Shaughnessy Number: 125401

Date Out of EFGWB: JUN MAY 26 1989

TO: D. Stubbs/L. Pemberton
Product Manager 41
Registration Division (TS-767C)

FROM: Patrick Holden, Chief
Ground-Water Section
Environmental Fate & Ground-Water Branch/EFED (TS-769C)

THRU: Henry Jacoby, Chief (Acting)
Environmental Fate & Ground-Water Branch/EFED (TS-769C)

Attached, please find the EFGWB review of:

Reg./File #: 89-LA-05

Chemical Name: Dimethazone

Type Product: Herbicide

Company Name: FMC Corporation

Purpose: Review of application for specific exemption under FIFRA Section 18 for use on sweet potatoes in Louisiana.

Date Received: 4/28/89 ACTION CODE: 510

Date Completed: 6/21/89 EFGWB #(s): 90547

Monitoring study requested: ____ Total Review Time: 1 day

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

** 907

Use this form for individual studies & to submit pesticide applications.

United States Environmental Protection Agency
Office of Pesticide Programs
Washington, DC 20460

Data Review Record

Confidential Business Information - Does not contain National Security Information (E.O. 12065)

Pack Number	Date Received
49286 EFED	4-28-89

1. Product Name: Command

Chemical Name: Clomazone

2. Identifying Number	3. Record Number	4. Action Code	5. MRID/ Accession Number	6. Study Guideline or Narrative
89-LA-05	244432	510		

7. Reference No.	8. Date Rec'd (EPA)	9. Prod/Review Mgr/DCI	10. PM/RM Team No.	11. Date to HED/ EFED/RD/BEAD	12. Proj Return Date	13. Date Returned to RD/SRRD
	4/25/89	Stubbs/Pemberton	41	4/28/89	5/13/89	

Instructions

Please update last yr's review of this request if tox input will be needed please call ASAP

This Section Applies to Review of Studies Only

14. Check Applicable Box

- ☐ Adverse 6(a)(2) Data (405)
- ☐ Special Review Data (870)
- ☐ Generic Data (Reregistration)(660)
- ☐ Product Specific Data (Reregistration)(655)

15. No. of Individual Studies Submitted

16. Have any of the above studies *(in whole or in part)* been previously submitted for review?

☐ Yes *(Please identify the study(ies))* ☐ No

17. Related Actions

18.	To	Type of Review	19. Reviews Also Sent to	20. Data Review Criteria
HED		Science Analysis & Coordination	☐ SAC ☐ PC	A. Policy Note No. 31
		Toxicology/HFA	☐ TOX/HFA ☐ PL	
		Toxicology/IR	☐ TOX/IR	☐ 1 = data which meet 6(a)(2) or meet 3(c)(2)(B) flagging criteria
		Dietary Exposure	☐ DEB ☑ EA	
		Nondietary Exposure	☐ NDE ☐ AC	
EFED	✓	Ecological Effects	☑ BA	☐ 2 = data of particular concern from registration standard
	✓	Environmental Fate & Groundwater	☐ EEB	
SRRD		Special Review	☐ EFGWB	☐ 3 = data necessary to determine tiered testing requirements
		Reregistration		
		Generic Chemical Support	☐ SR	
RD		Insecticide-Rodenticide	☐ RER	B. Section 18
		Fungicide-Herbicide	☐ GSC	☐ 1 = data in support of section 3 in lieu of section 18
		Antimicrobial		
		Product Chemistry	☐ IR	C. Inert Ingredients
		Precautionary Labeling	☐ FH	☐ 1 = data in support of continued use of List 1 inert
BEAD		Economic Analysis	☐ AM	
		Analytical Chemistry		908
		Biological Analysis		

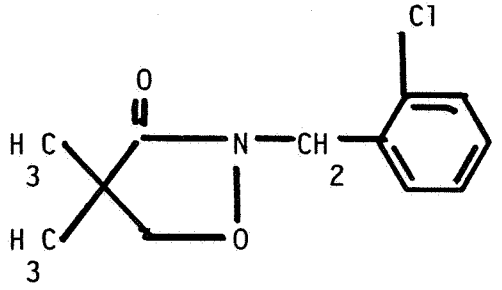
☐ Confidential Statement of Formula (EPA Form 8570-4) Attached *(Trade Secrets)*

☐ Label Attached

APPLICATION FOR EXEMPTION UNDER
FIFRA SECTION 18

1. CHEMICAL:

Chemical name: 2-(2-chlorophenyl)-methyl-4-4-dimethyl-3-isoxazolidinone
Common name: Dimethazone (FMC 57020)
Structure:



2. TEST MATERIAL:

Not Applicable.

3. STUDY/ACTION TYPE:

Review of application for specific exemption in accordance with FIFRA Section 18.

4. STUDY IDENTIFICATION:

Letter dated 4/21/89 with attachment from Bob Odom, Commissioner, Louisiana Department of Agriculutre & Forestry, to Douglas Campt, Director, U.S. EPA, Office of Pesticide Programs.

Submitted by: Bob Odom, Commissioner
Louisiana Department of Agriculture & Forestry
P.O. Box 94302
Baton Rouge, LA 70804-9302

Identifying No.: 89-LA-05
Action Code: 510
Record Number: 244,432
Date Sent to EFED: 4/28/89

5. REVIEWED BY:

W. Martin Williams
Hydrologist
OPP/HED/EFED/Ground-Water Section

Signature: W. Martin Williams
Date: 6/22/89

6. APPROVED BY:

Patrick W. Holden
Section Head
OPP/HED/EFED/Ground-Water Section

Signature: Henry Jacoby
Date: 6/26/89

7. CONCLUSIONS:

Dimethazone is both mobile and persistent in soil and water. Environmental fate properties are not unlike those of atrazine in soil and water. Atrazine has been shown to leach to ground water at low concentrations as a result of normal field use (40 ppb maximum, typically less than 1 ppb). Since dimethazone is significantly less toxic than atrazine and application rates in this request are lower than typical application rates for atrazine, it is unlikely that dimethazone will leach to ground water at levels of toxicological concern resulting from uses in accordance with this Section 18.

8. RECOMMENDATIONS: PLEASE CONTACT TOXICOLOGY BRANCH, HED FOR CONCURRENCE.

EFGWB does not object to this Section 18 on the basis of ground water concerns.

However, as a precaution, based on the mobility and persistence of dimethazone in soil and water, it is recommended that dimethazone not be used in hydrogeologically vulnerable conditions defined as having very permeable (sandy) soils, ground water less than 30 feet, and/or soil conditions conducive to preferential flow conditions (e.g., karst terrain).

9. BACKGROUND:

The applicant requests the use of Command 4EC at a rate of 1.0 tp 1.5 lb ai/A once per year to control broadleaf weeds in sweet potatoes. The treated area would cover 10,000 acres starting May 1989 through July 1989. The ineffectiveness of alternative methods of control are discussed in the application. Total quantity of active ingredient required is 15,000 lb (3,750 gallons).

10. DISCUSSION:

Table 1 compares soil and chemical attributes for dimethazone (USEPA 1985) to criteria used to assess leaching potential (Cohen et al. 1984). Table 1 illustrates that dimethazone is both mobile and persistent in the environment.

The leaching potential of dimethazone is compared to 13 high volume use pesticides in Table 2. The Retardation and Attenuation Factors in Table 2 were obtained using the interactive computer program CHEMRANK (Nofziger et al. 1988). The Retardation Factor is an index of mobility and is a function of the bulk density, organic carbon content, field capacity, and porosity of the soil as well as of the organic carbon-water partition coefficient and Henry's Law constant of the pesticide. The Attenuation Factor reflects the proportion of the applied compound that will reach a defined control depth in the soil and is based on the Retardation Factor, decay rate (soil degradation half-life), and recharge rate.

Pesticide mobility in an idealized sandy clay loam soil (20% clay, 20% silt, and 60% sand) was simulated with CHEMRANK to derive the results in Table 2. A control depth of 1.0 meter and overly conservative (intense) recharge rate of 10 mm/day were used in the model to calculate the Attenuation Factor. Two soil horizons were defined, with the first horizon being between 0.0 and 0.15 m, and the second horizon between 0.15 and 1.0 m. Respective characteristics of these two horizons were: organic carbon contents of 1.2 and 0.4% and bulk densities of 1.4 and 1.5 gram/cc. Both horizons were defined as having a field capacity of 20% and a porosity of 45% (by volume). A detailed discussion of Table 2 is presented by Barrett and Williams (1989).

Dimethazone is ranked in Table 2 according to leaching potential as defined by the Attenuation Factor. Dimethazone is ranked below carbofuran (a very mobile chemical based on its low organic carbon-water partition coefficient) but above simazine, 2,4-D, and atrazine. 2,4-D is very mobile but relatively nonpersistent. Atrazine and simazine are both mobile and persistent. Mobility and persistence as reflected by the organic carbon-water partition coefficients and soil half-lives, respectively, are similar for dimethazone, atrazine, and simazine.

EPA has no record of ground-water monitoring for dimethazone. Ground-water monitoring data for chemicals having similar environmental fate characteristics can be used to estimate maximum potential concentrations from the use of dimethazone. Carbofuran, simazine, 2,4-D, and atrazine have been detected in various studies in ground water as a result of normal field use (Williams et al. 1988). Concentrations have been reported as high as 176 ppb for carbofuran, 9.1 ppb for simazine, 49.5 ppb for 2,4-D, and 40 ppb for atrazine. Extensive monitoring has occurred for atrazine - more than the other pesticides. Except in conditions of very high hydrogeologic vulnerability (e.g., permeable soils, ground water less than 30 feet, and/or karst terrain), most atrazine concentrations in ground water associated with normal agricultural use fall in the sub-part per billions range (Barrett and Williams, 1989).

Table 2 illustrates that application rates for dimethazone are generally less than those of atrazine by a factor of 2 to 4. Application rates for this Section 18 are 1.0 to 1.5 lb ai/A compared to typical application rates of 2 to 4 lb ai/A for atrazine. Based on the lower application rates and similar environmental fate behavior, is unlikely that dimethazone will result in higher concentrations in ground water than atrazine.

Dimethazone is substantially less toxic than carbofuran, simazine, 2,4-D, and atrazine. Although EPA's Office of Drinking Water has not proposed a health advisory level for dimethazone, a surrogate lifetime health advisory of 300 ppb can be calculated from the reference dose (RfD) of 0.043 mg/kg/day (USEPA 1989) based on assuming a human having an average wight of 70 kg consumes two liters of water per day of which 20 percent is drinking water. This is the standard approach used by the Office of Drinking Water in calculating long-term health advisory levels. This surrogate standard of 300 ppb is significantly higher than the maximum concentration of 40 ppb detected to date for atrazine in ground water as a result of agricultural use.

REFERENCES

Barrett, M.R. and W.M. Williams, "The Occurrence of Atrazine in Ground Water as a Result of Agricultural Use", presented at the Conference on Pesticides in Terrestrial and Aquatic Environments, sponsored by the Virginia Water Resources Research Center, Virginia Polytechnic Institute, May 18-22, 1989 in Richmond Virginia.

Cohen, S.Z., S.M. Creeger, R.F. Carsel, and C.G. Enfiel, "Potential Pesticide Contamination of Groundwater from Agricultural Uses, in Treatment and Disposal of Pesticide Wastes", ACS Symposium Series #259, R.F. Krueger and J.N. Seiber, ed., American Chemical Society, Washington, D.C., 1984.

Nofziger, D.L., P.S.C. Rao, and A.G. Hornsby, "CHEMRANK: Interactive Software for Ranking the Potential of Organic Chemicals to Contaminate Groundwater", University of Florida, Gainesville, 1988.

U.S. Environmental Protection Agency, "Exposure Assessment Branch One Liner, EAB File No: 125401", unpublished chemical property summary on Dimethazone prepared by the Hazard Evaluation Division, Exposure Assessment Branch, Aug. 13, 1985.

U.S. Environmental Protection Agency, "RfD Tracking Report", unpublished, prepared by Office of Pesticide Programs, Health Effects Division, February 9, 1989.

Williams, W. M., P.W. Holden, D.W. Parsons, and M.N. Lorber, "Pesticides in Ground Water Data Base: 1988 Interim Report", U.S. Environmental Protection Agency, Office of Pesticide Programs, December 1988.

9/2

6

TABLE 1.
LEACHING ASSESSMENT FOR DIMETHAZONE

PROPERTY	RANGES	CRITERIA	ASSESSMENT
ADSORPTION PARTITION COEFF.	1.54 - 6.85	<5.0, <1.0 OR 2.0	MODERATE TO SIGNIFICANT
SOLUBILITY	1110 PPM	>30 PPM	SIGNIFICANT
HYDROLYSIS HALF-LIFE	STABLE	>25 WEEKS	SIGNIFICANT
PHOTOLYSIS HALF-LIFE	SOIL - STABLE WATER - 88 DAYS	>1 WEEK	SIGNIFICANT
AEROBIC SOIL HALF-LIFE	28 - 173 DAYS	>2-3 WEEKS	SIGNIFICANT
HENRY'S LAW CONSTANT	4.09 E-8 ATM-M3/MOL	<1.0 E-2 ATM-M3/MOL	SIGNIFICANT

OVERALL ASSESSMENT: DIMETHAZONE IS BOTH MOBILE AND PERSISTENT

COMPUTATION OF HENRY'S LAW CONSTANT:

KH = CS / P

P = VAPOR PRESSURE = 1.44 E-4 TORR = 1.895E-7 ATM

CS = SOLUBILITY = 1110.0 PPM = .00111 GM/M3
=.00111 GM/M3 X (1 MOLE/239.7 GM) = 4.631 MOLE/M3

KH = CS/P = 4.631 / 1.895E-7 = 2.444 E 7 MOL/(M3-ATM)

1/KH = 4.092 E-8 (M3-ATM/MOL)

913

Table 1. Environmental Chemistry Characteristics and Leaching Potential Ranking of Some Commonly Used Pesticides

Rank	Common Name	Use[1]	Health Standard[2] (ppb)	Typical Application Rate (lb./acre)	Henry's Law Constant (atm-m3/mol)	Organic Carbon Water Partition Coefficient (ml/g O.C.)	Retardation Factor	Degradation Half-Life (days)	Attenuation Factor
1	Carbofuran	I	40	0.90	8.10 E-09	25.5	2.0	42	5.2 E-01
2	Simazine	H	4	2.00 - 4.00	3.68 E-10	144.0	6.5	75	3.0 E-01
3	2,4-D	H	70	0.25 - 2.00	3.17 E-02	33.0	2.3	16	1.4 E-01
4	Atrazine	H	3	2.00 - 4.00	3.20 E-09	160.0	7.1	60	1.3 E-01
5	Metribuzin	H	200	0.25 - 1.00	2.33 E-10	95.0	4.6	30	1.2 E-01
6	Cyanazine	H	10	1.00 - 4.00	3.17 E-12	168.0	7.4	20	5.9 E-03
7	Metolachlor	H	100	1.50 - 3.00	9.16 E-09	200.0	8.6	20	2.5 E-03
8	Alachlor	H	2	1.50 - 4.00	3.24 E-08	190.0	8.2	14	2.9 E-04
9	Carbaryl	I	700	1.50	1.85 E-05	229.0	9.7	7	4.3 E-09
10	Butylate	H	350	3.00 - 6.00	8.26 E-06	540.0	22.0	12	1.5 E-11
11	Malathion	I	--	0.90	1.20 E-07	1790.0	69.0	1	0.0 E-00
12	Methyl parathion	I	2	0.50	6.12 E-07	7330.0	280.0	4	0.0 E-00
13	Trifluralin	H	2	0.50 - 1.00	1.62 E-04	9850.0	3830.0	70	0.0 E-00
14	DIMETHAZONE	H	300	0.4-1.5	4.13×10^{-8}	100.0	3.2	95	3.9 E-01

[1] (H)erbicide, (I)nsecticide
[2] Drinking water Maximum Contaminant Level or lifetime Health Advisory level (USEPA 1989)