

7-11-97

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D237059

DP Barcode : D219266

PC Code No : 129121

EEB Out :

To: Richard Keigwin
Product Manager 10
Registration Division (7505C)

From: Doug Urban
Screening and Greybeard Panel/EFED (7507C)

Attached, please find the EEB review of...

Reg./File # : 264-EUP-RNR RNE ; 264-LTN

Chemical Name : Fipronil

Type Product : Insecticide

Product Name : REGENT 80WG

Company Name : Rhone-Polenc Ag Company

Purpose : Section 5 (EUP)-for use on cotton

Action Code : 710 Date: 7/11/97

Reviewer : N.E. Federoff (Wildlife Biologist)

EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT
71-1(A)	437766-01	C	72-2(A)			72-7(A)		
71-1(B)	437766-02	C	72-2(B)			72-7(B)		
71-2(A)			72-3(A)			122-1(A)		
71-2(B)			72-3(B)			122-1(B)		
71-3			72-3(C)			122-2		
71-4(A)			72-3(D)			123-1(A)		
71-4(B)			72-3(E)			123-1(B)		
71-5(A)			72-3(F)			123-2		
71-5(B)			72-4(A)			124-1		
72-1(A)			72-4(B)			124-2		
72-1(B)			72-5			141-1		
72-1(C)			72-6			141-2		
72-1(C)						141-5		

Y=Acceptable (Study satisfied Guideline)/Concur

P=Partial (Study partially fulfilled Guideline but additional information is needed)

S=Supplemental (Study provided useful information but Guideline was not satisfied) N=Unacceptable (Study was rejected)/Nonconcur

ECOLOGICAL EFFECTS BRANCH REVIEW

Chemical Name: Fipronil: 5-amino-1-(2,6-dichloro-4-(trifluoromethyl)phenyl)-4-((1,R,S)-(trifluoromethyl)sulfinyl)-1-H-pyrazole-3-carbonitrile

Common Name: FIPRONIL

Trade Name: REGENT 80 WG Insecticide

100.0 **Submission and Label Information**

100.1 **Nature and Scope of the Submission**

Request for an experimental use permit (Section 5 of FIFRA) for use of Fipronil (REGENT 80 WG) on cotton throughout selected areas in the United States.

100.2 **Treatment Area**

Proposed label restricts use to the states of Alabama, Arkansas, Arizona, California, Florida, Georgia, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas.

Total Acreage: 1996: 3,360 (84 locations)
1997: 4,720 (118 locations)

Total Quantity of Formulated Product: 1996: 1,260 lbs
1997: 1,770 lbs

Total Quantity of Active Ingredient: 1996: 1,008 lbs
1997: 1,416 lbs

100.3 **Target Organisms**

Thrips, Plant bugs (*Lygus*), and Boll weevil.

100.4 **Formulation Information**

REGENT 80 WG is considered a dry powder flowable water dispersible formulation and applied by either foliar spray or In-Furrow methods.

***Active Ingredient:**

5-amino-1-(2,6-dichloro-4-(trifluoromethyl)phenyl)-
4-((1,R,S)-(trifluoromethyl)sulfinyl)-1-H-pyrazole-
3-carbonitrile.....80%
Inert Ingredients.....20%

*Contains 0.833 pounds of active ingredient per pound of product.

100.5 Application Methods and RatesPOUNDS OF FIPRONIL
REGENT 80 WG

APPLICATION METHOD	PESTS CONTROLLED	OUNCES PER ACRE	DIRECTIONS	USE RESTRICTIONS
In-furrow at planting	Thrips	2.0-3.0 oz. in a minimum of 3 gallons of water	Straight-stream or flat-fan nozzles aligned with the row.	Do not exceed 0.3 lbs ai/acre (6 oz 80 WG)
Foliar spray	Thrips	0.5 to 0.75	Apply a minimum 1 gallon of water mixture by air per acre. Apply minimum of 3 gallons of spray per acre by ground. Repeat as necessary to maintain control.	Do not apply less than 45 days before harvest. Only make one In-furrow application
Foliar spray	Plant bugs	0.75 to 1.0	Apply ounces of product in a minimum of 1 gallon of water/A by air. 3 gallon minimum spray/A by ground.	Begin application when insects reach recognized economic threshold. Apply at 3-10 day interval to maintain control.
Foliar spray	Boll Weevil	1.0 to 1.36	Apply ounces of product in a minimum of 1 gallon of water/A by air. 3 gallon minimum spray/A by ground.	

100.6 Date and Duration

Duration is two years from the date of EPA approval.

100.7 Precautionary Labeling (excerpted from proposed product label)**Environmental Hazards**

This pesticide is toxic to birds and aquatic and estuarine organisms (fish and invertebrates). Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Cover, incorporate or clean up granules that are spilled during loading or visible on soil surface in turn areas. Do not contaminate water when disposing of equipment wash water.

101.0 Hazard Assessment**101.1 Discussion**

Rhone-Poulenc Ag Company has applied for an experimental use permit for FIPRONIL (REGENT 80 WG) insecticide for cotton for the 1996 and 1997 growing seasons. REGENT 80 WG is a new soil insecticide with no currently registered uses.

REGENT 80 WG is a soil insecticide formulated as a fine flowable powder mixable in water and applied by air or with ground equipment. It is applied by using one of two application methods; either one In-Furrow application at planting or by foliar spray.

This EUP will be applied/used in certain states (see below). Each test site will range from 20 to 65 acres (maximum) in size with an average plot size of 40 acres. A maximum of 0.3 lb ai/A of REGENT 80 WG will be applied per acre per season.

STATE	COUNTY	ACREAGE	
		1996	1997
California	Kern, Tulare, Fresno, Madera, Merced, Imperial, Riverside	360	480
Arizona	Maricopa, Yuma, LaPaz, Pinal, Pima	200	400

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New Mexico	Dona Ana, Luna, Curry, Roosevelt, Lea	40	80
Texas	Dawson, Gaines, Hale, Hockley, Lamb, Lynn, Cochran, Bailey, Floyd, Crosby, Lubbock, Parmer, Castro, Swisher, Martin, Midland, Glasscock, Knox, Scurry, Haskell, Hall, Collinsworth, Childress, Hardman, Reeves, Pecos, Tom Green, Runnels, Williamson, Hidalgo, Harlington, Kennedy, Nueces, San Patricio, Uvalde, Cameron, Willacy, Fort Bend, Refugio, Matagorda, Wharton, Starr, Kleberg, Brazos, Robertson, Burleson, Caldwell, Milam, Ellis, Navarro, Hunt, Hill, Fannin, Falls, Denton, Collin, Bowie	600	880
Oklahoma	Jackson, Tillman, Harmon, Washita, Kiowa, Caddo, Greer, Beckham, Custer, Grady, Cotton, Coal, Garvin, Commanche, Canadian, Blain	80	120
Missouri	Dunklin, Peniscot, New Madrid, Stoddard	80	160

Tennessee	Haywood, Crockett, Dyer, Tipton, Fayette, Gibson, Lauderdale, Madison	120	160
Arkansas	Mississippi, Craighead, Crittenden, Lee, Phillips, Lonoke, Miller, Lincoln, Lafayette, Ashley, Drew, Chicot, Desha, Jefferson	320	440
Mississippi	Calhoun, Panola, Le Flore, Tallahatchie, Sunflower, Boliver, Washington, Lee, Marshall, Tunica, Quitman, Sharkey, Adams, Yazoo, Isaquena, Humphreys, Claiborn, Warren, Hinds, Jefferson, Rankin, Copiah, Carroll, Madison, Attala, Leake, Oktibbeha,	480	560
Louisiana	Morehouse, East Carroll, West Carroll, Richland, Ouachita, Catahoulla, Franklin, Concordia, Madison, Tensas, Caddo, Red River, Natchitoches, Point Coupee, Avoyeles, Rapides, Bossier, DeSoto, Webster	480	560

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Georgia	Thomas, Baker, Cook, Tift, Jeff Davis, Turner, Wilcox, Macon, Siminole, Brooks, Mitchell, Berrien, Irwin, Appling, Sumter, Dooly, Bleckley, Decatur, Early, Colquitt, Worth, Coffee, Lee, Crisp, Pulaski, Burke, Emanuel, Ware, Grady, Lowndes, Clay, Ben Hill, Dodge, Houston, Bulloch, Screven, Pierce	160240
Florida	Madison, Gadsen, Levy, Suwanee, Gilchrist, Alachua, Lafayette, Jackson, Houston, Russell, Barbour, Covington, Pike, Mobile, Conecuh, Washington, Baldwin, Escambia, Monroe, Wilcox, Santa Rosa	4040

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Alabama	Cobert, Lawrence, Madison, Blount, Lee, Cherokee, Chambers, Shelby, Tallapoosa, Calhoun, Autauga, Hale, Elmore, Macon, Henry, Montgomery, Lauderdale, Limestone, Morgan, Cullman, Etowah, Fayette, Pickens, Talladega, Chilton, Dallas, Greene, Lowndes, Tuscaloosa, Dale, Coffee, Marengo, Crenshaw, Geneva	160	240
North Carolina	Halifax, Scotland, Sampson, Johnston, Union, North Hampton	80	120
South Carolina	Calhoun, Florence, Clarendon, Lee, Orangeburg, Marlboro, Dillon, Sumter, Hampton, Williamsburg	160	240

101.2 Likelihood of Adverse Effects on Non-Target Organisms

Terrestrial Organisms Toxicity

The following summarizes the acute data for birds for Fipronil soil insecticide.

AVIAN TEST RESULTS

TABLE 1.

Avian Acute Oral Toxicity Findings					
Species	% A.I.	LD ₅₀ mg/kg	MRID No. Author/Year	Toxicity Category	Fulfills Guideline Requirement
Northern Bobwhite	96 Technical	11.3	429186-17 (1990) Pedersen	Highly toxic	Core
Mallard	96.8 Technical	> 2150	429186-16 (1990) Pedersen	Practically non-toxic	Core
Pigeon	97.7 Technical	> 500	429186-13 (1991) Hakin and Rodgers	Slightly toxic	Supplemental
Red-legged Partridge	95.4 Technical	34	429186-14 (1992) Hakin and Rodgers	Highly toxic	Supplemental
Pheasant	95.4 Technical	31	429186-15 (1992) Hakin and Rodgers	Highly toxic	Supplemental
House Sparrow	96.7 Technical	1000	429186-18 (1991) Pedersen and Helsten	Slightly toxic	Supplemental
Northern Bobwhite	99.7 MB46513	5	437766-01 (1993) Pedersen and Solatycki	Very Highly Toxic	Supplemental
Mallard	98.6 MB46513	420	437766-02 (1994) Helsten and Solatycki	Moderately Toxic	Supplemental
Northern Bobwhite	1.6 EXP-60655 A	1065 (formulation) 17 (active-ingredient)	429186-19 (1993) Pedersen and DuCharme	Slightly toxic = Formul. Highly toxic = Active ingredient	Supplemental

Avian Subacute Dietary Toxicity Findings					
Species	% A.I.	LC ₅₀ ppm	MRID No. Author/Year	Toxicity Category	Fulfills Guideline Requirement
Northern Bobwhite	> 95 Technical	48.0	429186-20 (1993) Pedersen	Very highly toxic	Core
Mallard	> 95 Technical	> 5000	429186-21 (1993) Pedersen	Practically non-toxic	Core

These results indicate that Fipronil is highly toxic to upland game bird species on an acute oral basis, is very highly toxic on a subacute dietary basis, and is practically non-toxic to waterfowl on an acute and subacute basis. The guideline requirements are fulfilled. (429186-16, 429186-17, 429186-20, 429186-21)

Avian Reproduction Findings						
Species	% A.I.	NOEC ppm	LOEC ppm	Endpoints affected	MRID No. Author/Year	Fulfills Guideline Requirement
Northern Bobwhite	96.7 Technical	10	Not reported	None	429186-22 (1993) Pedersen and DuCharme	Supplemental
Mallard Duck	96.7 Technical	1000	Not reported	None	429186-23 (1993) Pedersen and Lesar	Core

The avian reproductive studies indicate that Fipronil had no effects at the highest levels that were tested in Mallard (NOEC=1000) and Bobwhite Quail. The NOEC=10 for Bobwhite, which was the highest level tested, will be used as the regulatory endpoint. Although the quail study does not fulfill guideline requirements, the need for a new study is waived. The quail NOEC is very conservative and no value of information is added by requiring a new study. Therefore the guideline requirements are fulfilled. (429186-22 and 429186-23)

Mammalian Toxicity

Mammals

Wild mammal testing is required on a case-by-case basis, depending on the results of the lower tier studies such as acute and subacute testing, intended use pattern, and pertinent environmental fate characteristics. In most cases, however, an acute oral LD₅₀ from the Agency's Health Effects Division (HED) is used to determine toxicity to mammals (HED Tox Oneliners). These LD₅₀'s are reported below.

Mammalian Acute Oral Toxicity Findings			
Species	LD ₅₀ mg/kg	MRID #	Toxicity Category
Rat (small mammal surrogate)	97 mg/kg (MB 46030 93% Technical)	429186-28	Mod. Toxic
Rat (small mammal surrogate)	218 mg/kg (MB 46136 98% Technical) oxidation product	429186-75	Mod. Toxic
Rat (small mammal surrogate)	> 5000 (EXP 60655A 1.6%)	429186-36	P.Non-Toxic
Rat (small mammal surrogate)	> 5000 (RM 1601c 0.25%)	431211-04	P.Non-Toxic

The reported available mammalian data indicate that Fipronil (Technical) is moderately toxic to small mammals on an acute oral basis. (429186-28, 429186-75)

Freshwater Fish

In order to establish the toxicity of a pesticide to freshwater fish, the minimum data required on the technical grade of the active ingredient are two freshwater fish toxicity studies. One study should use a coldwater species (preferably the rainbow trout), and the other should use a warmwater species (preferably the bluegill sunfish).

Freshwater Fish Acute Toxicity Findings					
Species	% A.I.	LC ₅₀ ppm a.i.	MRID No.	Toxicity Category	Fulfills Guideline Requirement
Bluegill sunfish	100 Technical	0.083	429186-24	Very highly toxic	Core
Rainbow trout	100 Technical	0.246	429779-02	Highly toxic	Core
*Rainbow trout	99.2 (MB46136)	0.039	429186-73	Very highly toxic	Supplemental
*Rainbow trout	94.7 RPA104615	>100	432917-18	Pract.non-toxic	Supplemental
*Bluegill sunfish	99.2 (MB46136)	0.025	429186-74	Very highly toxic	Supplemental

* Studies used degradates/metabolites of Fipronil.

The results of the 96-hour acute toxicity studies indicate that Fipronil (Technical) is very highly toxic to Bluegill sunfish and highly toxic to Rainbow trout. The guideline requirements are fulfilled. (429779-02, 429186-73, 429186-24, 429186-74)

Data from fish early life-stage tests are required if the product is applied directly to water or expected to be transported to water from the intended use site, and when the pesticide is intended for use such that its presence in water is likely to be continuous or recurrent regardless of toxicity; or if any acute LC_{50} or EC_{50} is less than 1 mg/L; or if the EEC in water is equal to or greater than 0.01 of any acute EC_{50} or LC_{50} value; or if the actual or estimated environmental concentration in water resulting from use is less than 0.01 of any acute EC_{50} or LC_{50} value and any of the following conditions exist: studies of other organisms indicate the reproductive physiology of fish and/or invertebrates may be affected; or physicochemical properties indicate cumulative effects; or the pesticide is persistent in water (e.g. half-life greater than 4 days). This study is required for Fipronil due to high acute toxicity and the probability that it will enter bodies of water from the proposed use on cotton.

Fish Early Life-Stage Toxicity Findings							
Species	% A.I.	NOEC (ppm)	LOEC (ppm)	MATC (ppm)	MRID No. Author/Year	Endpoints Affected	Fulfills Guideline Requirement
Freshwater: Rainbow trout	96.7 Technical	0.0066 ppm	0.015 ppm	0.0099 ppm	429186-27 (1992) Machado	Larval length	Core

The results indicate that Fipronil affects larval growth at concentrations of greater than 0.0066 ppm in Rainbow Trout. The guideline requirement is fulfilled (429186-27).

Freshwater Invertebrates

The minimum testing required to assess the hazard of a pesticide to freshwater invertebrates is a freshwater aquatic invertebrate toxicity test, preferably using first instar *Daphnia magna* or early instar amphipods, stoneflies, mayflies, or midges.

Freshwater Invertebrate Toxicity Findings					
Species	% A.I.	EC ₅₀ (48hr)	MRID NO. Author/Year	Toxicity Category	Fulfills Guideline Requirement
<i>Daphnia magna</i>	100 Technical	190 pptr	429186-25 (1990) McNamara	Very Highly toxic	Core
<i>Daphnia magna</i>	*94.7 RPA104615	100 ppm	432917-19 (1992) Collins	Prac.non- toxic	Supplemental
<i>Daphnia magna</i>	*100 (MB46136)	29 ppb	429186-71 (1990) McNamara	Very highly toxic	Supplemental
<i>Daphnia magna</i>	*100 (MB45950)	100 ppb	429186-69 (1990) McNamara	Highly toxic	Supplemental

* studies used different degradates/metabolites of Fipronil.

There is sufficient information to characterize Fipronil as very highly toxic to aquatic invertebrates. The guideline requirement is fulfilled. (429186-25, 429186-71, 429186-69).

Data from invertebrate life cycle tests are required if the product is applied directly to water or expected to be transported to water from the intended use site, and when the pesticide is intended for use such that its presence in water is likely to be continuous or recurrent regardless of toxicity; or if any acute LC_{50} or EC_{50} is less than 1 mg/L; or if the EEC in water is equal to or greater than 0.01 of any acute EC_{50} or LC_{50} value; or if the actual or estimated environmental concentration in water resulting from use is less than 0.01 of any acute EC_{50} or LC_{50} value and any of the following conditions exist: studies of other organisms indicate the reproductive physiology of fish and/or invertebrates may be affected; or physicochemical properties indicate cumulative effects; or the pesticide is persistent in water (e.g. half-life greater than 4 days). These studies are required for Fipronil due to high acute toxicity and the probability that the compound will enter bodies of water from the proposed use on cotton.

Aquatic Invertebrate Life-Cycle Toxicity Findings							
Species	% A.I.	NOEC (ppb or ppt)	LOEC	MATC	MRID No. Author/Yr	Endpo ints Affect ed	Fulfills Guideli ne Requir ement
Mysid Shrimp estuarine study	97.7 Tech	< 5 pptr	5 pptr	< 5 pptr	436812-01 (1995) Machado	Surviv Repro Dry wt Length	Supple mental
Daphnia magna freshwater study	100 Tech	9.8 ppb	20 ppb	14 ppb	429186-26 (1990) McNamara	Length	Supple mental

The reported 21 day EC_{50} was 39 ppb. The results indicate that Fipronil affects length in Daphnids at concentrations greater than 9.8 ppb (429186-26). The results also indicate that Fipronil affects growth in Mysids at concentrations less than 5 pptr (436812-01). The Mysid study does not meet guideline requirements because effects occurred at all test concentrations and an NOEC was not determined. The Daphnia study does not meet guideline requirements due to high mortality in the dilution water control and high variability in the analytical measurements. However, the requirement for a new Daphnia study is waived for this use (see memo of Sept 6, 1995 from A. Maciorowski).

Estuarine and Marine Animals

Acute toxicity testing with estuarine and marine organisms is required when an end-use product is intended for direct application to the marine/estuarine environment or is expected to reach this environment in significant concentrations. The use of Fipronil on turf may result in exposure to the estuarine environment. The requirements under this category include a 96-hour LC_{50} for an estuarine fish, a 96-hour LC_{50} for shrimp, and either a 48-hour embryo-larvae study or a 96-hour shell deposition study with oysters.

Estuarine/Marine Acute Toxicity Findings					
Species	% A.I.	LC_{50}/EC_{50}	MRID No. Author/Year	Toxicity Category	Fulfills Guideline Requirement
Eastern oyster embryo larvae	96.1 Technical	$EC_{50}=0.77\text{ppm}$	432917-01 (1993) Dionne	Highly toxic	Core
Mysid Shrimp	96.1 Technical	$EC_{50}=140\text{pptr}$	432797-01 (1994) Machado	Very highly toxic	Upgraded to core
Sheepshead minnow	96.1 Technical	$LC_{50}=0.13\text{ppm}$	432917-02 (1993) Machado	Highly toxic	Core

There is sufficient information to characterize Fipronil as highly acutely toxic to oysters and sheepshead minnows, and very highly toxic to mysids. The guideline requirement is fulfilled. (432917-01, 432797-01, 432917-02)

Toxicity to Plants

Aquatic

Currently, aquatic plant testing is not required for insecticides, although data is supplemental and can be used in a risk assessment. The following species could be tested: *Selenastrum capricornutum*, *Lemna gibba*, *Skeletonema costatum*, *Anabaena flos-aquae*, and a freshwater diatom.

Tier 1 toxicity data on the technical/TEP material is listed below:

Nontarget Aquatic Plant Toxicity Findings					
Species	% A.I.	120hr EC50	MRID#	Author/Year	Fulfills guideline requirements
<i>Navicula pelliculosa</i> (Freshwater diatom)	96.1	>0.12 ppm	429186-58	Hoberg (1993)	Upgraded to core
<i>Lemna gibba</i> (Duckweed)	96.1	>0.10 ppm	429186-56	" (1993)	Supplemental
<i>Selenastrum capricornutum</i> (Freshwater green alga)	96.1	0.14 ppm	429186-60	" (1993)	Core
<i>Skeletonema costatum</i> (Marine Diatom)	96.1	>0.14 ppm	429186-59	" (1993)	Core
<i>Anabaena flos-aquae</i> (Freshwater Blue-green alga)	96.1	>0.17 ppm	429186-57	" (1993)	Core

Environmental Fate and Residues

Environmental fate data was submitted by the registrant but has not been fully reviewed by EFGWB.

Exposure and Risk Characterization

a. Ecological Exposure and Risk Characterization

Explanation of the Risk Quotient (RQ) and the Level of Concern (LOC): The Levels of Concern are criteria used to indicate potential risk to nontarget organisms. The criteria indicate that a chemical, when used as directed, has the potential to cause undesirable effects on nontarget organisms. There are two general categories of LOC (acute and chronic) for each of the four nontarget faunal groups and one category (acute) for each of two nontarget floral groups. In order to determine if an LOC has been exceeded, a risk quotient must be derived and compared to the LOC's. A risk quotient is calculated by dividing an appropriate exposure estimate, e.g. the estimated environmental concentration, (EEC) by an appropriate toxicity test effect level, e.g. the LC_{50} . The acute effect levels typically are:

- EC_{25} (terrestrial plants),
- EC_{50} (aquatic plants and invertebrates),
- LC_{50} (fish and birds), and
- LD_{50} (birds and mammals)

The chronic test results are the:

- NOEL (sometimes referred to as the NOEC) for avian and mammal reproduction studies, and either the NOEL for chronic aquatic studies, or the Maximum Allowable Toxicant Concentration (MATC), the geometric mean of the NOEL and the LOEL (sometimes referred to as the LOEC) for chronic aquatic studies.

When the risk quotient exceeds the LOC for a particular category, risk to that particular category is presumed to exist. Risk presumptions are presented along with the corresponding LOC's.

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Levels of Concern (LOC) and associated Risk Presumption

Mammals, Birds

<u>IF THE</u>	<u>LOC</u>	<u>PRESUMPTION</u>
acute RQ>	0.5	High acute risk
acute RQ>	0.2	Risk that may be mitigated through restricted use
acute RQ>	0.1	Endangered species may be affected acutely
chronic RQ>	1	Chronic risk, endangered species may be affected chronically,

Fish, Aquatic invertebrates

<u>IF THE</u>	<u>LOC</u>	<u>PRESUMPTION</u>
acute RQ>	0.5	High acute risk
acute RQ>	0.1	Risk that may be mitigated through restricted use
acute RQ>	0.05	Endangered species may be affected acutely
chronic RQ>	1	Chronic risk, endangered species may be affected chronically

Plants

<u>IF THE</u>	<u>LOC</u>	<u>PRESUMPTION</u>
RQ>	1	High risk
RQ>	1	Endangered plants may be affected

Currently, no separate criteria for restricted use or chronic effects for plants exist.

Exposure and Risk to Nontarget Terrestrial Animals

Terrestrial Risk Assessment

The principles of ecological risk assessment used to regulate pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) are explained in the EPA Standard Evaluation Procedures (SEP). These procedures define risk or hazard in the form of a hazard ratio comparing the potential estimated exposure to the greatest experimental toxicity level obtained.

The potential estimated exposure is represented by the calculation of an Estimated Environmental Concentration (EEC) based on application rates, intervals, frequencies, and other quantitative information found on the label. The greatest toxicity level comes from the results of studies which are required for registration.

Avian and Mammalian Exposure : Mammalian and Avian risk for aerial and ground spray application.

SPECIES	TOXICITY (ppm)	EXPECTED CONCENTRATIONS (Fletcher 1994) (ppm for 1 lb ai/A)	EEC (ppm) 0.068 lb ai/A rate X Fletcher	RISK QUOTIENT
Bobwhite Acute	LC50= 48	shortgrass= 240 broadleaf= 135 long grass= 110 fruit= 15	16.32 9.18 7.48 1.02	0.34* 0.19** 0.16** 0.02
Bobwhite ¹ Chronic	NOEC= 10	"	64 36 29 -	6.4*** 3.6*** 2.9*** -
Rat	LD50= 97 Converted to mg/Kg/day	"	"	0.008 0.005 0.004 0.001

* Risk may be mitigated through restricted use

** Exceeds LOC for endangered species

*** Exceeds LOC for Chronic risk, endangered species may be affected chronically

Rat LD50 / % body wt consumed = 1940

EEC/1940 = Rat RQ

¹ Based on aerobic soil metabolism

Based on the risk quotients above, Fipronil exceeds the acute LOC values for Restricted Use Classification and risks to endangered bird species. Also, all chronic LOCs were exceeded (RQ > 1) for avian species. There are no risks to mammals from acute dietary exposure. Risk may be mitigated through restricted use.

Aquatic Risk Assessment

Expected Aquatic Concentrations: Fipronil displays high toxicity to most aquatic organisms tested to date. EFED calculated generic EEC levels based on runoff from a 10 hectare field to a 1 hectare x 2 meter deep water body. These generic EEC's (GEEC's) take into account degradation in the field prior to a rain event. The available environmental fate inputs typically used in GENEEC and the input values used for Fipronil are as follows:

Water solubility 2.4ppm
 Koc (Organic Carbon Adsorption coefficient) Ave=803
 Hydrolysis half-life stable (pH 7)
 Aqueous photolysis half-life 0.15 days
 Aerobic soil metabolism 122-128 days
 Aerobic aquatic metabolism half-life N/A
 Incorporation depth 1 inch for In-furrow
 % spray drift 5% Aerial and 1% Ground

LOCs were exceeded using the GENEEC model. Thus, tier 2 assessment models (PRZM2/EXAMII) were then needed to calculate refined EECs. The Pesticide Root Zone Model (PRZM2) simulates pesticides in field runoff on daily time steps incorporating runoff, infiltration, erosion, and evapotranspiration. The model calculates foliar dissipation and runoff, pesticide uptake by plants, microbial transformation, volatilization, and soil dispersion and retardation. The Exposure Analysis Modeling System (EXAMII) simulates pesticide fate and transport in an aquatic environment. Refined EECs are tabulated below:

REFINED EEC's (PRZM2 MODEL, VERSION 2.3)

ESTIMATED ENVIRONMENTAL CONCENTRATIONS (PRZM2)							
Crop	Application Method	Application Rate in lbs a.i./A	Peak EEC (pptr)	4-day EEC (pptr)	21-day EEC (pptr)	60-day EEC (pptr)	90-day EEC (pptr)
Cotton	Foliar spray (Aerial)	0.068 x 4 applications	2459	2391	2205	1946	1845

AQUATIC RISK QUOTIENTS FOR USE CLASSIFICATION FOR FIPRONIL FOR AERIAL SPRAY METHODS OF APPLICATION

The acute risk quotients (RQ) for freshwater and estuarine organisms are:

Organism/ MRID No.	LC50/EC 50 (pptr)	PRZM2 EEC's (pptr) (PEAK)	RISK QUOTIENTS
Bluegill 429186-24	83,000	753 Aerial	0.03
Mysid Shrimp 432797-01	140	753 Aerial	***17.6
Oyster 432917-01	770,000	753 Aerial	0.003
Sheepshead Minnow 432917-02	130,000	753 Aerial	0.02
Daphnia 429186-25	190	753 Aerial	***13.0
Daphnia 429186-71 (MB46136) Degradate	29,000	753 Aerial	*0.08
Bluegill 429186-74 (MB46136) Degradate	25,000	753 Aerial	*0.1

* Endangered species may be affected acutely

** Exceeds the LOC, risk may be mitigated through restricted use

*** Exceeds the LOC for high acute risk

Based on the PRZM2/EXAMII model derived acute risk quotient (RQ) values ($RQ = EEC/LC50$ or $EC50$) for regulatory action outlined by the new paradigm, Fipronil exceeds the LOC values for high acute risk, risk that may be mitigated through restricted use and endangered species LOCs for freshwater and estuarine invertebrates (daphnids and mysids) for aerial application methods. Therefore, if Fipronil enters nearby bodies of water following application to cotton, these invertebrates are likely to be adversely impacted.

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The chronic RQ's ($RQ = EEC/MATC$) for freshwater and estuarine organisms are:

ORGANISMS/MRID	MATC (pptr)	PRZM2 EEC VALUES	RISK QUOTIENTS
Rainbow trout 429186-27	9900	1946 pptr (60 day)	0.02 Aerial
Daphnia magna 429186-26	14,000	2205 pptr (21 day)	0.16 Aerial
Mysid shrimp 436812-01	5	2205 pptr (21 day)	*441.0 Aerial

* Exceeds chronic LOC ($RQ > 1$)

These results indicate that there is a high chronic risk to estuarine invertebrates exposed to Fipronil in their environment. Based on the results of the Mysid life cycle study, estuarine invertebrates are likely to show significant reproductive effects from chronic, low level exposure to Fipronil.

AQUATIC PLANT RISK

The EC_{50} for the freshwater green algae, *Selenastrum capricornutum*, is 140,000 pptr. Based on the RQ value ($RQ = 0.02$ aerial spray), Fipronil does not exceed the LOC ($RQ < 1$), therefore, Fipronil has a low risk to aquatic plants.

101.3 Endangered Species Concern

The only group of endangered/threatened organisms likely to be jeopardized by the proposed use of Fipronil on cotton are freshwater and estuarine invertebrates. Invertebrates living in vernal pools in California (California Lideiella, Conservancy shrimp, Longhorn Fairy shrimp, Riverside Fairy shrimp, Vernal pool fairy shrimp, and the Vernal pool tadpool shrimp) may be affected from runoff or direct drift. Contact CA Dept. of Pesticide Regulation (DPR). There are no acute avian risks associated with the proposed use of Fipronil. For aquatic plants there are no endangered species concerns. The Endangered Species Protection Program is expected to become final sometime in the near future. Limitations in the use of Fipronil may be required to protect endangered and threatened species, but these limitations have not been defined and may be formulation specific. EPA anticipates that a consultation with the Fish and Wildlife Service will be conducted in accordance with the species-based priority approach described in the Program. Modifications would most likely consist of the generic label statement referring pesticide users to use limitations contained in county Bulletins.

101.4 Adequacy of Data

Only one outstanding study is a fish early life stage study (72-4a) conducted with an estuarine fish species. This data requirement is waived for this submission, based on the similarities between the acute toxicities and risk quotients of estuarine and freshwater fish and the comparative chronic toxicities and RQ's of both invertebrate test species and freshwater fish.

101.5 Adequacy of Labeling

The environmental hazards label statement for REGENT 80 WG for use on cotton needs to be amended as follows:

This pesticide is toxic to birds, mammals, fish, and aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Runoff and drift from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate.

This pesticide also meets the criteria for classification as a **Restricted Use Pesticide** (40 CFR 152.170 (c) (iii) with regard to risks to estuarine invertebrates.

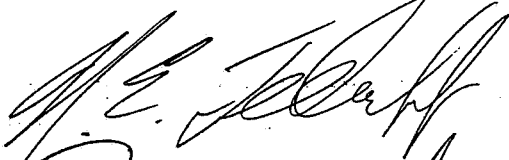
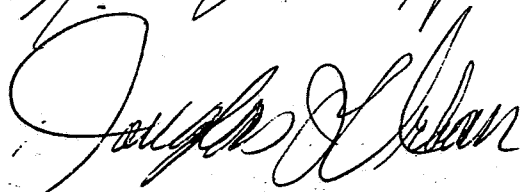
101.6 Conclusions

Based on the current toxicity data and proposed use of Fipronil (Regent 80 WG) on cotton, EEB concludes that Fipronil may present an acute risk to nontarget avian species which may be mitigated through restricted use. There may also be chronic risk to avian species at all trophic levels. Although Fipronil is highly toxic to terrestrial organisms, the method of application may significantly reduce exposure of these animals feeding on the treated areas. However, freshwater and estuarine invertebrates are at high acute and chronic risks from the entry of Fipronil into estuaries adjacent to treated areas, especially from aerial (based on PRZM2/EXAMSII model values) and ground spray application methods (GENEEC values). The registrant needs to consider methods to reduce exposure in freshwater and estuarine areas.

Use on cotton may jeopardize federally listed endangered/threatened aquatic organisms and other endangered or threatened avian and mammalian species.

N.E. Federoff, Wildlife Biologist
ERB IV
Environmental Fate and Effects Division

Doug Urban
Screening and Greybeard Panel
Environmental Fate and Effects Division

 7/24/97
 7/24/97

Fipronil / chronic
avian

DAILY ACCUMULATED PESTICIDE RESIDUES---MULTP. APPL.

Chemical name -----
Initial concentration (ppm) -----
Half-life -----
A number of application -----
Application interval -----
Length of simulation (day) -----

fipronil
16.32 ----- 0.068 x 240 ppm
122
4
3
60

DAY RESIDUE (PPM)

0	16.32
1	16.22754
2	16.1356
3	32.36419
4	32.18083
5	31.99851
6	48.13723
7	47.86451
8	47.59334
9	63.6437
10	63.28313
11	62.92461
12	62.56812
13	62.21364
14	61.86117
15	61.51071
16	61.16222
17	60.81571
18	60.47116
19	60.12857
20	59.78791
21	59.44919
	59.11238
23	58.77748
24	58.44449
25	58.11338
26	57.78414
27	57.45677
28	57.13125
29	56.80758
30	56.48574
31	56.16572
32	55.84752
33	55.53112
34	55.21651
35	54.90369
36	54.59263
37	54.28334
38	53.97581
39	53.67001
40	53.36594
41	53.0636
42	52.76298
43	52.46405

44	52.16682
45	51.87128
46	51.5774
47	51.28519
48	50.99464
49	50.70574
50	50.41847
51	50.13283
52	49.8488
53	49.56639
54	49.28557
55	49.00635
56	48.72871
57	48.45264
58	48.17813
59	47.90518
60	47.63378

Maximum residue	-----	63.6437
Average residue	-----	51.84191

DAY BY ACCUMULATED PESTICIDE RESIDUES---MULTP. APPL.

Chemical name	-----	fipronil
Initial concentration (ppm)	-----	9.18
Half-life	-----	122
A number of application	-----	4
Application interval	-----	3
Length of simulation (day)	-----	60

0.068 x 135 *11th*

DAY	RESIDUE (PPM)
---	-----

0	9.18
1	9.127992
2	9.076278
	18.20486
4	18.10172
5	17.99917
6	27.07719
7	26.92379
8	26.77126
9	35.79958
10	35.59676
11	35.39509
12	35.19457
13	34.99517
14	34.79691
15	34.59977
16	34.40375
17	34.20884
18	34.01503
19	33.82232
20	33.6307
21	33.44017
22	33.25072
23	33.06234
24	32.87502

25	32.68878
26	32.50358
27	32.31943
28	32.13633
29	31.95426
30	31.77323
31	31.59322
32	31.41423
33	31.23626
34	31.05929
35	30.88332
36	30.70836
37	30.53438
38	30.36139
39	30.18938
40	30.01835
41	29.84828
42	29.67917
43	29.51103
44	29.34384
45	29.17759
46	29.01229
47	28.84792
48	28.68449
49	28.52198
50	28.36039
51	28.19972
52	28.03995
53	27.88109
54	27.72313
55	27.56607
56	27.4099
57	27.25461
58	27.1002
59	26.94667
60	26.794
Maximum residue	35.79958
Average residue	29.16107

DAILY ACCUMULATED PESTICIDE RESIDUES---MULTP. APPL.

Chemical name	fipronil
Initial concentration (ppm)	7.48 — 0.068 x 110
Half-life	122
A number of application	4
Application interval	3
Length of simulation (day)	60

DAY	RESIDUE (PPM)
0	7.48
1	7.437623
2	7.395485
3	14.83359
4	14.74955
5	14.66599

6	22.0629	
7	21.9379	
8	21.81362	
9	29.17003	
10	29.00477	
11	28.84045	
12	28.67705	
13	28.51459	
14	28.35304	
15	28.19241	
16	28.03268	
17	27.87387	
18	27.71595	
19	27.55893	
20	27.4028	
21	27.24755	
22	27.09318	
23	26.93968	
24	26.78706	
25	26.6353	
26	26.4844	
27	26.33435	
28	26.18516	
29	26.03681	
30	25.8893	
31	25.74262	
32	25.59678	
33	25.45176	
34	25.30757	
35	25.16419	
36	25.02162	
37	24.87986	
38	24.73891	
39	24.59875	
40	24.45939	
41	24.32082	
42	24.18303	
43	24.04602	
	23.9098	
45	23.77434	
46	23.63964	
47	23.50572	
48	23.37254	
49	23.24013	
50	23.10846	
51	22.97754	
52	22.84737	
53	22.71793	
54	22.58922	
55	22.46124	
56	22.33399	
57	22.20746	
58	22.08164	
59	21.95654	
60	21.83215	
Maximum residue	-----	29.17003
Average residue	-----	23.76087

DAILY ACCUMULATED PESTICIDE RESIDUES---MULTP. APPL.

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DATA EVALUATION RECORD
§ 71-1(4) - AVIAN SINGLE-DOSE LD₅₀ TEST
(B)

1. CHEMICAL: Fipronil PC Code No.:129121
2. TEST MATERIAL: MB 46513 (Photodegradeate) Purity: 99.7 %
3. CITATION: see title
Authors: B.R. Helsten and A.M. Solatycki
Title: 14-Day Acute Oral LD50 Study with
MB46513 in Mallard Ducks.
Study Completion Date: 8/10/94
Laboratory: Bio-Life
Sponsor: Rhone-Poulenc Ag Co.
Laboratory Report ID: BLAL no. 108-027-04
MRID No.: 437766-02
4. REVIEWED BY: N.E. Federoff (Wildlife Biologist) EEB, EFED
Signature: *N.E. Federoff* Date: 10/20/95
5. APPROVED BY: Ann Stavola, Head, Section (5), EEB, EFED
Signature: *Ann Stavola* Date: 10/20/95
6. STUDY PARAMETERS

Scientific Name of Test Organism: (Anas platyrhynchos)
Test Organisms Age/Size: 26 weeks of age at test initiation.
Definitive Study Duration: 14 days
7. CONCLUSIONS: The study was scientifically sound and fulfills guideline requirements for an avian acute oral study. With an LD50 of 420 mg ai/kg, MB46513 is moderately toxic to waterfowl.

Results Synopsis
LD₅₀: 420 mg ai/kg
LOEL: 147 mg ai/kg

95% C.I.: 298-581 mg ai/kg
Probit Slope: 3.34
8. ADEQUACY OF THE STUDY

A. Classification: Core
B. Rationale: N/A
C. Repairability: N/A
9. GUIDELINE DEVIATIONS

1. No NOEL was obtained.

10. SUBMISSION PURPOSE: Registration

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
Species: A wild waterfowl species, preferably the mallard (<i>Anas platyrhynchos</i>), or an upland game bird species, preferably the bobwhite (<i>Colinus virginianus</i>).	Mallard Duck
Age at beginning of test: At least 16 weeks old.	26 weeks
Supplier	Whistling Wings
Acclimation period: At least 15 days.	70 days

B. Test System

Guideline Criteria	Reported Information
Pen facilities adequate?	122x122x122 cm steel wire pens
Photoperiod: 10-h light, 14-h dark is recommended.	10L/14D
Diet was nutritious and appropriate for species?	Yes
Feed withheld at least 15 hours prior to dosing?	Yes/21.5 hrs

C. Test Design

Guideline Criteria	Reported Information
Range finding test?	Yes
Definitive Test Nominal concentrations: At least five, in a geometric scale, unless $LD_{50} > 2000$ mg ai / kg.	147,215,464,1000,1470, and 2150 mg/kg
Controls: Water control or vehicle control (if vehicle is used)	Gelatin capsule
Number of birds per group: 10 (strongly recommended)	10 (5M/5F)
Vehicle: Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	None
Amount of vehicle per body weight: Constant volume/weight % of body weight, not to exceed 1% (1ml/100g).	N/A
Observations period: At least 14 days.	14 days

12. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Individual body weights measured at beginning of test, on day 14 and at end of test if extended beyond 14 days?	Yes
Mean feed consumption measured at beginning of test, on day 14, and at end of test if extended beyond 14 days?	Yes
Control Mortality: Not more than 10%	0 %
Raw data included?	Yes
Signs of toxicity (if any) were described?	Yes

Mortality

Dosage (mg/kg)	No. of Birds	Cumulative Number of Dead							
		Day of Study							
		1	2	3	4	5	6-8	9-11	12-14
Control	10	0	0	0	0	0	0	0	0
147	10	0	1	1	1	1	1	1	1
215	10	0	1	2	2	2	2	2	2
464	10	1	2	3	3	4	4	4	4
1000	10	3	8	9	9	9	9	9	9
1470	10	4	9	10	10	10	10	10	10
2150	10	8	10	10	10	10	10	10	10

Other Significant Results: Clinical signs noted included lack of coordination, convulsions, lethargy, chalky droppings, and death as well as reductions in bodyweight and food consumption.

Reported Statistical Results

Statistical Method: Litchfield and Wilcoxon

LD₅₀: 437 mg/kg 95% C.I.: 332-576 mg/kg

NOEL: Not achieved Probit Slope: 1.88

13. Verification of Statistical Results

Statistical Method: Probit

LD₅₀: 420 mg/kg 95% C.I.: 298-581 mg/kg

LOEL: 147 mg/kg Probit Slope: 3.34

14. REVIEWER'S COMMENTS: None

N.E.Federoff FIPRONIL MB46513 ACUTE ORAL LD50 (MALLARD)

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (PERCENT)
2150	10	10	100	9.765625E-02
1470	10	10	100	9.765625E-02
1000	10	9	90	1.074219
464	10	4	40	37.69531
215	10	2	20	5.46875
147	10	1	10	1.074219

THE BINOMIAL TEST SHOWS THAT 147 AND 1000 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 533.6925

RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	.118332	423.8456	302.661	574.3138

RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H
5	.1517387	1

GOODNESS OF FIT PROBABILITY
.780214

SLOPE = 3.340668
95 PERCENT CONFIDENCE LIMITS = 2.039356 AND 4.64198

LD50 = 420.4598
95 PERCENT CONFIDENCE LIMITS = 297.5286 AND 581.2357

LC10 = 175.2109
95 PERCENT CONFIDENCE LIMITS = 85.96451 AND 255.403

* THESE DATA CHARACTERIZE FIPRONIL MB46513 AS BEING MODERATELY TOXIC TO WATERFOWL ON AN ACUTE ORAL BASIS. - N.E. FEDEROFF

DP Barcode: D219266

MRID No.: 437766-01

DATA EVALUATION RECORD
§ 71-1(A) - AVIAN SINGLE-DOSE LD₅₀ TEST

1. CHEMICAL: Fipronil PC Code No.: 129121

2. TEST MATERIAL: MB 46513 (Photodegradeate)
Purity: 98.6 %

3. CITATION: 21-Day Acute Oral LD50 Study In Bobwhite Quail.

Authors: C.A Pedersen and A.M. Solatycki

Title: see citation

Study Completion Date: 6/25/93

Laboratory: Bio-Life

Sponsor: Rhone-Poulenc Ag Company

Laboratory Report ID: 108-017-03

MRID No.: 437766-01

4. REVIEWED BY: N.E. Federoff (Wildlife Biologist), EEB, EFED

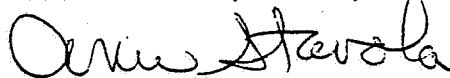
Signature:



Date: 10/20/95

5. APPROVED BY: Ann Stavola, Head, Section (5), EEB, EFED

Signature:



Date:

10/20/95

6. STUDY PARAMETERS

Scientific Name of Test Organism: *Colinus virginianus*

Test Organisms Age/Size: 20 weeks of age

Definitive Study Duration: 21 days

7. CONCLUSIONS: This study is scientifically sound and fulfills guideline requirements for an acute oral study. With an LD50 of 5 mg/kg, MB 46513 is very highly toxic to upland gamebirds.

Results Synopsis

LD₅₀: 5 mg ai/kg

NOEL: 3.16 mg ai/kg

95% C.I.: 2.44-12 mg ai/kg

Probit Slope: 3.62

8. ADEQUACY OF THE STUDY

A. Classification: Core

B. Rationale: N/A

C. Repairability: N/A

9. GUIDELINE DEVIATIONS

1.

DP Barcode: D219266

MRID No.: 437766-01

10. SUBMISSION PURPOSE: Registration

11. MATERIALS AND METHODS

A. Test Organisms

Guideline Criteria	Reported Information
Species: A wild waterfowl species, preferably the mallard (<i>Anas platyrhynchos</i>), or an upland game bird species, preferably the bobwhite (<i>Colinus virginianus</i>).	Bobwhite Quail
Age at beginning of test: At least 16 weeks old.	20 weeks
Supplier	Sand Prairie Quail Farm, IA.
Acclimation period: At least 15 days.	32 days

B. Test System

Guideline Criteria	Reported Information
Pen facilities adequate?	Yes in 61x53.3x38.1 cm steel wire pens.
Photoperiod: 10-h light, 14-h dark is recommended.	10L/14D
Diet was nutritious and appropriate for species?	Yes
Feed withheld at least 15 hours prior to dosing?	Yes, 21 hrs

C. Test Design

Guideline Criteria	Reported Information
Range finding test?	Yes
Definitive Test Nominal concentrations: At least five, in a geometric scale, unless LD ₅₀ > 2000 mg ai / kg.	31.6, 14.7, 6.81, 3.16, and 1.47 mg ai/kg
Controls: Water control or vehicle control (if vehicle is used)	Vehicle
Number of birds per group: 10 (strongly recommended)	10
Vehicle: Distilled water, corn oil, propylene glycol, 1% carboxymethylcellulose, or gum arabic.	Evaporated Acetone in gelatin capsules
Amount of vehicle per body weight: Constant volume/weight % of body weight, not to exceed 1% (1ml/100g).	N/A
Observations period: At least 14 days.	21 days