11-20-92

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EFGWB# 92-1030
PC Code ~~116004~~ 090301
DP Barcode D181274

MEMORANDUM:

SUBJECT: Review of Data Package for Methomyl

TO: Linda Propst, Chemical Review Manager
Registration Branch
Special Review and Re-Registration Division (H7508)

FROM: José Luis Meléndez, Chemist José Luis Meléndez Nov. 9, 1992
Environmental Chemistry Review Section #2/EFGWB/EFED

THROUGH: Emil Regelman, Supervisory Chemist
Environmental Chemistry Review Section #2/EFGWB/EFED

and

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

Henry Jacoby 11/20/92

A summary of the data requirements for methomyl is presented in a table attached.

Background:

Methomyl is a carbamate insecticide used to control a broad spectrum of insect pests in agricultural and ornamental crops, such as Alticinae, Aphidiae, and Lepidoptera in cereals, citrus, and cotton. The application rate is 0.1-1.5 lb ai/Acre. Depending on the type of crop it can be applied up to everyday. According to the Registration Standard, approximately 70-80% of the methomyl purchased annually in the United States is formulated into methomyl products that are used on soybeans, peanuts, cotton, and tobacco. Much of the remaining 20-30% is formulated into products that are used in a wide variety of vegetables.

A package was submitted to EFGWB, containing the following information:

The protocol entitled "Dissipation of Methomyl on Plastic Ground Cover Following Multiple Applications of Lannate L Insecticide to Tomato", Submitted by Du Pont de Nemours and Company, C.S. Baer, 1992, Dupont Protocol No. AMR 2346-92

The protocol entitled "An Aquatic Residue Monitoring Study of Methomyl in and around Sweet Corn Fields in Illinois", Submitted by Du Pont de Nemours and Company, C.S. Baer, 1992, Dupont Protocol No. AMR 2277-92

The protocol entitled "An Aquatic Residue Monitoring Study on Methomyl in and around Apple Orchards in Michigan (Chemical Analysis)", Submitted by Du Pont de Nemours and Company C.S. Baer, 1992, Dupont Protocol No. AMR 2278-92

The reviews of these protocols have been previously addressed in a memorandum from R. Hitch and R. D. Jones dated October 2, 1992 (copy attached).

A summary of the data requirements for Methomyl is in a table attached.

cc Betsy Behl
Groundwater Section

rev15
jlm

ENVIRONMENTAL - SUMMARY TABLE
FOR METHOMYL

Reviewer: José Luis Meléndez

Date: 11/9/92

Product Names: Lannate, Lanox, Nudrin, SD-14999, DPX-X1179

Chemical Names: S-methyl-N-[(methylcarbamoyl)oxy]thioacetimidate

Chemical Code: 090301

Case # 0028

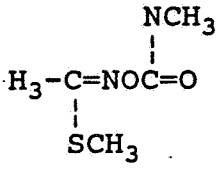
CAS Registry # 16752-77-5

Pesticide Type: Insecticide

Molecular weight: 162.2

Empirical Formula: $C_5H_{10}O_2N_2S$

Structure:



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* See note (1) in table attached.

Data Requirements for Methomyl

| Data Requirements and Guidelines Reference No. | Additional Data Required? |
|---|---|
| Degradation - Lab.: | |
| 161-1 Hydrolysis | Acceptable[1] |
| 161.2 Photolysis in Water | Acceptable[2] |
| 161.3 Photolysis in Soil | Acceptable[3] |
| 161-4 Photodegradation in Air | Supplemental[4] |
| Metabolism Studies - Lab. | |
| 162-1 Aerobic Soil Metabolism | Acceptable[5] |
| 162-2 Anaerobic Soil Metabolism | Acceptable[6] |
| 162-3 Anaerobic Aquatic Metabolism | Required[7] |
| 162-4 Aerobic Aquatic Metabolism | Required[7] |
| Mobility Studies - Lab. | |
| 163-1 Mobility in Soil | Supplemental[8] |
| 163-2 Volatility from Soil (Lab.) | Required[9] |
| 163-3 Volatility from Soil (Field) | Reserved[10] |
| Field Dissipation Studies | |
| 164-1 Terrestrial (Short-term) | Acceptable[11] |
| 164-2 Aquatic/Sediment | Required[12] |
| 164-5 Terrestrial (Long-Term) | Waived[13] |
| Accumulation Studies | |
| 165-1 In Confined Rotational Crops | Acceptable[14] |
| 165-3 In Irrigated Crops | Required[15] |
| 165-4 In Fish | Acceptable[16] |
| 165-5 In Aquatic, Non-target Organisms | Acceptable[16] |
| Other | |
| 166-1/-2/-3 Ground Water Monitoring Studies | Supplemental[17] |

FOOTNOTES:

1. Methomyl was relatively stable in pH 5 and 7 solutions at 25°C. A half-life of 30 days was observed for the pH 9 solution. The only degradate was S-methyl-N-hydroxythioacetimidate (MRID# 00131249).

2. Methomyl photodegraded with a half- life of 1 day in sterile aqueous pH 5 solution. The major degradate was acetonitrile, the minor degradate is S-methyl-N-hydroxythioacetimidate (MRID# 00161885).

3. Methomyl photodegraded with a half-life of 34 days on silty clay loam soil irradiated with natural sunlight at 24-28°C. The major degradate was acetonitrile (MRID# 00163745).

4. Methomyl is stable in sun after 120 days (data from EFGWB One Liner).

5. Methomyl degraded with a half-life of 30-45 days in silt loam soil incubated at 25°C. The major degradate was $^{14}CO_2$. A minor degradate was S-methyl-N-hydroxythioacetimidate (MRID# 00008568).

6. Methomyl degraded fast under anaerobic soil conditions. In the early stages acetonitrile is the initial degradation product. $^{14}CO_2$ was the final degradation product with more than 90% of the applied radioactivity at 8 days posttreatment (MRID# 00073214).

7. Study is required to support aquatic uses.

8. Methomyl and its degradate S-methyl-N-hydroxythioacetimidate were very mobile on sandy loam, silty clay loam, and silt loam soil TLC plates, with $R_f$ values ranging from 0.64 to 0.93. In batch equilibrium studies, methomyl was very mobile in two sandy loams, a silt loam, and a silt soil with $K_{ads}$ values from 0.5 to 2.8 (MRID#'s 00044306 and 00161884).

9. Required if the vapour pressure of the technical grade active ingredient is greater than $10^{-4}$ torr or a history of incidences is known.

10. Reserved pending results of the Volatility from Soil (163-1) study.

11. In Madera, California at an application rate of 9 lb ai/A, methomyl dissipated with a registrant calculated half-life of 54 days (MRID#'s 41623901 and 41623902).

12. A study has been submitted (MRID# 42345601). This study is currently in review.

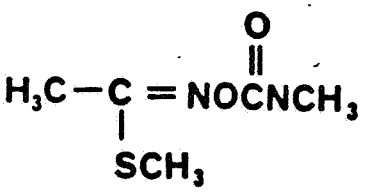
13. Waived based upon results of satisfactory short term studies.

14. Beets and cabbage planted 30 and 120 days posttreatment had total radioactivity ranging from 0.04 to 0.15 ppm. Sunflower seeds ranged from 1.5 to 2.0 ppm. The application rate was four times the maximum single use rate (MRID# 00019947).

15. Required to support the aquatic food crop uses.

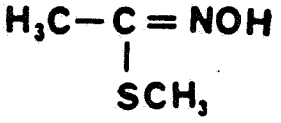
16. The octanol/water partition coefficient ($K_{ow}$) for methomyl ranges from 1.29 to 1.33. This value is significantly less than 1000. Chemicals with this low $K_{ow}$ are not expected to bioconcentrate. EFGWB concurs with a waiver of the Bioaccumulation in Fish data requirement for methomyl.

17. Required because the detection of methomyl in ground water has been confirmed, but data are insufficient to assess the extent and degree of groundwater contamination (EFGWB 90-0410).

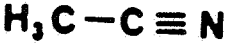


Methomyl

S-Methyl-N-[(methylcarbamoyl)oxy]thioacetimidate



S-Methyl-N-hydroxythioacetimidate



Acetonitrile

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PESTICIDES AND
TOXIC
SUBSTANCES

MEMORANDUM

October 2, 1992

SUBJECT: Protocols for methomyl residue monitoring studies.

TO: Ann Stavola
Section Chief
Ecological Effects Branch

FROM: Robert Hitch
Ecologist
Surface Water Section
Environmental Fate and Ground Water Branch

R. David Jones, Ph.D.
Agronomist
Surface Water Section
Environmental Fate and Ground Water Branch

THROUGH: Henry Nelson, Ph.D.
Section Chief
Surface Water Section
Environmental Fate and Ground Water Branch

Henry Jacoby
Branch Chief
Environmental Fate and Ground Water Branch

The registrant is proposing to begin residue monitoring studies on apples in Michigan and sweet corn in Illinois. Additionally, a protocol for dissipation of methomyl from black plastic, which is used in tomato culture, is described.

The chemical analysis method proposed for the apples and sweet corn studies is an immunoassay (ELISA) technique. The reviewers are not aware of an immunoassay method being previously used for chemical analysis in a fate study. While immunoassay techniques are appealing because of their relative ease of use, their use does raise some concerns. Immunoassay methods tend to specific to certain structural components in a molecule and consequently tend to be very selective. This limits their usefulness for detection of degradates. For this case, this does not appear to an important consideration as degradates are not of concern in these studies. Furthermore, because of the complex nature of environmental samples, false positives and false negatives can and do occur. EFGWB recommends that all positives be considered as true positives unless it can be specifically shown by a confirmatory method that the detection was a false positive. Secondly, that a representative number of samples be run with traditional analytical methods so that the rate of false negatives can be established.

In the apples and the sweet corn protocols, DuPont states that they will try to measure the runoff water flow rate if is possible. We should advise DuPont that if the site does not permit gauging the volume of runoff water then the site should not be utilized. It is also reasonable to expect that the watersheds be almost entirely planted in apples or almost sweet corn. Any non-crop areas in the watershed would dilute methomyl concentration in the runoff water. If there are currently significant expanses of non-cropped area then it would seem reasonable to divert the runoff from these areas out of the study zone. Additionally, comments made in a previous memo (June 18, 1992) relating to the appropriateness of the sweet corn scenario for use in determining runoff of methomyl are still relevant.

In regard to the deposit card samples, we believe that the proposed placements are adequate for the purposes of calculating deposition to the treated area and to the pond. They will not be useful for determining what the maximum drift from the two use patterns might have been, but it should help us decide how much pesticide deposited in the runoff area and it should tell us the magnitude of the pesticide drift to the surface of the pond.

In the protocol for the study of methomyl dissipation from black plastic in Florida, the sampling protocol is not clear. Are fifteen samples being taken and then being composited into three samples for analysis? Are the five samples being composited being taken randomly from the field or are they coming from one specific location in the field. The protocol states the samples (composited samples?) are being taken in a non-systematic manner? Does this mean they are being taken randomly? The sampling protocol needs to be much more completely described.