	RCL
	11
0.02	
0.02	=
15.38880094	
15.38880094	STD
	0
15.38880094	
Kd	R/S

1.26	STD
	1
1.26	
100.	STD
	2
100.	
0.02	STD
	3
0.02	
0.	STD
	4
0.	
100.	STD
	5
100.	
0.5	STD
	6
0.5	
3.	STD
	7
3.	
4.	STD
	8

4.	
4.	
1.3408107	00
1.1791893	00
4.6904906	-01

12

97.49303621	
97.49303621	LOG
1.988973596	
1.988973596	X
0.56	=
1.113825214	
-1.113825214	+
4.	=
2.886174786	
2.886174786	STD
	12
2.886174786	
10.	
10.	RCL
	12
2.886174786	
2.886174786	=
769.4400472	
769.4400472	
769.4400472	RCL
	11
0.02	
0.02	=
15.38880094	
15.38880094	STD
	0
15.38880094	

Kd

R/S

1.26	STD
	1
1.26	
100.	STD
	2
100.	
0.02	STD
	3
0.02	
0.	STD
	4
0.	
100.	STD
	5
100.	
0.5	STD
	6
0.5	
3.	STD
	7
3.	
4.	STD
	8
4.	
4.	
1.3408107 00	
1.1791893 00	
4.6904906-01	

3.04/989/02222
5.3909314 00

M-3A

0.074 STD
1

0.074
0.05 STD
3

0.05
58000. STD
9

58000.
162. STD
10

162.
0. PRT

.1551810648
3.667475-01
3.2524992-03
1.2937547-03
8.3370653-03
5.3909314 00

M EXAMS

0.
0.0247
0.0247
0.0247 STD

0.0247
0.75 x
3.28 =
2.46.
2.46 - STD

B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 9. DAYS.

EXAMS >

EXAMS >

11st 16

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS.

CHEMICAL: METHOMYL

ECOSYSTEM: CSTREAM(10CFS)

SIMULATION OF SYSTEM RESPONSE AFTER LOAD CEASES

TIME HOURS	AVERAGE POLLUTANT CONCENTRATIONS				MASS OF POLLUTANT	
	WATER COLUMN		BOTTOM SEDIMENTS		WATER COL	SEDIMENTS
	FREE(MG/L)	SED(MG/KG)	PORE(MG/L)	SED(MG/KG)	TOTAL KG	TOTAL KG
0.	4.73E-04	7.33E-05	4.73E-04	7.33E-05	1.064E-04	3.77E-06
1.	3.42E-08	5.31E-09	4.70E-04	7.28E-05	7.704E-09	3.75E-06
2.	-2.17E-08	-3.37E-09	4.66E-04	7.22E-05	-4.892E-09	3.71E-06
3.	1.31E-07	2.03E-08	4.62E-04	7.16E-05	2.948E-08	3.68E-06
4.	6.32E-08	9.80E-09	4.58E-04	7.10E-05	1.422E-08	3.65E-06
5.	2.55E-08	3.95E-09	4.55E-04	7.05E-05	5.730E-09	3.63E-06
6.	-2.38E-08	-3.69E-09	4.51E-04	6.99E-05	-5.349E-09	3.60E-06
7.	1.28E-08	1.99E-09	4.47E-04	6.93E-05	2.887E-09	3.57E-06
8.	6.93E-08	1.07E-08	4.44E-04	6.87E-05	1.559E-08	3.54E-06
9.	9.87E-09	1.53E-09	4.40E-04	6.82E-05	2.220E-09	3.51E-06
10.	5.14E-08	7.97E-09	4.36E-04	6.76E-05	1.156E-08	3.48E-06
11.	2.14E-08	3.31E-09	4.33E-04	6.71E-05	4.806E-09	3.45E-06
12.	-4.84E-08	-7.50E-09	4.29E-04	6.65E-05	-1.089E-08	3.42E-06

EXAMS >

11st 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS.

CHEMICAL: METHOMYL

ECOSYSTEM: CSTREAM(10CFS)

EXPOSURE ANALYSIS SUMMARY

EXPOSURE:

A. MAXIMUM CONC. IN WATER COLUMN: 4.7E-04 MG/L DISSOLVED, 4.7E-04 TOT

MAX. CONC. IN BOTTOM SEDIMENT: 4.7E-04 MG/L DISSOLVED IN PORE WATER

B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: .0 UG/G

BENTHOS: .0 UG/G

C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: 2.5E-04 MG/KG (DRY WEIGHT) ??

FATE:

A. TOTAL STEADY-STATE ACCUMULATION: 1.1E-04 KG; 96.58% IN WATER COL.,
3.42% IN BOTTOM SEDIMENTS.

B. TOTAL LOAD: 4.8E-04 KG/HOUR - DISPOSITION: 0.0 % VIA CHEMICAL
TRANSFORMATIONS, 0.0 % BIOTRANSFORMED, 0.0 % VOLATILIZED,
100.00% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

A. AT THE END OF A 12.0 HOUR RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 100.00% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 9.22% OF THEIR INITIAL BURDEN (96.89% REMOVAL OVERALL).

B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 15. HOURS.

EXAMS >

exit

$$\frac{7.33 \times 10^{-5}}{4.73 \times 10^{-4}}$$

15

EXAMS >

list 16

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS.
CHEMICAL: THIODICARB
ECOSYSTEM: CSTREAM(10CFS)

SIMULATION OF SYSTEM RESPONSE AFTER LOAD CEASES

TIME HOURS	AVERAGE POLLUTANT CONCENTRATIONS				MASS OF POLLUTANT	
	WATER COLUMN		BOTTOM SEDIMENTS		WATER COL	SEDIMENTS
	FREE(MG/L)	SED(MG/KG)	PORE(MG/L)	SED(MG/KG)	TOTAL KG	TOTAL KG
0.	1.12E-03	1.73E-02	1.12E-03	1.73E-02	2.523E-04	2.69E-04
1.	1.47E-06	2.28E-05	1.11E-03	1.72E-02	3.321E-07	2.68E-04
2.	1.41E-06	2.19E-05	1.10E-03	1.71E-02	3.189E-07	2.65E-04
3.	1.45E-06	2.25E-05	1.09E-03	1.69E-02	3.280E-07	2.63E-04
4.	1.40E-06	2.16E-05	1.08E-03	1.68E-02	3.149E-07	2.61E-04
5.	1.39E-06	2.15E-05	1.07E-03	1.67E-02	3.130E-07	2.59E-04
6.	1.33E-06	2.06E-05	1.07E-03	1.65E-02	2.993E-07	2.57E-04
7.	1.35E-06	2.10E-05	1.06E-03	1.64E-02	3.058E-07	2.55E-04
8.	1.46E-06	2.26E-05	1.05E-03	1.63E-02	3.293E-07	2.53E-04
9.	1.34E-06	2.08E-05	1.04E-03	1.61E-02	3.034E-07	2.51E-04
10.	1.36E-06	2.10E-05	1.03E-03	1.60E-02	3.061E-07	2.49E-04
11.	1.36E-06	2.11E-05	1.02E-03	1.59E-02	3.073E-07	2.47E-04
12.	1.40E-06	2.17E-05	1.01E-03	1.57E-02	3.160E-07	2.45E-04

EXAMS >

list 17

AERL-ESB MODEL OF FATE OF ORGANIC TOXICANTS IN AQUATIC ECOSYSTEMS.
CHEMICAL: THIODICARB
ECOSYSTEM: CSTREAM(10CFS)

EXPOSURE ANALYSIS SUMMARY

EXPOSURE:

- A. MAXIMUM CONC. IN WATER COLUMN: 1.1E-03 MG/L DISSOLVED, 1.1E-03 TOT
MAX. CONC. IN BOTTOM SEDIMENT: 1.1E-03 MG/L DISSOLVED IN PORE WATER
- B. BIOSORPTION - MAX. CONCENTRATION - PLANKTON: .0 UG/G
BENTHOS: .0 UG/G
- C. MAXIMUM TOT. CONC. IN SEDIMENT DEPOSITS: 1.8E-02 MG/KG (DRY WEIGHT)
- FATE:

- A. TOTAL STEADY-STATE ACCUMULATION: 5.2E-04 KG; 48.35% IN WATER COL.,
51.65% IN BOTTOM SEDIMENTS.
- B. TOTAL LOAD: 1.1E-03 KG/HOUR - DISPOSITION: 0.0 % VIA CHEMICAL
TRANSFORMATIONS, 0.0 % BIOTRANSFORMED, 0.0 % VOLATILIZED,
100.00% EXPORTED VIA OTHER PATHWAYS.

PERSISTENCE:

- A. AT THE END OF A 12.0 HOUR RECOVERY PERIOD, THE WATER COLUMN HAD
LOST 99.87% OF ITS INITIAL TOXICANT BURDEN; THE SEDIMENTS HAD
LOST 9.21% OF THEIR INITIAL BURDEN (53.05% REMOVAL OVERALL).

B. SYSTEM SELF-PURIFICATION TIME IS ROUGHLY 9. DAYS.

EXAMS >

116