UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Prevention, Pesticides, and Toxic Substances

April 26, 1996

MEMORANDUM:

SUBJECT: **Fipronil:** Environmental Assessment, Current for the Turf Registration

(CAS no. 120068-37-3; PC Code 129121)

FROM: David Farrar, registration team coordinator
Environmental Fate and Effects Division

THROUGH: Kathy Monk, Acting Chief
Science Analysis and Coordination Staff
Environmental Fate and Effects Division

TO: Richard Keigwin, Chemical Review Manager
Registration Division

Attached is an Environmental Assessment which integrates material from the EFED branches (EFGWB, EEB). This document is similar to the chapters that EFED proposes for REDs, except that it is formatted to be a stand-alone document. The document is current for the turf decision, but should be reviewed and updated for future decisions (e.g., corn, cotton).

For the turf EUP, EFED has provided recommendations in a previous communication (D. Farrar to R. Keigwin 4/29/96), including identification of information gaps for fish bioaccumulation and for chronic toxicity to estuarine invertebrates.

This document relies on branch reviews transmitted to RD, provided by EEB, the EFGWB review section, and the EFGWB Surface Water Section. However, note the following substantive differences between the present document and source documents:

1. A statement has been removed to the effect that Fipronil will be transported to aquatic environments will be mostly adsorbed to soil particles. The statement was based on review of fate studies before the evaluation of specific scenarios using PRZM. For the scenarios we simulated with PRZM, more Fipronil was transported dissolved.

2. Material on small mammal toxicity, taken from HED Tox One Liners, has been replaced to indicate that the values used in risk assessments are confirmed in identifiable memos (cited) from HED.

3. Risk evaluations based on the GENEEC model have been removed.

EFED Registration Team for Fipronil	
Nick Federoff	Reviewing Scientist, EEB
Ann Stavola	Section Head, EEB
Tom Bailey	Senior Aquatic Effects Scientist, EEB
Gail Maske	Reviewing Scientist, EFGWB
Paul Mastradone	Section Head, EFGWB
Siroos Mostaghimi	Surface Water Modeler, EFGWB
David Farrar	Fipronil Registration Coordinator, SACS[1]

[1] Phone (703) 305-7521

CC:\ Hank Jacoby
Tony Maciorowski
Kathy Monk
Sharlene Matten
EFED registration team members

Environmental Assessment for Fipronil

(Current for Registration for Use on Turf)

Environmental Fate and Effects Division

April 26, 1996

CONTENTS

1. Ecological Toxicity Data

The Agency has adequate data to assess the hazard of Fipronil (GAUNTLET 0.1G) to nontarget terrestrial organisms. An acceptable chronic toxicity study using mysids is needed to complete the assessment of risk to nontarget aquatic organisms.

a. Toxicity to Terrestrial Animals

(1) Birds, Acute and Subacute

In order to establish the toxicity of Fipronil to birds, the following tests are required using the technical grade material: one avian single-dose oral (LD_{50}) study on one species; two subacute dietary studies (LC_{50}) on one species of waterfowl and one species of upland game bird.

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 Nontoxic	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 MB 46513	5	437766-01 (1993) Pedersen and Solatycki	Very Highly toxic	Supplemental
Mallard	*98.6 MB 46513	420	437766-02 (1994) Helsten and Solatycki	Moderately toxic	Supplemental
Northern Bobwhite	1.6 EXP-60655A	1065 (formulation) 17 (active ingredient)	429186-19 (1993) Pedersen and DuCharme	Formulation slightly toxic; Active ingredient highly toxic	Supplemental

* Studies used metabolites/degradates of Fipronil

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 acute and subacute bases. The guideline requirements are fulfilled.

Metabolite MB46513 is more toxic than parent Fipronil to birds (very highly toxic to upland gamebirds and moderately toxic to waterfowl on an acute oral basis). (MRID 429186-16, 429186-17, 429186-20, 429186-21)

(2) Birds, Chronic

Avian reproduction studies are required when birds may be exposed repeatedly or continuously through persistence, bioaccumulation, or multiple applications, or if mammalian reproduction tests indicate reproductive hazard. Present product labeling of Fipronil allows two applications of the end-use product per year.

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

Fipronil had no effects at the highest levels tested for both mallard (1000 ppm) and bobwhite quail (10 ppm). The toxicity value used to calculate the risk quotient for avian chronic risk was the highest value tested for bobwhite quail (10 ppm). That value is a conservative no observed effect concentration (NOEC).

Although the quail study does not fulfill guideline requirements, the requirement for an acceptable study is waived. The quail NOEC is very conservative and therefore a new study

would have limited value. Therefore the guideline requirements are fulfilled for this use. (429186-22 and 429186-23).

(3) 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 LD_{50} from the Agency's Health Effects Division (HED) is used to determine toxicity to mammals.

Measurements of acute oral toxicity of fipronil to mammals have been reviewed by the Health Effect Division of the Office of Pesticide Programs (memo 6/28/94 V. Dobozy to R. Brennis). A rat acute oral LD_{50} of 97 mg/kg was obtained using MB 46030 Technical (Fipronil 93%). This value is the average of values for male rats (92 mg/kg) and female rats (103 mg/kg). A second study resulted in $LD_{50} > 50$ mg/kg using RM1601C (Fipronil 0.25%).

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

b. Toxicity to Aquatic Animals

(1) Acute Toxicity to 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	Practically Nontoxic	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. The data also show that metabolite/degradate MB46136 is more toxic than parent Fipronil to freshwater fish. (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 is 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 turf.

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 Tech.	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 greater than 0.0066 ppm in rainbow trout. The guideline requirement is fulfilled. (429186-27)

(2) Acute Toxicity to 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} (48 hr)	MRID NO. Author/Year	Toxicity Category	Fulfills Guideline Requirement
Daphnia magna	100 Technical	190 ppb	429186-25 (1990) McNamara	Highly toxic	Core
	*94.7 RPA104615	100 ppm	432917-19 (1992) Collins	Practically non-toxic	Supplemental
	*100 (MB46136)	29 ppb	429186-71 (1990) McNamara	Very highly toxic	Supplemental
	*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 highly toxic to aquatic invertebrates. The guideline requirement is fulfilled. Degradate/Metabolites MB46136 and MB45950 are more toxic than parent Fipronil. (429186-25, 429186-71, 429186-69).

(3) Chronic Toxicity to Freshwater and Estuarine Invertebrates

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 turf.

Aquatic Invertebrate Life-Cycle Toxicity Findings					
Species	**% A.I.**	**Toxicity**	**MRID No. Author/ Year**	**Endpoints Affected**	**Fulfills Guideline Requirement**
Mysid Shrimp (estuarine)	97.7 Tech.	NOEC<5 pptr LOEC=5 pptr MATC<5 pptr	436812-01 (1995) Machado	Survival Repro. Dry weight Length	Supplemental
Daphnia magna (freshwater)	100 Tech.	NOEC=9.8 ppb LOEC=20 ppb MATC=14 ppb	429186-26 (1990) McNamara	Length	Supplemental

Fipronil affected length of Daphnids at concentrations greater than 9.8 ppb. Also, there was mortality of adults (EC_{50}=39 ppb). 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). (MRID 429186-26)

Fipronil affected reproduction, survival, and growth of Mysids at concentrations less than 5 pptr. The Mysid study does not meet guideline requirements because effects occurred at all test concentrations and an NOEC was not determined. (MRID 436812-01)

(4) Acute Toxicity to 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	EC50=0.77ppm	432917-01 (1993) Dionne	Highly toxic	Core
Mysid Shrimp	96.1 Technical	EC50=140pptr	432797-01 (1994) Machado	Very highly toxic	Upgraded to core
Sheepshead minnow	96.1 Technical	LC50=0.13ppm	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)

c. Toxicity to Aquatic Plants

Although aquatic plant testing is not currently required for insecticides, studies have been reviewed. 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**	
Navicula pelliculosa (Freshwater diatom)	96.1	>0.12 ppm	429186-58	Hoberg (1993)	Upgraded to core	
Lemna gibba (Duckweed)	96.1	>0.10 ppm	429186-56	Hoberg (1993)	Supplemental	
Selenastrum capricornutum (Freshwater green alga)	96.1	0.14 ppm	429186-60	Hoberg (1993)	Core	
Skeletonema costatum (Marine Diatom)	96.1	>0.14 ppm	429186-59	Hoberg (1993)	Core	
Anabaena flos-aquae (Freshwater Blue-green alga)	96.1	>0.17 ppm	429186-57	Hoberg (1993)	Core	

2. Environmental Fate

a. Environmental Fate Assessment

Available laboratory data indicate that below the soil surface Fipronil dissipates by soil binding (kds 26.2 to 148.6 for ads; Kocs 2671 to 7818) followed by slower biotic mediated processes (aerobic soil half-life 128 days; anaerobic aquatic half-lives 116 to 130 days). However, on the soil surface (or foliage) the major route of degradation may be photolysis (aquatic photolysis half-life 3.63 hours, soil photolysis half-life 34 days) and/or soil binding followed by slower biotic mediated processes. Laboratory data indicate that Fipronil is not mobile in soils tested and degrades slowly under alkaline hydrolytic conditions (hydrolysis half-life 28 days at pH 9). Fipronil does appear to be stable to hydrolysis at pH 5 and pH 7.

Field studies appear to support findings based on laboratory studies. Half-lives of 1.1 to 1.5 months for bare soil and 0.4 to 0.5 months for turfed soil are reported in field data. In bare soil plots Fipronil residues were discernible only in the 0-6 inch soil depth.

Because Fipronil appears to bind to soil matter, potential for ground water contamination is considered low for turf use.

There are limited data available for persistence and mobility of degradates. The data available indicate that the metabolites are not mobile in soil. Two major degradates were identified, RPA 200766 (the amide) at maximum concentration 27-38% of applied radioactivity and

MB 46136 (5-amino-1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-4-trifluoromethyl-sulphonyl-pyrazole),

at maximum concentration 14-24% of applied radioactivity. In the anaerobic aquatic study, the major degradates were RPA 200766 at maximum concentration approximately 47% of applied radioactivity and

MB 45,950 (5-amino-1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-4-trifluoromethyl-thio-pyrazole)

at maximum concentration approximately 18% of applied radioactivity. In addition to the metabolites identified in the metabolism studies, degradation products

MB 46513 (5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylpyrazole),

MB 45350, and

RPA 104615 (5-amino-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)pyrazole-4-sulfonic acid (potassium salt))

were identified in the photolysis studies. Other minor metabolites were identified in laboratory studies, at concentrations less than 6% of applied radioactivity.

Supplemental fish accumulation data indicates that Fipronil does absorb in fish tissues. Bioconcentration factors of 321, 164, and 575 for whole fish, edible tissues, and nonedible tissues, respectively, are reported for the steady-state phase. However, the depuration data indicate that these Fipronil residues are almost completely eliminated (over 96% eliminated) after 14 days following cessation of exposure. These data appear to be in agreement with the octonal/water coefficient (10570). In order for the fish accumulation study to be upgraded to acceptable, storage stability data on tissue samples are needed to validate the analytical data.

Additional detailed discussion of degradation, mobility, accumulation, and field dissipation is given in memo P. Mastradone to R. Brennis (6/15/94).

3. 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.

Levels of Concern (LOC) and associated Risk Presumption

Mammals, Birds

IF THE	LOC	PRESUMPTION
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

IF THE	LOC	PRESUMPTION
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

IF THE	LOC	PRESUMPTION
RQ≥	1	High risk
RQ≥	1	Endangered plants may be affected

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

(1) Exposure and Risk to Nontarget Terrestrial Animals

The potential exposure to aquatic organisms is represented by an Estimated Environmental Concentration (EEC) based on application rates, intervals, frequencies, and other quantitative

information found on the label. For granular pesticides the exposure is represented by the amount of active ingredient in a square foot area. This exposure value is then compared to the LD_{50} for the most sensitive test species to derive the risk quotient in units of LD_{50} per square foot. LD_{50} values for birds and mammals are reviewed in Section 1.

(a) Birds

The LD_{50} per square foot for Fipronil was based on slit-placement application rates of 9.2 ounces (max rate) of GAUNTLET 0.1G per 1000 row feet. Maximum allowable amount applied per year is 50 pounds of product per acre (25 pounds per application with a maximum of 2 applications yearly). A single application rate is 0.025 lb ai/A.

With slit-placement application the granules are placed in the ground at the thatch/soil interface to contact the target pest. For this application procedure the Agency assesses terrestrial risk based on the assumption that from 1% to 8% of granules remain on the surface and are available to birds and mammals.

Application of 0.0092 ounces product (0.1% active ingredient) per square feet, with 8% unincorporated and bioavailable, corresponds to an exposure of 0.02 mg bioavailable a.i. per square foot. The risk quotient is then calculated in LD_{50} per square foot for the most sensitive species tested (bobwhite quail):

$$\frac{\text{Exposed a.i. mg/f}^2}{\text{LD}_{50}\text{(mg/kg)} \times \text{Wgt. of bird(kg)}} = \frac{0.02}{11.3 \times 0.178} = 0.01\ \text{LD}_{50}/\text{ft}^2$$

The RQ of 0.01 LD_{50}/f^2 for Fipronil does not exceed levels of concern for high risk (RQ 0.5 LD_{50}/f^2) or for restricted use (RQ 0.1 LD_{50}/f^2). However, the LD_{50} of 11.3 mg/kg for bobwhite quail does meet the criterion for Restricted Use Classification ($LD_{50} \leq 50$ mg/kg).

(b) Mammals

Studies reviewed by the Health Effects Division indicate a rat acute oral LD_{50} of 97 mg/kg (Section 1.a). The exposure estimate is calculated as for birds (0.02 mg/ft^2). The risk quotient is calculated as:

RQ = Exposed a.i. / (LD_{50} × body wgt. of rat)

= 0.02 mg/f^2 / (97 mg per kg × 0.4 kg)

= 0.0052 LD_{50} / f^2

The RQ value for Fipronil does not exceed the mammalian levels of concern for high acute risk (0.5) or restricted use (0.2).

(2) Exposure and Risk to Nontarget Aquatic Animals

Estimated environmental concentrations were calculated using the PRZM2 model, Version 2.3. The Agency has simulated aquatic concentrations resulting from proposed uses of Fipronil on corn (based on a Mississipi site with Loring silt loam), cotton (Georgia site with Cowarts sandy loam), and turf (Mississippi site with Sharkey clay). Chemical characteristics, management practices, locations, and summaries of results are described in detail in memo S. Mostaghimi to A. Stavola, 4/18/96.

For the turf use, it was estimated that 0.14% of applied chemical was transported to the aquatic environment. Of the chemical transported to the aquatic environment 97.6% was in runoff water and 2.4% adsorbed to eroding soil.

The initial aquatic concentration was estimated to be 0.0056 μg/L corresponding for an application rate of 0.025 lb a.i/A. For the scenario with use on corn, the initial EEC was 0.248 μg/L for an application rate of 0.13 lb a.i./A. These differences suggest that, depending on soil texture and environmental conditions, practices that reduce runoff volume and soil erosion and can be effective in reducing Fipronil transport to aquatic environments.

Below are the EECs and the risk quotients.

ESTIMATED ENVIRONMENTAL CONCENTRATIONS							
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)
Turf	Slit-placement	0.025	5.6	3.9	1.7	0.89	0.68

Risk quotients were calculated by dividing the LC_{50} by the estimated peak exposure of 5.6 pptr:

Organism and MRID	LC50/EC50 (pptr)	Risk Quotient
Bluegill (freshwater) 429186-24	83,000	0.00007
Mysid Shrimp (estuarine) 432797-01	140	0.04
Oyster (estuarine) 432917-01	770,000	0.00001

Sheepshead Minnow (estuarine) 432917-02	130,000	0.00004
Daphnia (freshwater) 429186-25	190,000	0.00003
Daphnia (freshwater) 429186-71 (Degradate MB46136)	29,000	0.00003
Bluegill (freshwater) 429186-74 (Degradate MB46136)	25,000	0.0002

These results suggest that Fipronil does not present an acute risk to aquatic organisms from the use on turf by slit-placement application.

Potential risks from exposure to degradates was also evaluated as the toxicity data indicate that one of the degradates, MB46136, is more toxic than parent Fipronil. The RQ's for the degradates are based on the assumption that, at worst, the concentration of MB46136 will be as great as that of parent Fipronil. Even with this worst case assumption, the results indicate that acute risks to freshwater organisms from exposure to MB46136 are minimal.

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

Organism and MRID	MATC (pptr)	Estimated Exposure	Risk Quotient
Rainbow trout (freshwater) 429186-27	9900	0.89 pptr (60 day)	0.0001
Daphnia magna (freshwater) 429186-26	14,000	1.7 pptr (21 day)	0.0001
Mysid shrimp (estuarine) 436812-01	<5	1.7 pptr (21 day)	>0.34

These results do not indicate a chronic risk to *freshwater* organisms from the proposed use on turf by slit-placement application methods. The risk determination for *estuarine* organisms is only preliminary because the chronic study did not provide an NOEC. An

NOEC is needed to calculate the MATC, which is the concentration used to determine risk. The information from the available (supplemental) study only indicates that the risk quotient is greater than 0.34, a result that is consistent with a risk quotient exceeding the level of concern (1). An acceptable study could indicate a concern for effects on non-molluscan estuarine invertebrates. This risk assessment will be reviewed upon submission of a new mysid chronic study.

(3) Exposure and Risk to Nontarget Plants

Toxicity data are available for aquatic plants. The lowest available EC_{50} value was for the freshwater green alga *Selenastrum capricornutum*, with an EC_{50} of 140,000 pptr. The risk quotient value (RQ=0.001) does not exceed the LOC. Therefore the Agency does not find a concern for risk to nontarget plants.

(4) Endangered Species

No concerns for endangered species have been identified based on studies submitted to the Agency, as risk quotients are below the levels of concern (LOC). However, at this time the chronic risk to estuarine species cannot be quantified. Once an acceptable mysid chronic study is submitted with a valid NOEC, there is a possibility that the chronic risk quotient based on that study will exceed the LOC for estuarine animals. However, there currently are no estuarine organisms on the endangered/threatened species list.

The Endangered Species Protection Program is expected to become final 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.