

US EPA ARCHIVE DOCUMENT



101201
SHAUGHNESSEY NO.

21
REVIEW NO.

EEB BRANCH REVIEW

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FILE OR REG. NO. 239-2404

PETITION OR EXP. PERMIT NO. _____

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TYPE PRODUCT(S): I, D, H, F, N, R, S Insecticide

DATA ACCESSION NO(S). _____

PRODUCT MANAGER NO. W. Miller (16)

PRODUCT NAME(S) Monitor 4 Spray

COMPANY NAME Chevron Chemical Company

SUBMISSION PURPOSE Proposed Conditional Registration Of Celery Use
(Florida only)

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
<u>101201</u>	<u>Methamidophos</u>	<u>40%</u>
	<u>Inert ingredients</u>	<u>60%</u>

Monitor 4 Spray

100 Pesticide Label Information

100.1 Pesticide Use

Proposed conditional registration is for use on celery in Florida.

100.2 Formulation Information

Methamidophos.....40%
Inert Ingredients.....60%

100.3 Application Methods, Directions, Rates

Apply 1 to 2 pints (0.5 - 1.0 lb. a.i) per acre. Up to 10 applications may be made at 7 to 10 day intervals using ground equipment only. Do not apply within 21 days of harvest.

100.4 Target Organism

Dipterous leafminers

100.5 Precautionary Labeling

The following environmental hazards labeling appears on the label.

"This product is toxic to birds and other wildlife. Birds and other wildlife in treated areas may be killed. Do not apply directly to water. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from areas treated.

Do not contaminate water by cleaning of equipment, or disposal of wastes."

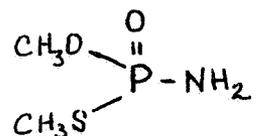
"This product is highly toxic to bees exposed to direct treatment or residues on crops. Protective information may be obtained from your Cooperative Agricultural Extension Service."

101 Physical and Chemical Properties

101.1 Chemical Name

O,S-dimethyl phosphoramidothioate

101.2 Structural Formula



101.3 Common Name

Methamidophos

101.4 Trade Name

Monitor

101.5 Molecular Weight

141.13

101.6 Solubility

Infinitely miscible with water and alcohol. Soluble in alcohols, aliphatic chlorinated hydrocarbons; slightly soluble in ether.

102 Behavior in the Environment

102.1 Soil

102.1.1 Persistence

<u>Soil Type</u>	<u>Half-life (days)</u>
Silt	1.9
Loam	4.8
Sandy	6.1

102.1.2 Degradation

Major route of degradation in soil appears to be biological. Methamidophos is not retained by soil particles.

102.2 Water

102.2.1 Hydrolysis

<u>pH</u>	<u>T 1/2 (25°C)</u>	<u>T 1/2 (37°C)</u>
3-8	-	stable for 2 weeks
7	-	stable for 1 month
9	2-6 days	1.5 days

102.2.2 Leaching

Methamidophos does leach, but degrades rapidly while leaching.

102.3 Plant

Metabolic pathway is strictly hydrolytic. When applied to soil, methamidophos readily moves throughout the whole plant via the root system. When applied to foliage, it translocates only with the transpiration stream towards the margins of treated leaves. No translocation occurs out of the treated leaves via the phloem into the stem or other leaves.

102.4 Animal

Bioaccumulation in fish is not indicated.

103 Toxicological Properties

103.1 References from Toxicology Branch

<u>Species</u>	<u>Test</u>	<u>Results</u>	
Rat	Acute oral	Male LD ₅₀ : 15.6 mg/kg Female LD ₅₀ : 13.0 mg/kg	95% Tech.
Rat	2-year feeding	NOEL: 10 ppm	97% Tech.
Rabbit	Acute dermal	LD ₅₀ : 118 (97.5-143) mg/kg	95% Tech.

103.2 Minimum Requirements

103.2.1 Avian Acute Oral LD₅₀

<u>Species</u>	<u>Test Material</u>	<u>LD50</u>	<u>Validation Category</u>
Bobwhite	Tech.	Males-10.1 mg/kg Females - 11.0 mg/kg	Core
Bobwhite	Tech.	8.0 mg/kg	Supplemental
Mallard	Tech.	29.5 mg/kg	Supplemental
Junco	Tech.	8.0 mg/kg	Supplemental

103.2.2 Avian Dietary LC₅₀'s

<u>Species</u>	<u>Test Material</u>	<u>LC50</u>	<u>Validation Category</u>
Bobwhite	Tech.	42 pm	Core
Mallard	Tech.	1302 ppm	Core

103.2.3 Fish Acute LC₅₀'s

<u>Species</u>	<u>Test Material</u>	<u>LC50</u>	<u>Validation Category</u>
Rainbow trout	Tech.	25 ppm	Core
Bluegill sunfish	Tech.	34 ppm	Core

103.2.4 Aquatic Invertebrate LC₅₀

<u>Species</u>	<u>Test Material</u>	<u>LC50</u>	<u>Validation Category</u>
<u>Daphnia magna</u>	Tech.	26 ppb	Core
<u>Daphnia magna</u>	Tech.	50 ppb	Core

103.3 Additional Terrestrial Laboratory Tests

103.3.1 Avian Reproduction Studies

<u>Species</u>	<u>Test Material</u>	<u>NEL</u>	<u>Validation Category</u>
Mallard	Tech.	>15 ppm	Core
Bobwhite	Tech.	< 5 ppm	Core

104 Hazard Assessment

104.1 Discussion

Approximately 12,100 acres of celery was planted in Florida in 1980. Eight-five percent of the total was planted in Palm Beach County, with the remainder in the counties of Orange, Seminole and Sarasota.

The following discussion is excerpted from a previous EEB review by J. Tice (1/6/78).

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The vegetable industry in Florida is generally located in areas with rich organic soils. Most often fields are created by draining fresh water marsh land. Fields are located close to lakes, marshes, and other areas that support wildlife. Many of the fields in Palm Beach County are located on the S.E. edge of Lake Okeechobee and are drained via canals towards the S.E. and the Loxahatchee National Wildlife Refuge. All fields in Seminole County drain directly into small lakes in the area. Not only do the farms in the area drain into lakes or freshwater marshes, but they are located very close to the marshes. Any substance introduced into drainage or irrigation canals will eventually affect the surrounding aquatic environment.

The proposed use provides for the following maximum expected residues after the initial application.

<u>Vegetation/Insect Surface</u>	<u>Residues (ppm)</u>	
	<u>0.5 lb a.i./A</u>	<u>1.0 lb a.i./A</u>
Sparse foliage (short grasses)	120	240
Long grasses	55	110
Leaves/Leafy crops	67.5	125
Forage/small insects	29	58
Pods/seeds/large insects	5	10
Fruits	3.5	7
Soil (0.1 inch)	11	22

104.2 Likelihood of Adverse Effects to Non-target Organisms

The following discussion is excerpted from the EEB Review for the Methamidophos Registration Standard (Urban 3/5/82).

Estimations of the mg of toxicant/kg of body weight/day intake by birds of varying sizes resulting from eating foods from an area treated uniformly with a single application of methamidophos at 1.0 lb a.i./acre are presented below.

<u>Maximum residues in or on food types (ppm)¹</u>	<u>Mg/kg/day ingested by different sized birds</u>		
	<u>20g (18%)²</u>	<u>100g (9.2%)</u>	<u>1000g (3.6%)</u>
240	43	22	9.0
58	10	5.3	2.1
10	1.8	0.9	0.4

¹ from Kenaga 1973

² percent of body weight ingested in dry food/day

These residues are in some cases greater than the laboratory acute (LD₅₀) or subacute (LC₅₀) toxicity levels for birds. The typical diet of young bobwhite quail is composed of 80% small to medium-size insects (58 ppm x 80%) and 20% seeds (10 ppm x 20%). Therefore, the expected body burden from exposure to an application of 1.0 lb. a.i./acre of methamidophos would be 48.4 ppm. This residue is greater than the LC₅₀ for bobwhite quail (42 ppm), and thus the RPAR criterion has been exceeded for birds. Further, all application rates greater than 0.2 lb a.i./A of methamidophos exceed the Restricted Use criterion for birds.

Given multiple applications (up to 10) at 7-10 day intervals, accumulated residues, at or near avian acute and subacute toxicity levels, are expected to be present for an extended period of time. Applications to control dipterous leafminers will be made anytime from December to June, exposing avian species during their breeding seasons. Reproductive impairment has been shown to occur in bobwhite quail at 5 ppm dietary exposure. The proposed use of methamidophos, therefore, poses a possible serious chronic hazard to avian species in and around celery fields.

In addition, a 1980 bird kill in Wisconsin resulted from aerial application of Monitor 4 to cabbage. Methamidophos residues (0.8-24 ppm) were detected in plant samples collected in and around the field margins. Brain cholinesterase analyses showed significant inhibition in house sparrows and killdeer. The bird specimens contained methamidophos residues ranging from 0.6 to 5.8 ppm. The normal use of this chemical is likely to pose a significant acute hazard to birds exposed to it.

Monitor applied at 1.0 lb a.i./A to a 6" body of water would result in a maximum calculated concentration of 0.73 ppm methamidophos in the water. Laboratory testing indicates that the most sensitive fish species (rainbow trout) has a 96-hour LC₅₀ of 25 ppm. The calculated concentration in the water is insufficient to pose an acute hazard to freshwater fish. Daphnia magna, however, have reported 48-hour LC₅₀s of 0.026 and 0.05 ppm. Under the worst-case scenario presented above, the use of this chemical would pose a potential significant acute hazard to freshwater invertebrates. However, this use pattern is not a direct application to water. It has been reported that between 0.5 and 1.5% of the total amount of water-soluble insecticides like methamidophos, applied in agricultural areas, usually reach aquatic environments via runoff alone (Wauchope 1978). At the maximum application rate of 1.0 lb a.i./A, the estimated concentration in water would be between 0.004 and 0.01 ppm methamidophos. The proposed use of Monitor on celery may result in concentrations of methamidophos lethal to aquatic invertebrates in adjacent shallow waters. No data are available on the chronic effects of methamidophos on aquatic invertebrates.

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104.3 Endangered Species

Several Federally listed endangered species occur in counties likely to be covered by the requested registration of Monitor on celery in Florida. There is currently no evidence to indicate that any species would be jeopardized by this use pattern.

104.4 Data Adequacy Conclusions

The six basic fish and wildlife data requirements for methamidophos have been fulfilled.

104.5 Additional Data Required

The following additional data have been required for Methamidophos:

- 1) a simulated short-term (small pen) field study on birds using Monitor 6 Spray, and
- 2) acute toxicity studies on estuarine/marine invertebrates.

105 Classification

Monitor 4 Spray is a Restricted Use pesticide.

106 RPAR Criteria

The expected body burden from exposure to an application of 1.0 lb a.i./A of methamidophos is greater than the LC₅₀ for bobwhite quail (42 ppm), thus exceeding the RPAR criterion for birds.

107 Conclusions

EEB has completed an incremental risk assessment (3(c)(7) finding) of the proposed conditional registration of Monitor 4 for use on celery.

Based upon the available data EEB concludes that the proposed use provides for a minimal increase in exposure, but there are significant risks to nontarget organisms.

107.1 Environmental Hazards Labeling

The Environmental Hazards statements should be amended to read as follows:

"This product is extremely toxic to birds and other wildlife. Birds and other wildlife in treated areas may be killed. Do not apply directly to water bodies or wetlands (e.g., lakes, streams, ponds, canals). Do not contaminate water by cleaning of equipment or disposal of wastes.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area."

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Table 1A.

Calculated LC₅₀ values and estimated Monitor 4 exposure (MG/KG/DAY and MG/ANIMAL/DAY) for seven species of non-target birds.

SPECIES	BODY WGT. (GMS.)	FOOD CONS. (GMS.)	F. CONS./ B. WGT (%)	CALCULATED LC50	TOXICANT MG/KG/DAY	CONSUMED ^{2/} MG/ANIMAL/DAY	1/5 / 0	
							CALCULATED LC50 ^{3/}	LC10 ^{4/}
1. Bobwhite Quail (Young)	30.05	6.05	20.0	42.0	8.4	0.3	8.4	4.4
2. Bobwhite Quail (Adult)	170.00	15.20	8.94	93.9	8.4	1.4	18.8	9.8
3. Robin	81.10	8.11	10.0	83.9	8.4	0.7	16.8	8.7
4. Mourning Dove	100.00	11.20	11.20	75.0	8.4	0.8	15.0	7.8
5. Eastern Cowbird	50.00	7.00	14.00	60.0	8.4	0.4	12.0	6.2
6. Field Sparrow	13.90	4.60	33.10	25.4	8.4	0.1	5.1	2.6
7. Grasshopper Sparrow	13.90	4.60	33.10	25.4	8.4	0.1	5.1	2.6
8. Carolina Wren	19.00	6.50	34.20	24.6	8.4	0.2	4.9	2.5
9. <i>Spizella monticola</i>		45.2	10.00	101.0	10.1			

$$1/ \text{LC50 (ppm)} = \frac{\text{MG/KG/Day}}{\text{F. Con. (g) / B. WGT (g)}}$$

$$2/ \text{MG/ANIMAL/DAY} = \text{MG/KG/DAY} \times \text{Body weight (kg)}$$

3/ 1/5 LC₅₀ value for registration labeling criteria.

4/ 1/5 LC₁₀ value for hazard evaluation to endangered species (Slope = 4.50).

5/ Milligrams body WGT. (Average weight) 17 day old birds.

6/ Average 5-day food consumption, 17 day old birds.

FOOTNOTES FOR TABLES 1B AND 1C

- 1/ Refer to table 1 (Footnote 6) for an explanation of how the "calculated LC50's" were obtained.
- 2/ Application of Sec. 102.11(c)(2)(iii)(B) criterion of Sec. 3 Regulations.
- 3/ This information is taken from:
Martin, Alexander C., et al., American Wildlife and Plants; A Guide to Wildlife Food Habits, Dover Publ., Inc., N.Y., 1951
- 4/ Based upon a 1.0 lb. active ingredient per acre, application to expected food items using following references:
(a) 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.
(b) Kenaga, E.E., Factors to be Considered in the Evaluation of the Toxicity of Pesticides to Birds in Their Environment, Environmental Quality and Safety, Academic Press, N.Y., II: 166-181, 1973.
- 5/ Residue values adjusted to reflect % animal/plant matter consumed. Examples:

(a) Bobwhite Quail, Adult:	(b) Robin, Adult:
58.0 ppm x 0.27 (27%) = 15.7 ppm	58.0 ppm x 0.40 (40%) = 23.2 ppm
12.0 ppm x 0.73 (73%) = 8.8 ppm	12.0 ppm x 0.60 (60%) = 7.2 ppm
- 6/ Reflects total residues expected in the diet: animal or plant alone or a total of animal and plant food items. Examples:

(a) Robin, Adult:	(b) Mourning Dove, Adult:
23.2 + 7.2 = 30.4 ppm total for animal and plant foods.	12.0 ppm total expected in food items consumed (i.e., 1.00 (100%) x 12.0 ppm = 12.0 ppm).
- 7/ (k) refers to maximum expected residues as per (4)(a), and (b) above.
- 8/ This is the maximum expected residue value for daily pesticide burden occurring from animal items.
- 9/ Daily pesticide burden occurring from ingested plant items.