14/13/91

ECOLOGICAL EFFECTS BRANCH REVIEW

Chemical: XRM 5313 [Trifluralin and XRM 5019 (DE498; Flumetsulam)]

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use
DowElanco is applying for an Experimental Use Permit to evaluate XRM 5313 Herbicide for control of grasses and broadleaf weeds on soybeans. The active ingredients of the formulation are Trifluralin (36.35%) and XRM 5019 (2.67%), also referred to as DE498 or Flumetsulam. XRM 5313 contains 3.4 pounds of Trifluralin and 0.25 pounds of XRM 5019 per gallon.

100.2 Formulation Information
Refer to attached photocopies of label.

100.3 Application Methods, Directions, Rates
Refer to attached photocopies of label.

100.4 Target Organisms
A list of the weed spectrum controlled by XRM 5313 is attached.

100.5 Precautionary Labeling
Refer to attached photocopies of label.

101 Hazard Assessment

101.1 Discussion
It is proposed that this permit be issued from March 1, 1992 to December 1, 1993. Application will be preplant, preemergence and will be made with ground equipment. Plots established with research application equipment will be approximately 10 feet by 50 feet in size with 3 replicates. Plots established with commercial application equipment will be 1 or more acres, generally unreplicated. Thirty-one states are included in the program. A list of states and acreage is attached.

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Ecological effects toxicity data for the active ingredients of XRM 5313 are as follows:

TRIFLURALIN

Terrestrial Species

Avian acute oral LD_{50}:
Quail LD_{50} >2000 mg/kg - "practically non-toxic"
Category: Supplemental

Avian dietary LC_{50} (upland gamebird):
Quail LC_{50} >5000 ppm - "practically non-toxic"
Category: Core

Avian dietary LC_{50} (waterfowl):
Mallard LC_{50} >5000 ppm - "practically non-toxic"
NOEL = 5000 ppm
Category: Core

Avian Reproduction:
Bobwhite quail: no effects up to 50 ppm
Mallard duck: increase in cracked eggs at 50 ppm
Both studies are classified as core.

Mammal acute oral toxicity studies:
Laboratory rat LD_{50}=>2000 mg/kg

Non-Target Insects:
Honeybee acute contact: "Relatively non-toxic" - Core

Aquatic Organisms

Acute Freshwater Fish Toxicity:

Warmwater: Bluegill sunfish LC_{50}=58 ppb "highly toxic".
Category: Core

Coldwater: Rainbow trout LC_{50}=41 ppb "highly toxic".
Category: Core.

Acute Freshwater Invertebrate Toxicity:
Daphnia magna: EC_{50}=560 ppb "highly toxic".
Category: Core.

Marine-Estuarine Acute Toxicity:
Grass shrimp: LC_{50}=638.5 ppb "highly toxic"
Core

Sheepshead minnow: LC_{50}=190 ppb "highly toxic"

Fish early life stage and aquatic invertebrate life cycle:

Fathead minnow: MATC=1.9-5.1 ppb
Daphnia magna: MATC =2.4-7.2 ppb
Both studies are classified as core.

Environmental Fate and Residues
Hydrolysis: Trifluralin is stable at pH 3-9.

Adsorption-desorption: Trifluralin is immobile in soil, with a Kd of 80.

Soil metabolism: Trifluralin was studied in a loam, a silty loam and a clay loam. Half-lives were 25-29 days anaerobically and 115 days aerobically on loam.

XRM 5019 (DE498; Flumetsulam)

Terrestrial Organisms

Avian acute oral LD_{50}:
Quail LD_{50} >2250 mg/kg - "practically non-toxic"
Category: Core

Avian dietary LC_{50} (upland gamebird):
Quail LC_{50} >5620 ppm - "practically non-toxic"
Category: Core

Avian dietary LC_{50} (waterfowl):
Mallard LC_{50} >5620 ppm - "practically non-toxic"
Category: Core

Avian Reproduction:
Under Review

Mammal acute oral toxicity studies:
Laboratory rat LD_{50}=>5000 mg/kg for males and females combined

Non-Target Insects:
Honeybee acute contact: >100 ug/bee "Relatively non-toxic"
NOEL = 36 ug/bee
Category: Core

Aquatic Organisms

Acute Freshwater Fish Toxicity:

Warmwater: Bluegill sunfish LC_{50}>300 mg/L "practically non-toxic".
Category: Core

Coldwater: Rainbow trout LC_{50}>300 mg/L "Practically non-toxic".
Category: Core.

Acute Freshwater Invertebrate Toxicity:
Daphnia magna: EC_{50}=243 mg/L "practically non-toxic".
Category: Core.

Marine-Estuarine Acute Toxicity:
Grass shrimp: LC_{50}>350 mg/L "practically non-

toxic"
Core

Fathead minnow: LC_{50}>380 mg/L "Practically non-toxic"
Core

Atlantic silverside: LC_{50}>380 mg/L "Practically non-toxic
Core

Eastern oyster: LC_{50}>100 mg/L "Practically non-toxic"
Core

Environmental Fate and Residues[1]
The vapor pressure of XRM 5019 is 0.8 x 10^{-15} mmHg at 20°C, which is very low. The water solubility is 49 ppm at pH 2.5 and 25°C and 5650 ppm at pH 7.0 at 25°C. The K_{OW}=1.62. XRD 5019 is stable to hydrolysis at pH 5-9 at 25°C in the dark with no loss of parent compound after 66 days of incubation. The soil half-life varies from 23 days at low pH to 4 months at high pH. the high ph half-life is reduced to 2-4 weeks if the organic carbon content of the soil is under 2.5%. Persistence of XRM 5019 in the field should be shorter for soils with higher pH, but longer for soils with higher organic carbon content. XRM 5019 is more water soluble at higher pH but of shorter persistence, unless the soil contains more than 2.5% organic carbon. The mobility of XRM 5019 was tested on 21 different soil types. The Kd values ranged from .09-1.05, which indicates that XRM 5019 is mobile in soil.

Vegetation Residues[2] (Maximum expected values immediately after application)

	Trifluralin	XRM5019
Short rangegrass	238 ppm	32ppm
Leafy crops	122 ppm	14ppm
Forage (and small insects)	57 ppm	8.2ppm
Legumes and pods (large insects)	11.5ppm	1.5ppm

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[1]From EEB review dated 10/22/91 by R. Petrie. Data from EFGWB files.

[2]Hoerger, F.D. and E.E. Kenaga. 1972. 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.

Soil Residues[3]

	Trifluralin	XRM5019
0.1 inch	21 ppm	2.0 ppm
1.0 inch	2.0 ppm	0.21 ppm
6.0 inches	0.35ppm	0.02 ppm

Water (direct application)[2]

	Trifluralin	XRM 5019
0.5 feet	.733 ppm	.0732 ppm
1 foot	.367 ppm	.0365 ppm
6 feet	.060 ppm	.0020 ppm

Water (runoff) (See Attachments A1 and A2)
soil incorporated 2 inches
Trifluralin (solubility = 0.4 so 1% runoff used)=1.17 ppb
XRM 5019 (solubility = 5650 so 5% runoff used)=0.427 ppb

Risk assessment

A. Effects on terrestrial organisms:
Avian: Based on the toxicity data, neither trifluralin nor XRM 5019 appear to pose a concern for avian species at the levels used under this EUP.

Mammalian: The exposure of both trifluralin and XRM 5019 is expected to be well below the rat LD_{50} of 2000 mg/kg and 5000, respectively. Therefore, there is no concern for mammalian species.

B. Effects on aquatic organisms: The expected exposure of trifluralin and XRM 5019 is less than 1/10 the LC_{50} for fish and aquatic invertebrates and does not exceed the chronic effect levels. Therefore, there is no expected hazard to aquatic organisms from XRM 5313, based on the EECs and toxicity of the two active ingredients.

C. Endangered species consideration: There is no concern for endangered terrestrial or aquatic wildlife species for the proposed use. Since XRM 5313 is an herbicide, there is a possible risk for endangered plant species; however, there is no specific concern for endangered plant species at this time due to the minimal drift incurred during application of XRM 5313 to soybean crops via ground application with soil incorporation.

101.4 Adequacy of Toxicity Data
No data was submitted with this EUP application. EEB has sufficient data to support this EUP.

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[3]Urban, D. and N. Cook. 1986. Ecological Risk Assessment. EPA-540/9-85-001).

101.5 Adequacy of Labeling

EEB is providing the following statements for incorporation into labeling: "This pesticide is toxic to fish and aquatic invertebrates. Do not apply directly to water, areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate." This should replace current environmental hazards labelling.

102 Conclusions

EEB has completed a hazard assessment for the use of XRM 5313 herbicide to control broadleaf weeds and grasses in soybeans. EEB has determined that minimal environmental concerns exist from the proposed use. Data are sufficient to support the Experimental Use Permit.

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Literature Cited

Hoerger, Fred and Eugene E. Kenaga. 1972. 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.

U.S. EPA 1986. Hazard Evaluation Division Standard Evaluation Procedure - Ecological Risk Assessment. United States Environmental Protection Agency, Office of Pesticide Programs, Washington, D.C. EPA 540/9-85-001. 96pp.

Trifluralin at 0.96 lb/acre

Attachment A1

EEC CALCULATION SHEET

I. For un-incorporated ground application

A. Runoff

___lb(s) x 0.0_ (_% runoff) x 10 (A) (from 10 A. drainage basin) = _____lb(s) (tot.runoff)

EEC of 1 lb a.i. direct application to 1 A. pond 6-foot deep = 61 ppb

Therefore, EEC = 61 ppb x ____(lb) = _____ ppb

II. For incorporated ground application 2" = 5cm

A. Runoff

0.96lb(s) ÷ 5 (cm) (depth of incorporation) x 0.01 (1% runoff) x 10 (A) (10 A d.basin) = 0.0192lb(s) (tot.runoff)

Therefore, EEC = 61 ppb x 0.0192(lbs) = 1.17 ppb

III. For aerial application (or mist blower)

A. Runoff

____ lb(s) x 0.6 (appl. efficiency) x 0.0 (_% runoff) x 10 (A) (10 A. d.basin) = _____lb(s) (tot.runoff)

B. Drift

_____ lb(s) x 0.05 (5 % drift) = _____ lb(s) (tot. drift)

Tot. loading = _____ lb(s) (tot. runoff) + _____ lb(s) (tot. drift) = _____lb(s)

Therefore, EEC = 61 ppb x _____(lbs) = _____ppb

XRM 5019 at 0.07 lb/A

Attachment AZ

EEC CALCULATION SHEET

I. For un-incorporated ground application

A. Runoff

___lb(s) x 0.0_ (_% runoff) x 10 (A) (from 10 A. drainage basin) = _____lb(s) (tot.runoff)

EEC of 1 lb a.i. direct application to 1 A. pond 6-foot deep = 61 ppb

Therefore, EEC = 61 ppb x ____(lb) = _____ ppb

X II. For incorporated ground application

A. Runoff

0.07lb(s) ÷ 5 (cm) (depth of incorporation) x 0.05 (5% runoff) x 10 (A) (10 A d.basin) = .007 lb(s) (tot.runoff)

Therefore, EEC = 61 ppb x .007(lbs) = 0.427 ppb

III. For aerial application (or mist blower)

A. Runoff

____ lb(s) x 0.6 (appl. efficiency) x 0.0 (_% runoff) x 10 (A) (10 A. d.basin) = _____lb(s) (tot.runoff)

B. Drift

_____ lb(s) x 0.05 (5 % drift) = _____ lb(s) (tot. drift)

Tot. loading = _____ lb(s) (tot. runoff) + _____ lb(s) (tot. drift) = _____lb(s)

Therefore, EEC = 61 ppb x _____(lbs) = _____ppb