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

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Review of New Chemical Screen for XRD-498, XRM-5019, XRM-5313
CAS Reg. No.: 98967-40-9/1582-09-8
Chemical code: 129016
DP Barcode: 170635

TO: J. Miller/S. Robbins
Product Manager #23
Registration Division (H7505C)

THRU: Paul Mastradone, Chief
Chemistry Review Section #1
Environmental Fate and Ground Water Branch (H7507C)

THRU: Hank Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

FROM: Gail Maske, Chemist
Chemical Review Section #1
Environmental Fate and Ground Water Branch (H7507C)

The registrant, DowElanco, is requesting a new chemical screen for XRD-498 for use on corn and soybeans to control broadleaf weeds and annual grasses. Concurrent to this request, DowElanco is requesting registration of two end use products (XRM-5019 and XRM-5313). XRM-5313 is the trade name used for an end use product containing two active ingredients, XRD-498 and triflualin. Based on a review of the data base for the terrestrial food and feed use pattern, there are insufficient data for XRD-498, XRM-5019, and XRM-5313 to pass the new chemical screen. Unlike most new chemical screens, many of the data requirements for XRD-498 and triflualin have been reviewed in detail.

However, there are deficiencies in five data requirements [aerobic soil metabolism (162-1), anaerobic aquatic metabolism (162-3), leaching, adsorption/desorption (163-1), terrestrial field dissipation (164-1), and accumulation in confined rotational crop (165-1)] for XRD-498 which have not been addressed. EFGWB, in order to fully understand the environmental fate of XRD-498, will need definitive information on the pattern of formation and decline of degradates and XRD-498, as well. Therefore, additional aerobic soil metabolism data using highly elevated application rates may be needed.

In addition, a combination and tank mix study (164-4) is also needed for XRD-5313. Therefore, a terrestrial soil dissipation study on two soils using trifluralin, a terrestrial soil dissipation study on two soils using XRD-498, and a terrestrial soil dissipation study on two soils using both trifluralin and XRD-498 using the appropriate formulations are needed to understand the environmental fate of XRD-5313.

The environmental fate data are not adequate to support the registration of trifluralin used in XRM-5313 for the terrestrial food and feed use pattern, as well. Deficiencies in the aerobic soil and anaerobic soil metabolism (162-1 and 162-2), laboratory volatility (163-2), accumulation in confined rotational crops (165-1), and accumulation in fish (165-4) studies have not been addressed. In addition, mobility studies on two other representative soils using unaged trifluralin are needed to fully understand the environmental fate of trifluralin.

Also, based on the submitted data for trifluralin, there is a discrepancy between the hydrolytic half-live reported and the photolytic dark control half-life for aqueous photodegradation (no degradation vs 19.1 days, respectively). The reason for the difference is not apparent and the registrant needs to address this difference.

Furthermore, the following data requirements for trifluralin registration are reserved until evaluation of other data is completed:

161-4 Photodegradation in air
163-3 Volatility, field
165-2 Accumulation in field rotational crops

ENVIRONMENTAL FATE ASSESSMENT XRD-498

Available data are insufficient to fully assess the environmental fate of XRD-498 at this time. Based upon a review of the submitted studies, some of which were found to be supplemental, XRD-498 is persistent (hydrolysis-$t_{1/2}$->>60 days, aerobic soil metabolism-2 to 3 months, anaerobic aquatic metabolism-183 days, field dissipation-$t_{1/2}$=1.5 to 3 months) and very mobile. In twenty-three soils ranging in texture from sandy loam to clay the adsorption coefficients (K_d) ranged from 0.05 to 2.42, and K_{oc} values ranged from 5 to 182. Only one degradate has been found to be present at a maximum concentration of 10% of applied and/or 0.01 ppm.

The degradate was seen in the anaerobic aquatic metabolism study and was only tentatively identified. The low application rate used in the aerobic soil metabolism studies resulted in the pattern of formation and decline of degradates and XRD-498 not being addressed. No mobility data have been submitted on the anaerobic metabolism degradate. However, in supplemental data furnished an aerobic half-life of ≈2 months was reported for this degradate. Field dissipation data for XRD-498 indicated similar half-lives (1.5 to 3 months) and mobility in well drained soils with low organic matter content. In summary, XRD-498 may be persistent and may exhibit some leaching in the environment. Additionally, XRD-498 appears to degrade faster in soils with higher pH and lower organic carbon content.

Based on an octanol/water coefficient of 1.62, XRD-498 is not expected to accumulate in fish. In addition, confined rotational crops data indicated XRD-498 does accumulate (≤10 ppb in 365 day posttreatment; ≤100 ppb in the 30- and 120-days posttreatment) in rotational crops.

ENVIRONMENTAL FATE OF TRIFLURALIN

Based upon a review of the submitted data, some of which were found to be supplemental, trifluralin appears to be persistent and mobile under some laboratory conditions and not persistent under others. The hydrolysis half-life was not reported (<3% of applied degraded); but the aerobic soil metabolism ($t_{½}$=77 to 126 days depending on soil type), photodegradation in water (half-lives of 8.9 hours), photodegradation on soil ($t_{½}$=41 days), anaerobic soil metabolism ($t_{½}$=25-29 days) half-lives were reported. Unaged trifluralin was reported to be mobile in sand, sandy loam, and loam soils and slightly mobile in clay loam. Aged trifluralin residues were reported to be sightly mobile in sand and loam soils. The Freundlich K_{ads} values ranged from 18.0 to 19.0 for the sand soil, 52.5 to 56.3 for the sandy loam soil, 81.8 to 98.8 for the loam soil, and 124.7 to 155.6 for the clay loam soil. The K_{des} values ranged from 24.3 to 36.9 for the sand soil, 66.4 to 93.2 for the sandy loam soil, 117.2 to 244.7 for the loam soil, and 132.1 to 238.1 for the clay loam soil. Following leaching of aged residues [2-ethyl-7-nitro-1-propyl-5-(trifluoromethyl)benzimidazole, α,α,α-trifluoro-2,6-dinitro-N-propyl-p-toluidine, α,α,α-trifluoro-5-nitro-N4-propyl-toluene-3,4-diamine, 2-ethyl-7-nitro-1-propyl-5-(trifluoromethyl)benzimidazole-3-oxide, 2-ethyl-7-nitro-5-(trifluoromethyl)benzimidazole, α,α,α-trifluoro-2,6-dinitro-p-cresol, 2, 2'-azoxy-bis(α,α,α-trifluoro-6-nitro-N-propyl-p-toluidine, were identified in the metabolism studies] in soil columns, the total radioactivity was, 1.65 to 4.8% in the 6 to 12 cm segment, 0.77 to 1.27% in the 12 to 18 cm segment, and ranged between 0.16 to 0.64 in the remaining segments. In the leachate the total radioactivity was 0.65 to 2.57% of the applied radioactivity. In field dissipation studies, trifluralin was not detected in samples taken below 6 inches.

In summary, the results of the metabolism studies demonstrated that the dissipation rate of trifluralin in soil is rather slow in sandy loam, loam, clay loam, and clay soils, and that volatilization may contribute to the dissipation rather than degradation. Volatilization appears to be controlled to a large extent by

soil moisture and temperature (increases with temperature-WGM;08/91). However, trifluralin did not volatilize when applied in a pesticide mixture. For the reasons stated above - tight adsorption of trifluralin and enhanced decay due to moist conditions (volatilization) and surface application (photolysis)- trifluralin would not be expected to leach under certain environmental conditions. However, trifluralin is sometimes incorporated into the soil; therefore, these modes of degradation may be insignificant.

Trifluralin residues accumulated in Swiss chard, turnips, corn, and winter wheat planted in treated sandy loam soil. Accumulation was greatest (up to 0.086 ppm) in crops planted at 30 days posttreatment. In crops planted at 108 days posttreatment trifluralin residues were not detected in Swiss chard leaves and turnip roots and leaves. Trifluralin residues accumulated in fish with maximum mean BCF of 2041X, 9586X, and 5674X for edible, nonedible, and whole fish, respectively. However, depuration was 86.4 to 88.0% of the accumulated residues when exposed to pesticide-free water for 14 days.

The status of the Environmental Fate Data Requirements for XRD-498 for terrestrial food and feed crops use pattern is as follows:

Environmental Fate Data Requirement		Status of Data Requirement	MRID No.
Degradation Studies-Lab			
161-1	Hydrolysis	Fulfilled (WGM;02/02/90)	41263229
161-2	Photodegradation in water	Fulfilled (GJT;10/ /91)	41931726 41931727
161-3	Photodegradation on soil	Fulfilled (WGM;10/ /91)	41931728 41931729 41931730
161-4	Photodegradation in air	Not Submitted[1]	
Metabolism Studies-Lab			
162-1	Aerobic soil	Not Fulfilled[2] (WGM;06/22/90) (WGM;10/ /91)	41263230 41931731 41931732
162-3	Anaerobic aquatic	Not Fulfilled (WGM;10/ /91)	41931733
Mobility Studies			
163-1	Leaching, Adsorption/ Desorption	Partially Fulfilled[3] (WGM;06/22/90)	41263231 41290403
163-2	Volatility-lab	Not Submitted[1]	
163-3	Volatility-field	Not Submitted[1]	
Dissipation Studies-field			
164-1	Soil	Not Fulfilled (WGM;10/ /91)	41931735
164-4	Combination tank mix	Not Submitted[4]	
Accumulation Studies			
165-1	Rotational crops-confined	Not Fulfilled (WGM;02/02/90) (WGM;10/ /91)	41263232 41931739
165-4	in Fish	Waived (WGM;06/22/90)	

[1] Based on the low vapor pressure (0.8×10^{-15} mm Hg) and toxicological classification of ≥3, there would be sufficient data to support a waiver request for these studies.
[2] This data requirement has been fulfilled for EUP only.
[3] The mobility of degradates has not been addressed.
[4] Combination tank mix data is needed for XRD-5313 only.

The current status of environmental fate data requirements to support the registration of trifluralin for use to control annual grasses and broadleaf weeds in terrestrial food and feed crops is as follows:

Environmental Fate Data Requirements	Status of Data Requirement	MRID No.
Degradation Studies-lab		
161-1 Hydrolysis	Fulfilled[3] (NKW;01/17/84) (DYNAMAC;07/11/85)	00131135
161-2 Photodegradation in water	Fulfilled (DYNAMAC;07/11/85) (WGM;08/ /91)	00094029 40560101
161-3 Photodegradation on soil	Fulfilled (DYNAMAC;07/11/85) (WGM;08/ /91)	00041576 00094807 00105759B 00105772G 40597801 40551301
161-1 Photodegradation in air	Reserved[1]	
Metabolism Studies-lab		
162-1 Aerobic soil	Not Fulfilled (DYNAMAC;07/11/85) (WGM;08/ /91)	00105759A 00105772C 00105772D 00105772G 00105772H 00124024 41240501
162-2 Anaerobic soil	Not Fulfilled (DYNAMAC;07/11/85) (WGM;08/ /91)	00002814 00105772G 00124024 41240502
Mobility Studies		
163-1 Leaching, Adsorption/ Desorption	Partially (DYNAMAC reviewed numerous studies none of which were acceptable) (WGM;07/11/91)	40673501
163-2 Volatility-Lab	Not Fulfilled (DYNAMAC;07/11/85) (WGM;08/ /91)	00105759E-F 00124914 40673601A-C
163-3 Volatility-field	Not Fulfilled[1] (WGM;08/ /91)	40673601D-G

Con't--

Environmental Fate Data Requirements	Status of Data Requirement	MRID No.
Dissipation Studies-field		
164-1 Soil	Fulfilled (DYNAMAC reviewed numerous studies none of which were acceptable) (WGM;07/11/91)	41661101 41781901
Accumulation Studies		
165-1 Confined rotational crops	Not Fulfilled (NKW;01/17/84) (DYNAMAC;07/11/85) (WGM;08/??/91)	00131136 41661102
165-2 Field rotational crops 165-4 in Fish	Reserved[2] Not Fulfilled (DYNAMAC;07/11/91) (WGM;08/ /91)	 00094030 00098842 00105772K 40673801

[1] The photodegradation in air and the field volatility studies are reserved pending the evaluation of an acceptable volatility-lab (163-2) study.

[2] The accumulation in field rotational crops is reserved pending the evaluation of an acceptable confined rotational crops study.

[3] There is a discrepancy between the hydrolytic half-live reported and the photolytic dark control half-life for aqueous photodegradation (no degradation vs 19.1 days, respectively). The reason for the difference is not apparent and the registrant needs to address this difference.