Shaughnessy Number: 090301

Date Out of EFGWB: JUL 15 1991
JUL 15 1991

TO: Joanne Edwards
Product Manager 74
Registration Division (H7505C)

FROM: Elizabeth Behl, Acting Section Head
Ground-Water Technology Section
Environmental Fate & Ground-Water Branch/EFED (H7507C)

THRU: Henry Jacoby, Chief
Environmental Fate & Ground-Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of:

Reg./File #: _____

Chemical Name: Methomyl

Type Product: Insecticide

Company Name: E.I. Du Pont de Nemours

Purpose: Review request for waiver of small-scale retrospective ground-water monitoring study.

Date Received: 6/01/91 ACTION CODE: 660

Date Completed: 6/26/91 EFGWB #(s): 90-0410

Monitoring study requested: X Total Review Time: 6 days

Monitoring study voluntarily: ___

Deferrals To: _____ Biological Effects Branch

_____ Science Integration & Policy Staff, EFED

_____ Non-Dietary Exposure Branch, HED

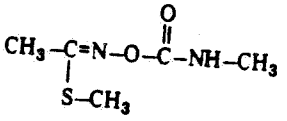
_____ Dietary Exposure Branch, HED

_____ Toxicology Branch, HED

HJ
7-10
836

1. CHEMICAL:

Chemical name: S-Methyl-N-[(methylcarbamoyl)oxy]-thioacetimidate
Common name: Methomyl
Trade name(s): Lannate, Nudrin (discontinued)
Structure:



2. TEST MATERIAL:

Not Applicable.

3. STUDY/ACTION TYPE:

Review request for waiver of small-scale retrospective ground-water monitoring study.

4. STUDY IDENTIFICATION:

Title: Field Research Studies on the Movement and Degradation of Thiodicarb and its Metabolite Methomyl

Authors: Jones, R.L.; Hunt, T.W.; Norris, F.A.; and Harden, C.F. (Rhone-Poulenc)

Submitted for: E. I. Du Pont de Nemours
Wilmington, DE

Identifying No.: 40242
Identification Code:
Record Number: 260379
Date Sent to EFED: 2/28/90

5. REVIEWED BY:

Estella Waldman
Hydrologist
OPP/HED/EFED/Ground-Water Section

Signature: Estella Waldman

Date: July 9, 1991

6. APPROVED BY:

Elizabeth Behl
Acting Section Head
OPP/HED/EFED/Ground-Water Section

Signature: Eliz Behl

Date: July 9, 1991

7. CONCLUSIONS:

In response to the EPA request for a small-scale retrospective ground-water monitoring study for methomyl, Du Pont has submitted a field study done by Rhone-Poulenc on thiodicarb. The study was published on February 22, 1988 by R.L. Jones et al. Thiodicarb is a relatively immobile compound with methomyl as its principle degradate.

The study was conducted from May 27 through December 2, 1987 on six field plots, two of which were sampled for ground water. Methomyl residues were detected in shallow ground water at both of these sites.

According to the "Guidance Document for Ground-Water Monitoring Studies", the purpose of a ground-water monitoring study is to detect the likelihood of a pesticide leaching to ground water, and to determine the levels of the pesticide in ground water. A small-scale retrospective ground-water monitoring study attempts to conclusively determine whether a pesticide leaches to ground water in fields that are characteristic of the type of agricultural use and associated agricultural practices for which the pesticide is registered, and to characterize the leaching pattern in the soil profile with time.

The Rhone-Poulenc study was done specifically for the registration of the chemical thiodicarb. The rate of degradation of thiodicarb to methomyl is somewhat dependent upon soil pH but, in general, thiodicarb metabolizes to methomyl in less than one week (EAB #70780). It is unlikely that the methomyl concentrations resulting from thiodicarb breakdown in this study approached the concentrations that would be expected if methomyl were applied according to the label instructions under normal agricultural-use conditions. Ground-water samples for the study were taken only on the sites where thiodicarb was applied directly to the soil. Another problem with the determination of methomyl residues in ground water from this study was that a foliar application of methomyl was not done. Therefore, the method of application was not representative of the standard method of methomyl application.

The study illustrates that methomyl is a mobile compound and that residues do indeed contaminate ground water. However, in order to determine what concentration of methomyl would be found in a "realistic worst case" scenario, additional information is needed. The detection of methomyl in ground water has been confirmed but the data are still insufficient to assess the extent and degree of ground-water contamination.

8. RECOMMENDATIONS:

1) The registrant is required to conduct a small-scale ground-water monitoring study for methomyl. A study protocol should be submitted to the Agency prior to study initiation.

2) The study submitted by Rhone-Poulenc supplies qualitative information indicating that methomyl does leach to and contaminate ground water. The Registrant should revise the current labels for products containing this compound as an active ingredient to include a ground-water advisory. The ground-water advisory should state that "methomyl is known to leach through soil and into ground water when applied in areas overlain by sandy soils with low organic matter, and where water tables are less than 30 feet below the surface. Users are advised not to apply in areas where soils are permeable or

in karst areas. Consult with the pesticide state lead agency for information regarding soil permeability and aquifer vulnerability in your area".

9. BACKGROUND:

Methomyl is the common name for S-methyl N-[(methylcarbamoyl)oxy]-thioacetimidate. It is marketed under the trade name Lannate (a former trade name, Nudrin, has been discontinued).

Methomyl is a broad-spectrum insecticide registered to control a variety of pests (including many Lepidopteran larvae) on agricultural and ornamental crops. According to the Pesticide Registration Standard (4/89) approximately 80% of methomyl use is on soybeans, peanuts, cotton, tobacco, and corn. The remaining 20% is formulated into products that are used on a variety of vegetables, fruits, field crops, and commercial ornamentals.

Methomyl is formulated primarily into a water-soluble powder (90% ai) and water-soluble liquids (1.8 and 2.4 lb ai/gal). Other registered formulations include dusts and granulars (1-5% ai), baits (1-2% ai), and ready-to-use liquids (1%). All soluble concentrates not in water soluble bags and baits (except 1% fly bait) are restricted-use pesticides registered for sale to and use only by certified applicators or persons under direct supervision.

The liquid and solid soluble concentrates are diluted with water and applied as a foliar treatment after the insects first appear. Methomyl is applied by aircraft (fixed-wing and helicopter); ground equipment, including airblast sprayers, and hydraulic sprayers with a single wand (gun) or boom; and others. The type of equipment is determined by the site and equipment availability.

Methomyl is moderately persistent in soils, but the persistence in soils appears to be tied to the soil condition, and especially pH . The half-life under aerobic conditions in soils is 15-45 days; the half-life under anaerobic conditions in soils is eight days. Methomyl degrades to unextractable bound residues, carbon dioxide, and minor amounts of extractable residues (S-methyl-N-hydroxythioacetimidate). The extractable residues are not expected to form in amounts that pose a threat to ground water (EAB #80979, 10/31/88).

Methomyl hydrolyzes slowly under acidic to neutral conditions (pH 5-7), and hydrolysis is rapid under alkaline conditions. Methomyl is also susceptible to degradation through photolysis (EAB #80979, 10/31/88).

The Health Advisory for methomyl is 200 µg/L, and it is listed in Cancer Group D (EPA, 4/91). The health effects associated with acute and subchronic exposure to methomyl are primarily due to cholinesterase inhibition (EPA, ODWHA, 1989). According to the Registration Standard for methomyl (4/89), technical methomyl is highly toxic to laboratory mammals by the oral route of exposure. It is also a pulmonary irritant. Chronic feeding studies on rats and dogs show dose-related histopathology effects on kidney and spleen. Methomyl was not found to be oncogenic in rats or mice. Methomyl may have an adverse affect on fish, other aquatic organisms, and birds but the impact is not known.

Methomyl and its degradate, S-methyl-N-hydroxythioacetimidate, were found to be very mobile under laboratory conditions. In order to resolve the

environmental fate and movement of methomyl, a ground-water monitoring study was requested (memo from Stephen J. Simko to Dennis Edwards, November 9, 1987). In a later memo from Catherine A. Eiden to Dennis Edwards (EAB # 80979; 10/31/88), it was stated that methomyl was capable of leaching to ground water in very sensitive environments. The need for a ground-water monitoring study was again stressed in this memo.

A review of the "Pesticides in Ground Water Data Base" showed detections of methomyl in three states including New York, New Jersey, and Florida (EAB # 80979; 10/31/88). Data indicated that methomyl was reaching ground water in New York at 9 ppb, in New Jersey at 1-2 ppb, and in Florida at 12 ppb. In New York and New Jersey, inadequate records were kept regarding pesticide usage. Therefore, a correlation between normal agricultural use of methomyl and the positive detections of methomyl was not able to be confirmed. However, the contamination was believed to be caused normal field use of methomyl. In Florida, the detections were believed to be caused by improper disposal practices (EAB # 80979, 10/31/88).

Since previous monitoring studies could not prove a correlation between methomyl detections in areas associated with methomyl use, a small-scale retrospective ground-water monitoring study was requested.

10. DISCUSSION:

Du Pont requested a waiver of the ground-water monitoring study for methomyl, and submitted a field study done by Rhone-Poulenc on thiodicarb in order to waive the requirement. The study, called "Field Research Studies on the Movement and Degradation of Thiodicarb and its Metabolite Methomyl", was authored by R.L. Jones, T.W. Hunt, F.A. Norris, and C.F. Harden and published on February 22, 1988. Thiodicarb is a relatively immobile compound with methomyl as its principle degradate.

The report contains monitoring data collected by Rhone-Poulenc following the application of thiodicarb to two corn fields in New York and New Jersey, and the application of thiodicarb and methomyl to three cotton fields in North Carolina.

Methomyl residues were detected in shallow ground water at two of the sites. At the third site, methomyl residues were found in soil after 170 days (the end of the study) and at a 1.2-1.8 m depth. This occurred in a soil with a sandy clay loam to clay subsoil indicating that movement is substantial even in heavy-textured soils. The detection limit was 1 µg/kg for soil and 1 µg/L for water.

SITE DESCRIPTION:

Three sites, described below, were chosen for the Rhone-Poulenc study:

Palermo Site. The Palermo site was located on a 0.4 ha field in Oswego County, New York. The surface soil was classified as a Hinkley gravelly loam. The percent sand increased in the soil below 0.3 m. Organic matter was 3.1 wt

percent at the surface and 0.1 wt percent below 0.6 m. The water table ranged between 1.0 and 1.8 m during the study.

Oviedo Site: The Oviedo site in Seminole County, Florida was located on a 0.5 ha field. The surface soil was classified as an Immokalee fine sand which is not normally used for corn production. However, the site was considered more vulnerable than most of the soils in Florida used for corn production. Subsoils on the site were also sands. Organic matter averaged 0.7 wt percent from 0-0.3 m, 0.1 wt percent from 0.3-0.6 m, and 1.0 wt percent from 0.6-1.2 m. The water table ranged from 0.1 to 0.7 meters during the study.

Clayton Site: The Clayton site in Johnston County, North Carolina consisted of three cotton plots, each 27 by 30 m, on the Rhone-Poulenc research farm. The soil on these plots has been classified as a Norfolk loamy sand. Deeper strata on the site range from sandy clay loam to clay. Organic matter in the surface soil averaged 0.7 wt percent and decreased to 0.1 wt percent below 0.6 m. The water table was measured at 2.7 m in one plot but was apparently deeper in other areas.

RESULTS

Soil Samples

Clayton. Three plots were sampled for soil residues. On the first plot (thiodicarb application), soil samples were taken on 0, 6, and 13 days after application. Six days after application, methomyl residues were detected in a range of 4-54 µg/kg from 0-0.3 m, and at 1 µg/kg from 0.3-0.6 m in one soil core. After 13 days, residues of methomyl ranged from 2-12 µg/kg in the 0-0.3 m interval. No detections were found in the deeper sample intervals from 0.3-1.2 m.

In the second plot, methomyl was applied on the surface soil. Soil samples were taken after 13 days, and residues ranging from 1-18 µg/kg were seen in the 0-0.3 m interval. No residues were detected from 0.3-1.2 m.

In the third plot, methomyl was soil incorporated. Methomyl residues were analyzed at 13, 30, 62, 123, and 170 days in 16 soil cores. Residues ranging from 1-7 µg/kg were detected as deep as 1.2-1.8 m after 170 days. Maximum residues during the 170-day sampling period were 107 µg/kg from 0.3-0.6 m. It is interesting to note that residues were not detected at this depth after the 123 day sampling, indicating vertical movement of the chemical during this time.

Palermo. One set of soil samples was taken 60 days after application. Residues of methomyl (1 µg/kg) were detected to a depth of 1.2 m in one soil core. No detections were found from 1.2-1.8 m, although only 10 soil samples instead of 16 were analyzed in this depth interval.

Oviedo. Soil samples were taken after 59 days. Methomyl residues from 1-4 µg/kg were detected in the 0-0.3 m interval. One soil core showed 1 µg/kg of methomyl in the 0.3-0.6 m interval. Since no detections were noted for the shallower interval, this again indicates the vertical migration of the chemical.

Ground Water

Palermo. No detections of methomyl were found in either the shallow or deep well in cluster 1. Methomyl was also not detected in the shallow well in cluster 2. However, one detection of the chemical at 1 µg/L, was found in the deep well of cluster 2 on 10/30/87, 3 months after application.

Oviedo. No detections of methomyl were reported from either the deep or shallow well in cluster 1. The deep well in cluster 1 was dry for 5 out of the 8 sampling dates and, therefore, only 3 ground-water samples were analyzed. On two of these sampling dates, 6/8/87 and 10/26/87, the shallow well was able to be sampled, indicating some problems with the data.

In cluster 2, a detection of 20 µg/L was reported on 10/27/87, one month after application, in the shallow well. In the deep well of the cluster, 2 µg/L were detected 1 month after application. Three months after application, 1 µg/L was detected in the deep well.

The study done by Rhone-Poulenc illustrated that methomyl residues do contaminate ground water. However, the study was not conducted according to the EPA guidelines and, therefore, the concentrations observed in the samples should not be regarded as "worst case" or as representative of possible levels that might be found in ground water.

STUDY DETAILS:

1. Site Data Problems
   The field study provided by Rhone-Poulenc does not provide any information about the topography, well locations, irrigation ditches or wells, or other information about important features near the sites which could have influenced the ground-water results. Also, no ground-water flow maps were provided for any of the sites.

2. History of Pesticide Use Problems
   Prior use information about the pesticides applied to the fields used for the studies was not documented. As a minimum, the guidelines require documentation regarding use of the pesticide in the year previous to the year of study.

3. Soil Sampling Problems
   Soil samples were collected in 0.3 m increments to a depth of 0.6 m, and in 0.6 m increments below a depth of 0.6 m. The depths for soil sampling are substantially larger than those stated in the guidelines. Considering that the depths to the water tables on the Palermo and Oviedo sites were 1.0-1.8 m and 0.1-0.7 m, respectively, the soil sampling intervals are too large. Field residues would be expected to decrease with depth in this sort of study, and in increase in the sampling increment would, therefore, probably result in a decrease in detected residues. Also, samples were composited which would not allow measurement of the individual high concentration samples.

   The soil dissipation study review (EFGWB # 90-0886) for methomyl indicated that methomyl would not leach more than 11 and 15 inches over 3 and 5 months, respectively, in a light-textured soil. Soil samples

were not taken after 2 months for this study but ground-water samples showed detections of methomyl after three months.

4. Ground-Water Sampling Problems
   A minimum of three well clusters is required by the guidelines on each site. Ground water from these wells must be sampled at a minimum of once every month for 1 year. The study done by Rhone-Poulenc did not adhere to these guidelines. Only two well clusters were installed on each of the study sites and sampling was done over a 4 month period. Also, methomyl was not applied to the sites on which ground water sampling was done.

5. Aquifer Data Problems
   No description of the shallow aquifer to be sampled was provided nor was the hydraulic conductivity of the aquifer given. Also, no information was provided about the ground-water velocities on either of the sites.

6. General Problems
   A description of the general geology in the areas of study is not provided.

7. Half-Life Problems
   The study done by Rhone-Poulenc states that degradation rate of methomyl in surface soils corresponds to a half-life of less than 2 days (page 12 of the report). The degradation rate in subsoils is significant but appears to be substantially less than at the surface. The half-life in the subsoils was approximately 0.5 months during the first two months following application, and 1.6 months after first two months. However, no data is available after this two month time period.

REFERENCES:

Eiden, C.A., 1988, Memo to Dennis Edwards regarding methomyl registration standard requirements for a small-scale retrospective ground-water monitoring study, EAB #80979, 10/31/88.

Jones, R.L., Hunt, T.W., Norris, F.A., and Harden, C.A., 1988, Field Research on the Movement and Degradation of Thiodicarb and its Metabolite Methomyl, Rhone-Poulenc Ag. Company, 2/22/88.

Sisko, S.J., 1987, Memo to Dennis Edwards regarding Methomyl registration standard, 11/9/87.

USEPA, 1987, Evaluation of Thiodicarb Protocols for Field Leaching Studies, EAB #70780, 8/5/87.

USEPA, 1989, Drinking Water Health Advisory: Pesticides, Office of Drinking Water Health Advisories, pp. 521-539.

USEPA, 1989, Registration Standard for Pesticide Products Containing Methomyl as the Active Ingredient, Office of Pesticide Programs, April 1989.

USEPA, 1990, EFGWB Field Dissipation Study Review, EFGWB #90-0886, 11/27/90.

USEPA, 1991, Drinking Water Regulations and Health Advisories, Office of Water, April 1991.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
METHOMYL
Last Update on October 5, 1990
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Common Name:METHOMYL
Smiles Code:S(C)C(=NOC(=O)NC)C
PC Code # : 90301 CAS #:16752-77-5 Caswell #:

Chem. Name :S-METHYL-N-[(METHYLCARBAMOYL)OXY]THIOACETIMIDATE

Action Type:Insecticide

Trade Names: LANNATE, LANOX 90, LANOX 216, DPX-X1179, SD-14999, NUDRIN
(Formul'tn):GRANULAR; DUST; WATER SOL. POWDER;
Physical State: CLRLSS CRYS;SULFUROUS ODR

Use :FIELD CROPS; VEGETABLES; FRUITS; ORNAMENTALS
Patterns :
(% Usage) :
:

Empirical Form: $C_5H_{10}O_2N_2S$
Molecular Wgt.: 162.21 Vapor Pressure: 5.00E -5 Torr
Melting Point : °C Boiling Point: °C
Log Kow : 0.11 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured) 1.84E-10 (calc'd)

Solubility in ...					Comments
Water	5.80E 4	ppm	@20.0	°C	
Acetone	E	ppm	@	°C	
Acetonitrile	E	ppm	@	°C	
Benzene	E	ppm	@	°C	
Chloroform	E	ppm	@	°C	
Ethanol	E	ppm	@	°C	
Methanol	E	ppm	@	°C	?
Toluene	E	ppm	@	°C	
Xylene	E	ppm	@	°C	
	E	ppm	@	°C	
	E	ppm	@	°C	

Hydrolysis (161-1)
[V] pH 5.0:STABLE
[V] pH 7.0:STABLE
[V] pH 9.0: 30 DAYS
[ ] pH 10.0: 3 HRS
[ ] pH 1.0: 21 HRS
[V] pH 4.0:STABLE

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
METHOMYL
Last Update on October 5, 1990
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)
[S] Air :NO DECOMP IN SUN, 120 DA
[V] Soil :SiClLm, SUNLIGHT, 34 DAYS
[V] Water:1 DAY IN ARTIFL LIGHT, AT
[ ] :25 C, pH 5
[ ] :
[ ] :

Aerobic Soil Metabolism (162-1)
[V] SdLm 15-30 DAYS
[V] MUCK AND SiLm 45 DAYS
[V] IN STERILE FLANAGAN SiLm, 89%
[ ] STILL PRESENT AFTER 45 DAYS
[V] AT 4 PPM, IN SiLm, IN DARK, AT
[ ] 25 C AND 70% WHC; 30-45 DAYS
[ ]

Anaerobic Soil Metabolism (162-2)
[V] TOTAL CONVERSION TO CO2 IN
[ ] ABOUT 8 DAYS
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aerobic Aquatic Metabolism (162-4)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
METHOMYL
Last Update on October 5, 1990
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Soil Partition Coefficient (Kd) (163-1)

	Kads	Kdes
[ ]		
[S]	0.72	1.0
[S]	1.0	1.6
[S]	1.4	2.8
[S]	0.23	0.5

[ ] See Composition Under Rf

Soil Rf Factors (163-1)

	Sd	Si	Cl	%OM	pH	Rf
[ ]						
[S]	61	21	18	2.1	6.5	0.53
[S]	2	81	17	4.3	5.4	0.82
[S]	12	83	5	7.5	5.2	0.52
[S]	60	33	7	1.1	6.6	0.46
[ ]						

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[V] IN SiLm 98% METHOMYL DISSIPATES WITHIN 1 MONTH; IN LmSd 85%
[ ] DISSIPATES AFTER 5 MONTHS; NO RESIDUE IN MUCK AFTER 7-32 DA.
[V] AT 4 LBS AI/A, DECREASED FROM 91% AT DAY 0 TO 55% AT DAY 15,
[ ] AND TO 33% AT 30 DAYS IN SdLm SOIL IN A GREENHOUSE.
[V] AT 9 LBS AI/A, IN SdLm, 1/2 LIFE 54 DAYS OVER A 9 MONTH
[ ] PERIOD (IN CABBAGE).
[ ]
[ ]
[ ]
[ ]

Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
METHOMYL
Last Update on October 5, 1990
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[V] AT APPL RATE 4X MAX USE, BEETS AND CABBAGE PLANT-
[ ] ED 30- AND 120 DAYS LATER, CONTAINED .04-.15 PPM

Accumulation in Rotational Crops, Field (165-2)
[ ]
[ ]

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[V] 96-HR LC50 FOR WARMWATER FISH = 1.05-1.88 PPM; FOR COLDWATER
[ ] FISH = 1.6 PPM.

Bioaccumulation in Non-Target Organisms (165-5)
[V] 48-HR LC50 FOR DAPHNIA = 31.7 PPB.
[ ]

Ground Water Monitoring, Prospective (166-1)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[S] IN NEW YORK, 9PPB; IN NEW JERSEY, 1-2 PPB; IN FLA, 12 PPB
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
METHOMYL
Last Update on October 5, 1990
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Field Evaluation (202-1)
[ ]
[ ]
[ ]
[ ]

Degradation Products

Acetonitrile
CO2
(methomyl per se is the only residue of concern in plants)
S-methyl-N-hydroxythioacetimidate
methomyl oxime

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
METHOMYL
Last Update on October 5, 1990
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

-In plants, methomyl is absorbed by roots and translocated to leaves.
-Slightly toxic to avian wildlife.
-Degradation in soil is primarily a microbial process. Repeated applications within 19 day period may result in prolonged period of reduced nitrification.
-Can be a hazard to honeybees and other beneficial insects.
-Health advisory level is 175 ppb.
-Adsorption is directly related to org. content of soil; adsorption to org. matter is similar to that of terbacil.
Koc = 72 (U)

References: EPA REVIEWS
Writer : PJH, MIR

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
THIODICARB
Last Update on November 8, 1989
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Common Name:THIODICARB
Smiles Code:S(C)C(=NOC(N(SN(C(=O)ON=C(SC)C)C)C)=O)C
PC Code # :114501 CAS #:59669-26-0 Caswell #:

Chem. Name :N,N'-[THIOBIS[(METHYLIMINO)CARBONLOXY]]-BIS-DIMETHYL ESTER

Action Type:Insecticide / ovicide

Trade Names:LARVIN; NIVRAL
(Formul'tn):FLOWABLE, WP
Physical State:

Use :SWEET CORN
Patterns :
(% Usage) :
:

Empirical Form: $C_{10}H_{18}N_4S_3O_4$
Molecular Wgt.: 354.46 Vapor Pressure: 4.30E -5 Torr
Melting Point : °C Boiling Point: °C
Log Kow : 0.22 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured) 5.73E -7 (calc'd)

Solubility in ...					Comments
Water	35.00E	ppm	@20.0	°C	
Acetone	E	ppm	@	°C	
Acetonitrile	E	ppm	@	°C	
Benzene	E	ppm	@	°C	
Chloroform	E	ppm	@	°C	
Ethanol	E	ppm	@	°C	
Methanol	E	ppm	@	°C	
Toluene	E	ppm	@	°C	
Xylene	E	ppm	@	°C	
	E	ppm	@	°C	
	E	ppm	@	°C	

Hydrolysis (161-1)
[ ] pH 5.0:
[ ] pH 7.0:
[V] pH 9.0:22 HR
[V] pH 3.0:206 HR
[V] pH 6.0:STABLE
[ ] pH :

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
THIODICARB
Last Update on November 8, 1989
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)
[ ] Air :
[V] Soil :8 HRS LmSd; 21 DA TX SdLm
[S] Water:81 DAYS, ARTIFICIAL LIGHT
[ ] :
[ ] :
[ ] :

Aerobic Soil Metabolism (162-1)
[V] 1 WEEK
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Soil Metabolism (162-2)
[V] 1 WEEK
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aerobic Aquatic Metabolism (162-4)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
THIODICARB
Last Update on November 8, 1989
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Soil Partition Coefficient (Kd) (163-1)
[V] 1.34 CLAY LOAM = Kads
[V] 0.58 LOAMY SAND = "
[V] 1.22 SANDY LOAM = "
[ ]
[ ]
[ ]

Soil Rf Factors (163-1)
[ ] SEE COMMENTS
[ ]
[ ]
[ ]
[ ]
[ ]

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[V] IN FINE SANDY LOAM (CA), WITH 204 MM RAINFALL, T1/2=6 DAYS.
[V] IN SANDY LOAM (NC), WITH 475 MM RAINFALL, T1/2= 3 DAYS.
[V] IN SILTY CLAY LOAM (MISS), WITH 469 MM RAINFALL, T1/2= 8 DAYS
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
THIODICARB
Last Update on November 8, 1989
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[ ]
[ ]

Accumulation in Rotational Crops, Field (165-2)
[V] RESIDUES WOULD NOT BE EXPECTED IN FOLLOW CROPS
[ ] EVEN IF PLANTED 30 DAYS AFTER LAST TREATMENT.

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[S] CATFISH BCF= 13.7 X; BLUEGILL BCF = 5 X
[ ]

Bioaccumulation in Non-Target Organisms (165-5)
[ ]
[ ]

Ground Water Monitoring, Prospective (166-1)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[V] THIODICARB=NONE; METHOMYL = TRACE UP TO 20 PPB
[ ]
[ ]

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
THIODICARB
Last Update on November 8, 1989
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Field Evaluation (202-1)
[ ]
[ ]
[ ]
[ ]

Degradation Products

Methomyl is principal degradate in photo., soil,. and hydrolysis. Under aerobic conditions methomyl gives C02; anaerobically, it produces acetonitrile.
Other degradates: Methomyl sulfoxide, methomyl oxime, mono sulfoxide, methomyl sulfoxide oxime, methomyl methylol

Soil degradates have high potential to leach.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
THIODICARB
Last Update on November 8, 1989
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

LEACHING DATA:

Sd	Si	Cl	pH	%OM	STATE	THIODI.	Rf METH. OXIME	METHOMYL
25	42	33	8.1	1.3	CA	.12	.86	.64
83	15	2	5.8	0.8	NC	.21	.89	.77
65	17	18	7.8	1.0	TX	.12	.93	.79
38	42	20	5.4	1.3	OH	.08	.88	.73

Soil Koc = 300 (estimate)

References: FARM CHEMICALS HANDBOOK; EPA REVIEWS
Writer : PJH