



Pesticide
Fact Sheet

Name of Chemical: Pinoxaden
Reason for Issuance: Conditional Registration
Date Issued: July 2005

1. **DESCRIPTION OF CHEMICAL**

Generic Name: 8-(2,6-diethyl-4-methylphenyl)-1,2,4,5-tetrahydro-7-oxo-7H-pyrazolo[1,2-d][1,4,5]oxadiazepin-9-yl 2,2-dimethylpropanoate

Common Name: Pinoxaden

Trade Name: Axial

EPA PC Code: 147500

Chemical Abstracts
Service (CAS) Number: 243973-20-8, 99607-70-2

Year of Initial
Registration: 2005

Pesticide Type: Herbicide

Chemical Class: Phenylpyrazolin

U.S. Producer: Syngenta Crop Protection, Inc.

2. **USE PATTERNS AND FORMULATIONS**

Application Sites: Pinoxaden is registered for use on wheat and barley

Types of Formulations: 98% technical product
9.71% emulsifiable concentrate end-use product

Types and Methods
of Application:

For post emergence control of grass weeds in wheat (including durum) and barley. One application per crop season by agricultural workers using either open-cab ground boom equipment or via aerial application..

Application Rates:

Application rates of 0.036-0.062 lb active ingredient per acre.

3. SCIENCE FINDINGS

Summary Science Statements

Based upon a battery of acute toxicity studies, **pinoxaden has a low order of acute toxicity by the oral, dermal and inhalation routes (Toxicity Categories III or IV). Pinoxaden is irritating to the eye, but is not irritating to the skin. Pinoxaden is not a skin sensitizer.** There is a complete toxicity data base for pinoxaden and exposure data are complete or are estimated based on data that reasonably accounts for potential exposures. **Acute dietary exposure from food and water to pinoxaden will occupy 1.5 % of the aPAD for females 13 - 49 years. Drinking water was incorporated directly into the acute dietary assessment using the annual peak concentration for surface water generated by the PRZM -EXAMS model as a high-end estimate.** Chronic dietary exposure to pinoxaden from food and water will utilize 0.9 % of the cPAD for the U.S. general population, and 2.1 % of the cPAD for children 1-2 years old, the highest exposed population subgroup. Drinking water was incorporated directly into the chronic dietary assessment using the annual mean concentration for surface water generated by the PRZM-EXAMS model as a high-end estimate. Based on the hazard characterization data, EPA determined that the special FQPA Safety Factor should be reduced to 1x because there are no concerns and no residual uncertainties with regard to pre- and/or postnatal toxicity. The pinoxaden risk assessment team evaluated the quality of the exposure data and based on these data, recommended that the special FQPA SF be reduced to 1x. Pinoxaden is not likely to pose a cancer risk.

Available data indicate that pinoxaden use on wheat (including durum) and barley should result in minimal risk to listed and non-listed dicotyledonous terrestrial plants; however confirmatory data are needed for the two main degradates. No adverse acute and chronic effects are expected for non-listed birds and mammals exposed to parent pinoxaden; however, confirmatory data are needed for the formulated product with adjuvant. Potential indirect effects exist for listed birds and mammals that rely on monocots and non-flowering plants for food or habitat. No unacceptable risks are expected to listed and non-listed aquatic organisms. Listed and non-listed monocots and non-flowering terrestrial plants are at risk from channelized runoff and drift from wheat and barley fields

The fate and disposition of pinoxaden in the environment suggest a compound that is an herbicide that is persistent and mobile, stable to hydrolysis, and has the potential to reach aquatic environments and organisms via sheet and channel run-off, discharged groundwater into surface

waters, and spray drift from either ground or aerial spray application.

Hydrolysis of pinoxaden is pH dependent and occurs faster under basic conditions. Aqueous photolysis of pinoxaden is not a major dissipation route when exposed to sunlight. In soil, photolysis is also not a significant pathway for degradation for pinoxaden without hydrolytic degradation.

Pinoxaden degrades rapidly under aerobic soil metabolism conditions with half-lives ranging from 2 to 3 days, forming the major degradate M2, which degrades further to form the degradate M3.

Under aerobic aquatic conditions, pinoxaden degrades rapidly to M2 (half-life < 1 day) to the major transformation product, M2. M2 was the major product detected in the treated water-sediment systems under both anaerobic and aerobic conditions. The minor transformation product M3 was identified with maximums of 0.3%, 0.1% and 0.4% in water, sediment and total system, respectively. Under aerobic aquatic conditions, more than 86% of applied activity remains (in total system) in form of the major degradate M2.

Volatility is not a significant route of dissipation. The major degradates of pinoxaden (M2 and M3) are considered to be mobile based on Freundlich K_{ads} values ranging from 0.06-128 ml/g, and 0.856-0.28 ml/g, respectively, in three test soils (loamy sand, loam, silty clay loam textures).

Chemical Characteristics

Property	Technical	End-use
Physical State	Solid	Liquid
Color	White	Yellow orange
Odor	Odorless	Thymol like
Melting Point (range)	120.5-121.6°C	
Density	1.16 X 10 ³ kg/m ³ @ 24°C	8.6 lbs/gal @ 20°C
Solubility (Water)	200 mg/L at 20°C	
Vapor Pressure	4.6 x 10 ⁻⁷ Pa @ 25°C	
Octanol/Water Partition Coefficient	Log P _{ow} = 3.2 @ 25°C	
pH	4.9 @ 25°C	4.71 @ 25°C

Toxicology Characteristics

Acute Toxicity of Pinoxaden Technical			
Guideline No.	Study Type	Results	Toxicity Category
870.1100	Acute Oral - rat	LD ₅₀ > 5000 mg/kg	IV
870.1200	Acute Dermal - rat	LD ₅₀ > 2000 mg/kg	III
870.1300	Acute Inhalation - rat	LC ₅₀ > 5.22 mg/L	IV
870.2400	Primary Eye Irritation - rabbit	Formulation is irritating to the eye	I
870.2500	Primary Skin Irritation - rabbit	No erythema or edema were noted at any point during the study. Non-irritating to the skin.	IV
870.2600	Dermal sensitization - guinea pig	Not a dermal sensitizer	N/A

Acute Toxicity of Axial™ Herbicide			
Guideline No.	Study Type	Results	Toxicity Category
870.1100	Acute Oral - rat	3129 mg/kg = LD ₅₀	III
870.1200	Acute Dermal - rat	LD ₅₀ > 2000 mg/kg	III
870.1300	Acute Inhalation - rat	LC ₅₀ > 5 mg/L	IV
870.2400	Primary Eye Irritation - rabbit	Ocular irritation in all rabbits observed, which subsided within 7 days. Moderate irritant.	III
870.2500	Primary Skin Irritation - rabbit	Moderate local irritation. Erythema and edema subsided by day 14, but desquamation was still present.	III
870.2600	Dermal sensitization - guinea pig	Not a dermal sensitizer.	n/a

Subchronic, Chronic, and Other Toxicity Profile Of Pinoxaden		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.3100 90-Day rats - gavage	46203239 (2003) Acceptable/Guideline 0, 3, 10, 30, 100, or 300 mg/kg/day	NOAEL = 300/100 mg/kg/day (M/F) LOAEL was not observed in males; = 300 mg/kg/day in females, based on increased water consumption and urinary volume
870.3100 90-Day rats - diet	46203235, 46203237 (2003) Acceptable/Guideline 0, 150, 1000, 5000, or 10000 ppm (0/0, 15/16, 98/110, 466/527 or 900/965mg/kg/day in males/females)	NOAEL = 466/537 mg/kg/day (M/F) LOAEL = 900/965 mg/kg/day based on decreased body weight and body weight gain and increased incidence of renal lesions in both sexes; decreased food consumption and increased water consumption in males; and increased urine volume in females
870.3100 13-Week oral mice - gavage	46203241 (2002) Acceptable/Guideline 0, 10, 100, 400, 700 or 1000 mg/kg/day (limit dose)	NOAEL = 700 mg/kg/day LOAEL = 1000 mg/kg/day based on increased incidence of piloerection and decreased body weight gain in both sexes, and increased incidence of renal tubular basophilia in males
870.3100 90-Day oral mice - diet	46203236, 46224805 (2003) Acceptable/Guideline 0, 1000, 2500, 5000 or 7000 ppm (0/0, 140.9/165.9, 365.0/436.7, 708.2/900.6 or 992.3/1311.7 mg/kg/day in males/females)	NOAEL was not observed in females, but was 365.0 mg/kg bw/day in males LOAEL =165.9 mg/kg bw/day in females, based on decreased body weight and body weight gain and 708.2 mg/kg bw/day in males, based on decreased food efficiency
870.3150 90-Day dogs - capsule	46203242 (2003) Acceptable/Guideline 0, 25, 100, 250 or 500 mg/kg/day	NOAEL = 100 mg/kg/day LOAEL = 250 mg/kg/day based on clinical signs of toxicity fluid feces, vomit, pale and thin appearance, decreased activity, dehydration, cold to touch, and regurgitation in both sexes, and mucus in feces in the males) and decreased body weights, body weight gains, and food consumption in both sexes

Subchronic, Chronic, and Other Toxicity Profile Of Pinoxaden		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.3200 28-Day dermal toxicity - rat	46203243 (2001) Acceptable/Guideline 0, 10, 100, or 1000 mg/kg/day	LOAEL was not observed NOAEL = 1000 mg/kg bw/day (the limit dose)
870.3700 Prenatal developmental toxicity - rabbit	46203303 (2003) Acceptable/Guideline 0, 3, 10, 30, or 100 mg/kg/day	Maternal NOAEL = 30 mg/kg/day Maternal LOAEL = 100 mg/kg/day, based on increased mortality, abortion, and decreased body weights, body weight gains and food consumption Developmental NOAEL = 30 mg/kg/day Developmental LOAEL = 100 mg/kg/day, based on increased incidence of complete early litter resorption
870.3700 Prenatal developmental toxicity - rat	46203305 (2003) Acceptable/Guideline 0, 3, 30, 30, 300 or 800 mg/kg/day	Maternal NOAEL = 30 mg/kg/day Maternal LOAEL = 300 mg/kg bw/day, based on decreased body weight gains and food consumption Developmental NOAEL = 30 mg/kg/day Developmental LOAEL = 300 mg/kg/day, based on delays in skeletal ossification in the skull and hind digits
870.3800 Reproduction and fertility effects - rat	46203308 (2003) Acceptable/Guideline 0, 10, 50, 250 and 500 mg/kg/day	Parental NOAEL = 250 mg/kg/day Parental LOAEL = 500 mg/kg/day, based on increased water consumption, renal tubular atrophy, and chronic nephropathy in both sexes, and increased incidence of renal pelvic dilatation in the males Offspring NOAEL = 250 mg/kg/day Offspring LOAEL = 500 mg/kg bw/day, based on decreased body weights and body weight gains in the F ₁ pups, and decreased body weights in the F ₂ males Reproductive NOAEL = 500 mg/kg/day Reproductive LOAEL was not observed

Subchronic, Chronic, and Other Toxicity Profile Of Pinoxaden		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.4100 Chronic toxicity dogs - capsule	46203309 (2003) Acceptable/Guideline 0, 5, 25 or 125 mg/kg/day	NOAEL = 125 mg/kg/day LOAEL was not observed
870.4200 Carcinogenicity mice - diet	46448801 (2004) Unacceptable/Guideline 0, 10, 150, 500, 1500 or 4000 ppm (0/0, 16.3/20.2, 60.7/75.7, 181.2/216.5 and 573.7/706.4 mg/kg/day in males/females) [4000 ppm dose discontinued at Week 40]	NOAEL = 216.5/181.2 mg/kg/day (M/F) LOAEL was not determined
870.4200 Carcinogenicity mice- gavage	46224808 (2003) Unacceptable/Guideline 0, 5, 40, 300 or 750 mg/kg	Study could not be interpreted due to gavage errors and lung involvement.
870.4300 Chronic toxicity/carcinogenicity rats - gavage	46224809 (2003) Acceptable/Guideline 0, 1, 10, 100 250 or 500 mg/kg/day	NOAEL = 100 mg/kg/day LOAEL = 250 mg/kg/day, based on mortality, clinical signs, and increased serum urea and creatinine in males, and decreased body weights and body weight gains, increased water consumption and incidence of urinalysis findings, kidney surface granulation, and microscopic renal lesions in both sexes
870.5100 <i>In Vitro</i> bacterial gene mutation <i>S. typhimurium</i> / <i>E. coli</i>	46203314 (2001) Acceptable/Guideline 33, 100, 333, 1000, 2500, or 5000 µg/plate w/wo activation (cytotoxicity was observed at ≥1000 µg/plate)	No marked increases in the number of revertants were observed at any concentration in any strain in either trial. [negative]

Subchronic, Chronic, and Other Toxicity Profile Of Pinoxaden		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.5300 <i>In Vitro</i> mammalian gene mutation (L5178YTK ⁺ /-)	46203318 (2003) Acceptable/Guideline 6.3, 12.5, 254200 µg/mL (-S9) and 3.1, 6.3, 12.5, 25, 50, 100 or 150 µg/mL (+S9)	No reproducible substantial ($\geq 2x$ solvent controls) and/or concentration-dependent increases in mutant colonies per 10^6 cells were observed at any dose level in the presence or absence of S9. [negative]
870.5375 <i>In vitro</i> mammalian cytogenetics in V79 Chinese Hamster Lung Fibroblasts	46203321(2001) Acceptable/Guideline 6.3, 10, 12.5, 20, 25, 40, 50, 60, 75, 80 or 100 µg/mL 10, 20, 40, 60, 80, or 100 µg/mL (-S9); 10, 12.5, 20, 25, 30, 40, 50, 60, 70, 75, 80, 100 or 120 µg/mL (+S9)	Although there was not a clear dose-response and several of the increases in percent aberrant cells were within the historical control range (0.0-4.0%), there was sufficient reproducible evidence of a positive mutagenic effect in the presence and absence of S9. [positive]
870.5375 <i>In vitro</i> mammalian cytogenetics in V79 Chinese Hamster Lung Fibroblasts	46203322 (2002) Acceptable/Guideline 10, 15, 20, 30, 40, 45, 60, 75, 80, 90 and 100 µg/mL (-S9); 3.8, 7.5, 15, 30, 45, 60 and 90 µg/mL (+S9)	There was an increase in the percent aberrant cells that exceeded the historical control range with/without S9 metabolic activation. [positive]
870.5395 <i>In Vivo</i> mammalian cytogenetics micronucleu s mice	46203325 (2002) Acceptable/Guideline 2000 mg/kg (bone marrow toxicity was not induced)	There were no marked increases observed in mean net nuclear grains (NNG) or percent cells in repair (NNG ≥ 5) at 2 or 16 hours post-dosing compared to controls. [negative]

Subchronic, Chronic, and Other Toxicity Profile Of Pinoxaden		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.5550 UDS in mammalian cells	46203329 (2001) Acceptable/Guideline 0, 1.17, 2.34, 4.69, 9.38, 18.75, 37.5, 75, 150, 300, or 600 µg/mL (cytotoxic levels ≥300 µg/mL)	There were no marked increases observed in the mean grains per nucleus or mean NNG in either trial. Negative for increased UDS up to limit dose. [negative]
870.5550 UDS in mammalian cells	46203325 (2002) Acceptable/Guideline 2000 mg/kg	There were no marked increases observed in mean net nuclear grains (NNG) or percent cells in repair (NNG ≥5) at 2 or 16 hours post-dosing compared to controls. [negative]
870.6200 Acute neurotoxicity rats - gavage	46203331, 46203330 (2003) Acceptable/Guideline 0, 100, 500 or 2000 mg/kg	NOAEL = 2000 mg/kg (for neurotoxicity) LOAEL was not determined.
870.6200 Subchronic neurotoxicity rats -gavage	46203332 (2003) Acceptable/Guideline 0, 10, 100 or 500 mg/kg/day	NOAEL = 500 mg/kg/day (for neurotoxicity) LOAEL was not determined

Subchronic, Chronic, and Other Toxicity Profile Of Pinoxaden		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.7485 Metabolism- Rat	46203333-46203336 (2001) Acceptable/Guideline 0.5 or 300 mg/kg	Approximately 90% of the orally gavaged dose was absorbed from the gastrointestinal tract. Approximately, 90% of the absorbed dose was excreted in the urine and feces in 72 hours and excretion was nearly complete in 7 days. Excretion in the urine ranged from 59-78% and in feces 20-25%. Tissue distribution data indicated no significant accumulation in the body. Billiary excretion study did not indicate enterohepatic circulation. No parent compound was detected in the urine, feces or bile. Major metabolite in the urine and feces was the hydrolysis product M2. Major metabolites in the urine were M2 (65%-85%) and M4 (5-13%) and in the feces 50%-70%) and M4 (25%-35%) depending up on the dose. There were no sex related differences in the absorption, distribution, excretion or qualitative profile of the metabolites.
870.7600 <i>In Vivo</i> Dermal penetration- Rat	46203342 (2003) Acceptable/Guideline 0.05, 0.25 or 4.0 mg/rat (EC 100 formulation)	Low dose= 4%, 14%, 18% at 4, 10, 24 hours Mid dose= 1%, 2%, 4% at 4, 10, 24 hours High dose= 17%, 30%, 36% at 4, 10, 24 hours

Toxicological Endpoints

The dose at which no adverse effects are observed (the NOAEL) from the toxicology study identified as appropriate for use in risk assessment is used to estimate the toxicological level of concern (LOC). However, the lowest dose at which adverse effects of concern are identified (the LOAEL) is sometimes used for risk assessment if no NOAEL was achieved in the toxicology study selected. An uncertainty factor (UF) is applied to reflect uncertainties inherent in the extrapolation from laboratory animal data to humans and in the variations in sensitivity among members of the human population as well as other unknowns. An UF of 100 is routinely used, 10X to account for interspecies differences and 10X for intra species differences. EPA has concluded that the toxicology database for pinoxaden is complete.

For dietary risk assessment (other than cancer) the Agency uses the UF to calculate an acute

or chronic reference dose (acute RfD or chronic RfD) where the RfD is equal to the NOAEL divided by the appropriate UF ($RfD = NOAEL/UF$). Where an additional safety factors (SF) is retained due to concerns unique to the FQPA, this additional factor is applied to the RfD by dividing the RfD by such additional factor. The acute or chronic Population Adjusted Dose (aPAD or cPAD) is a modification of the RfD to accommodate this type of FQPA SF.

For non-dietary risk assessments (other than cancer) the UF is used to determine the LOC. For example, when 100 is the appropriate UF (10X to account for interspecies differences and 10X for intraspecies differences) the LOC is 100. To estimate risk, a ratio of the NOAEL to exposures (margin of exposure (MOE) = $NOAEL/exposure$) is calculated and compared to the LOC.

A summary of the toxicological endpoints for pinoxaden used for human risk assessment is shown in the following table:

Toxicological Dose and Endpoints for Pinoxaden for Use in Human Risk Assessment			
Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (females 13-49)	NOAEL = 30 mg/kg/day UF = 100 Acute RfD = 0.30 mg/kg	FQPA SF - 1X aPAD = 0.30 mg/kg	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on increased incidence of complete early litter resorption
Acute Dietary (general population)	N/A	N/A	An endpoint of concern attributable to a single dose effect was not identified in the database.
Chronic Dietary (all populations)	NOAEL = 30 mg/kg/day UF = 100 Chronic RfD = 0.30 mg/kg/day	FQPA SF - 1X cPAD = 0.30 mg/kg/day	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Incidental Oral Short-Term (1 - 30 days)	NOAEL = 30 mg/kg/day	LOC = MOE - 100 (residential includes the FQPA SF)	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.

Toxicological Dose and Endpoints for Pinoxaden for Use in Human Risk Assessment			
Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Incidental Oral Intermediate-Term (1 - 6 months)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF)	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Dermal Short-Term (1 - 30 days)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF) LOC for occupational =100 Dermal-absorption rate=40%	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Dermal Intermediate-Term (1 - 6 months)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF) LOC = MOE=100 (Occupational) Dermal-absorption rate=40%	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Dermal Long-Term (> 6 months)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF) LOC = MOE=100 (Occupational) Dermal-absorption rate=40%	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Inhalation Short-Term (1 - 30 days)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF) LOC = MOE=100 (Occupational) Inhalation-absorption rate=100%	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Inhalation Intermediate-Term (1 - 6 months)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF) LOC = MOE=100 (Occupational) Inhalation-absorption rate=100%	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.

Toxicological Dose and Endpoints for Pinoxaden for Use in Human Risk Assessment			
Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Inhalation Long-Term (> 6 months)	NOAEL = 30 mg/kg/day	LOC = MOE=100 (residential includes the FQPA SF) LOC = MOE=100 (Occupational) Inhalation-absorption rate=100%	Developmental toxicity - rabbit LOAEL = 100 mg/kg/day based on morbid condition in one rabbit (mortality), clinical signs of toxicity in a morbid rabbit, abortion, decreased body weights, body weight gains and food consumption.
Cancer (oral, dermal, inhalation)	Not likely to pose a cancer risk.		

Human Exposures and Risks

Acute risk

EPA has concluded that the acute dietary exposure from food and water to pinoxaden will occupy 1.5 % of the aPAD for females 13 - 49 years. **Drinking water was incorporated directly into the dietary assessment using the annual peak concentration for surface water generated by the PRZM-EXAMS model as a high-end estimate (0.76 ppb; 90th percentile annual daily maximum).** An endpoint of concern attributable to a single dose effect was not identified in the database for the general population, therefore, an acute risk assessment was not performed for the general population, or for the general population including infants and children.

Chronic risk

EPA has concluded that chronic dietary exposure to pinoxaden from food and water will utilize 0.9 % of the cPAD for the U.S. general population, and 2.1 % of the cPAD for children 1-2 years old, the highest exposed population subgroup. **Drinking water was incorporated directly into the dietary assessment using the annual mean concentration for surface water generated by the PRZM-EXAMS model as a high-end estimate (0.000473 ppm; 90th percentile annual mean).** There are no residential uses for pinoxaden that result in chronic residential exposure to pinoxaden.

Cancer Risk

Although an acceptable cancer study in rats was submitted, the dietary cancer study in the mouse was found to be unacceptable due to the failure to test at high enough doses. Nonetheless, based on the following weight-of-evidence, a repeat carcinogenicity study in mice is not required at this time:

- No evidence of carcinogenicity was observed in an acceptable/guideline carcinogenicity study in rats
- The gavage carcinogenicity study in mice was conducted at doses as high as 750 mg/kg/day.

No tumors were observed in other organs except adenomas/carcinomas in the lungs. However, the interpretation of the adenomas/carcinomas in the lungs was confounded by the gavage errors that may have introduced the dosing solution in to the trachea and lungs, and perhaps leading to lung tumors and excessive mortality.

- No tumors were seen in the mouse dietary carcinogenicity study, however, the dosing was considered to be inadequate due to the lack of significant systemic toxicity at doses up to 181.2 mg/kg/day (the study, performed under OECD and EPA guidelines, was terminated early for humanitarian reasons due to excessive decreases in body weight gain in the high dose animals).
- In the 90-day feeding study in mice, pinoxaden was tested up to 7000 ppm (1311 mg/kg/day; Limit Dose), and did not produce any tumors or severe toxicity.
- Pinoxaden was considered to be non-mutagenic.

This evidence convinces EPA that repeating the dietary mouse cancer study is unlikely to provide additional useful information for the risk assessment, and that pinoxaden is not likely to pose a cancer risk.

FQPA Safety Factor

There is a complete toxicity data base for pinoxaden and exposure data are complete or are estimated based on data that reasonably accounts for potential exposures. **Based on the hazard characterization data, EPA determined that the special FQPA SF should be reduced to 1x because there are no concerns and no residual uncertainties with regard to pre- and/or postnatal toxicity. The pinoxaden risk assessment team evaluated the quality of the exposure data and based on these data, recommended that the special FQPA SF be reduced to 1x. This recommendation is based on the following:**

- **The dietary exposure assessment utilizes proposed tolerance level residues and 100% crop treated information for all commodities. By using these screening-level assessments, chronic exposures/risks will not be underestimated.**
- **The dietary drinking water assessment utilizes values generated by a model and associated modeling parameters which are designed to provide conservative, health protective, high-end estimates of water concentrations.**
- **There are no residential uses proposed for pinoxaden at this time.**
- **There are no concerns and no residual uncertainties with regard to pre- and/or postnatal toxicity**

Occupational Risk

Pinoxaden is intended for use as a postemergence herbicide for control of grass weeds in wheat (including durum) and barley. The proposed use of pinoxaden is one application per crop season at a rate of 0.036-0.062 lb active ingredient per acre. The pre-harvest interval is 60 days, with an REI of 48 hours, and a 30 day pre-grazing interval. There is a zero day plant back interval (PBI) for

wheat and barley, a 30 day PBI for leafy and root crops, and a 120 PBI for all other cereal grains and crops.

Based upon the proposed use pattern, HED believes the most highly-exposed occupational pesticide handlers (i.e., mixers, loaders, applicators) are:

- 1) Mixer/loader using open-pour loading of liquids in support of aerial operations
- 2) Applicator using open-cab ground-boom equipment
- 3) Aerial applicator (pilot).

Short- (1-30 days) and intermediate-term (1-6 months) exposures were assessed. Although the proposed labeling directs users not to apply more than one application per year, commercial applicators may experience intermediate-term exposures since they may treat a number of farms sequentially.

No chemical-specific data were available with which to assess potential exposure to pesticide handlers. The estimates of exposure to pesticide handlers are based upon surrogate study data available in Pesticide Handlers Exposure Database (PHED; v. 1.1, 1998). It is HED policy to assess handler exposure and risk using “baseline” personal protective equipment (PPE) which is comprised of long-sleeved shirt, long pants, and shoes plus socks. If necessary, HED assesses risk using “baseline” plus the use of protective gloves or other PPE as might be necessary or appropriate. The proposed label directs applicators and other handlers to wear a long-sleeved shirt and long pants, shoes plus socks and chemical resistant gloves.

Short- and intermediate-term handler risks were estimated for handlers and postapplication workers. A dermal-absorption factor of 40% was used to calculate occupational risks. HED assumed 100% inhalation absorption.

Provided that mixer/loaders use protective gloves as specified on the proposed label, all margins of exposure (MOEs) are ≥ 100 and therefore do not exceed HED’s level of concern (MOE of at least 100).

There is a potential for agricultural workers to have post-application exposure to pesticides during the course of typical agricultural activities. Based upon the proposed use pattern (early post-emergence), the most conservative transfer coefficient (TC) applicable to pinoxaden is for scouting at 100 cm²/hr. Short-term exposures are expected. Post-application worker exposure is estimated using the highest proposed application rate and a TC of 100 cm²/hr. This TC was obtained from an interim TC policy developed by HED’s Science Advisory Council for Exposure (ExpoSAC) using proprietary data from the Agricultural Re-Entry Task Force (ARTF) database (SOP # 3.1).

Lacking compound-specific dislodgeable foliar residue (DFR) data, HED assumes 20% of the application rate is available as DFR on day zero after application, adapted from the ExpoSAC SOP No. 003 (7 May 1998 - Revised 7 August 2000). The estimated MOE for postapplication workers is 65,000 and does not exceed HED’s level of concern (MOE of at least 100).

Environmental Characteristics

STUDY TYPE	HALF LIFE/OTHER
Hydrolysis	Stable
Photolysis in Water	Not a major dissipation route when exposed to sunlight
Photolysis on Soil	Not a significant pathway for degradation without hydrolytic degradation
Aerobic Soil Metabolism	2-3 days
Anaerobic Aquatic Metabolism	< 1 days
Mobility-Leaching	Mobile
Terrestrial Field Dissipation	The parent was not detected above the LOQ in soil below the 0-15 cm depth. A degradate was initially detected in the 0-15 cm depth, but was not detected above the LOQ in soil below the 0-15 cm depth.

Potential to Contaminate Groundwater

The fate and disposition of pinoxaden in the environment suggest a compound that is a systemic herbicide that is persistent and mobile, stable to hydrolysis, and has the potential to reach aquatic environments and organisms via sheet and channel run-off, discharged groundwater into surface waters, and spray drift from either ground or aerial spray application.

Ecological Characteristics

Terrestrial Organisms

Minimal risk is expected for mammals potentially exposed from a maximum application of 0.0624 lb ai per acre to wheat or barley. One pinoxaden degradate (NOA-447204) was slightly toxic to rats. Parent pinoxaden, the formulation, and other tested degradates were practically non-toxic. Chronic testing indicated some toxicity in mammals but only at dose levels above those expected from the proposed use rates.

Parent pinoxaden is practically nontoxic to birds on an acute-oral and dietary basis. Because the acute oral and dietary values classify pinoxaden are practically nontoxic to birds and no mortality was reported at the highest test concentration, minimal risk is presumed.

Tests with the honey bee exposed via oral and contact routes of exposure were conducted with parent pinoxaden, the 10.1% ai formulation, the formulation with adjuvant, and the adjuvant alone. Only the formulation displayed toxicity that might be of concern, (LD50 >6.3 µg ai/bee). While the

LD50 was not shown to exceed 11 µg ai/bee, pinoxaden is not expected to pose an unacceptable risk to honey bees.

Aquatic Organisms

No unacceptable acute or chronic risks were identified for aquatic organisms. A number of the aquatic studies that were submitted were found to be supplemental. The magnitude of the uncertainties caused by not having a number of the studies were not considered to have a significant impact on risk conclusions. For example, although a toxicity value for a freshwater arthropod (e.g., *Daphnia magna*) was not available, acute risks to freshwater invertebrates as represented by the mollusk shell deposition value are considered representative. The shell deposition study was 60 times more sensitive than the estuarine/marine fish study and 30 times more sensitive than the arthropod study with the mysid shrimp.

No unacceptable acute or chronic risks are expected to aquatic animals from spray drift of the formulated product and adjuvant. The toxicity of the formulation and adjuvant expressed as the parent 96-h LC50 is >140 ppb, which far exceeds the estimated environmental concentration of less than 3 ppb.

The Level of Concern (LOC) is not exceeded for aquatic plants based on EECs expected for a maximum application of pinoxaden of 0.0624 lb ai per acre to wheat or barley.

Plants

The LOC is exceeded for non-listed and listed monocots and non-flowering plants inhabiting lowland areas subject to channelized runoff from either an aerial or ground application. The LOC also is exceeded for any listed monocots and non-flowering plants exposed to drift from an aerial application. No LOC is exceeded for the dicots exposed to sheet or channelized runoff or drift alone from either aerial or ground application.

Risk to terrestrial plants is presumed only for monocots and non-flowering plants.

Nontarget Species

The Agency's LOC is exceeded for nontarget, listed, and threatened terrestrial monocots and non-flowering plants from the proposed uses on wheat and barley, based on a conservative assessment. Tier II Estimated EECs for pinoxaden and its degradates were estimated using EFED's aquatic models PRZM-EXAMS (EXposure Analysis Modeling System). PRZM is used to simulate pesticide transport as a result of runoff and erosion from an 10-ha agricultural field, and EXAMS considers environmental fate and transport of pesticides in surface water and predicts EECs in a standard pond (10,000-m² pond, 2-m deep), with the assumption that the small field is cropped at 100%. The TERRPLANT model was used to calculate EECs for terrestrial plants. Model inputs include the maximum application rate of 0.0624 lb ai per acre, a runoff value of 0.05 based on the water solubility of pinoxaden (3800 mg/L), no incorporation, and ground and aerial application.

Mechanism of Pesticidal Action

Pinoxaden is a representative of the new phenylpyrazolin class of chemicals. The mode of action is the inhibition of the enzyme, acetyl-coenzyme A carboxylase (ACCase). ACCase activity in plants can be attributed to two isoenzymes located in different compartments of the plant cell, the chloroplast and the cytosol. The chloroplastic enzyme is responsible for the *de novo* biosynthesis of all fatty acids in the cell. The malonyl-coenzyme A produced by the cytosolic ACCase is required for fatty acid elongation to form very long-chain fatty acids, and for the biosynthesis of flavonoids and malonylated metabolites. Pinoxaden has been found to inhibit both the chloroplastic and the cytosolic ACCase enzyme in gramineae.

4. SUMMARY OF REGULATORY POSITION AND RATIONALE

Available data provide adequate information to support the conditional registration of pinoxaden (Axial) for postemergence use on barley and wheat.

Use, Formulation, Manufacturing Process or Geographic Restrictions

Environmental Hazards

For terrestrial uses: Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water or rinsate.

Required Labeling

Contains petroleum distillates.

Do not use or store near heat or open flame.

0-day Plant Back Interval (PBI) for wheat and barley
30-day PBI for leafy and root crops
120-day PBI for other cereal grains and all other crops

Make only one application per crop season.

Do not graze livestock or feed forage of hay from treated areas for a minimum of 30 days following application.

Do not allow spray to drift to adjacent fields seeded to crops other than wheat or barley.

Do not treat wheat or barley underseeded to forages.

Do not apply this product through any type of irrigation system.

Do not harvest for 60 days following application.

Do not exceed an application rate of 0.045 lb active ingredient per acre (6.9 oz/acre) when used alone, or 0.0624 lb active ingredient per acre (9.6 oz/acre) when tank mixed with broadleaf weed herbicides.

Do not apply this product in a manner that allows spray to drift from the application target site and causes or is likely to cause harm to humans, animals or other non-target sites.

To avoid adverse effects on nontarget monocot species, the following mitigation measures will be required:

For ground applications, the applicator must:

1. Apply when there is sustained wind away from native plant communities, OR
2. Use low-pressure nozzles according to manufacturer's specifications that produce only coarse or very coarse droplets, OR
3. Leave 25 foot untreated buffer between treatment area and native plant communities

For aerial applications, the applicator must:

1. Apply only when there is sustained wind away from native plant communities, OR
2. Leave 150 foot untreated buffer between treatment area and native plants."

5. **SUMMARY OF DATA DEFICIENCIES**

Toxicology:

- None

Residue Chemistry:

- Guideline 860.1340: Additional validation data for pinoxaden and M2 residues in livestock commodities (ruminant and poultry) are required as a condition of registration.
- Guideline 860.1380: Additional storage stability data for wheat and barley processed fractions are required as a condition of registration.

Environmental Fate Data (Refer to Appendix A for details):

- None

Ecological Toxicity Data (Refer to Appendix A for details):

- Guideline 72-1(a,c): fish acute toxicity tests are required for parent pinoxaden to replace supplemental studies.
- Guideline 72-2: a freshwater invertebrate acute toxicity test is required using parent pinoxaden to replace an unacceptable study.
- Guideline 72-3a: an estuarine/marine fish acute toxicity test is required using parent pinoxaden to replace a supplemental study.
- Guideline 72-3c: an estuarine/marine shrimp acute toxicity test is required using parent pinoxaden to replace a supplemental study.
- Guideline 72-4a: a freshwater fish early life-stage study is required using parent pinoxaden
- Guideline 72-4b: a freshwater invertebrate life-cycle study is required using parent pinoxaden

Additional Ecological Toxicity Studies needed as a result of Agency Review:

- Guideline 71-2 (a,b): Avian dietary studies in mallard duck and bobwhite quail are being requested for the formulated product with adjuvant.
- Guideline 72-1(a,c): Acute fish toxicity studies are being requested for the degradate NOA-407854 on warm water species only, for the degradate NOA-447204 on warm water & cold water species, and for the formulated product with adjuvant on warm water and cold water species
- Guideline 72-2: Freshwater invertebrate life-cycle studies are being requested for the degradate NOA-447204 and formulated product with adjuvant.
- Guideline 72-3b: Marine/estuarine shell deposition studies are being requested for the degradates NOA-407854 and NOA-447204.
- Guideline 72-4a: Freshwater-fish early life-stage studies are being requested for the degradate NOA-407854, and the degradate NOA-447204
- Guideline 72-4b: Freshwater invertebrate life-cycle studies are being requested for the degradate NOA-447204, and for the degradate NOA-407854 to replace a supplemental study.
- Guideline 123-1 (a,b): Seedling emergence and vegetative vigor studies are being requested for each of the two main degradates (NOA-407854 and NOA-447204)
- Guideline 123-2: Tier II Aquatic plant growth studies are being requested for the parent pinoxaden, degradates NOA-407854 and NOA-447204, and for the formulation with adjuvant.

6. **CONTACT PERSON AT EPA**

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DISCLAIMER: The information presented in this Pesticide Fact Sheet is for informational purposes only and may not be used to fulfill data requirements for pesticide registration and reregistration.

APPENDIX A: STATUS OF SUBMITTED DATA REQUIREMENTS AND DATA GAPS

Ecotoxicity:

Guide. no.	Study description	Test material	Data required?	Data requirement satisfied?	MRID no.	Status	
71-1(a)	Acute Avian Oral, Bobwhite	Parent pinoxaden	yes	yes	462031-03	acceptable	
71-2(a)	Avian Dietary Toxicity, Bobwhite	Parent pinoxaden	yes	yes	462031-04	acceptable	
		Formulation + adjuvant	yes	no	none submitted	study required	
71-2(b)	Avian Dietary Toxicity, Duck	Parent pinoxaden	yes	yes	462031-05	acceptable	
		Formulation + adjuvant	yes	no	none submitted	study required	
71-3	Mammalian Acute Oral, Rat	Parent pinoxaden	yes	yes	462032-14	acceptable	
		Formulation	yes	yes	462032-17	acceptable	
		NOA-447204 (degradate)	no	n/a	462032-15	n/a - see note	
		SYN-502836 (metabolite)	no	n/a	462032-16	n/a - see note	
		SYN-519312 (metabolite)	no	n/a	462032-18	n/a - see note	
		note: studies with the degradate and two metabolites were not required and have not been reviewed by HED					
83-3(a)	Mammalian Reproductive, Rat	Parent pinoxaden	yes	yes	462033-08	acceptable	
71-4(a)	Avian Reproductive, Bobwhite	NOA-407854 (degradate)	yes	yes	462031-07	acceptable	
71-4(b)	Avian Reproductive, Duck	NOA-407854 (degradate)	yes	yes	462031-08	acceptable	
71-5	Field Testing, Terrestrial Animals		reserved	n/a	none submitted	n/a	
72-1(a)	Fish Acute Toxicity, Warmwater fish	Parent pinoxaden	yes	no	462030-36	supplemental - new study required	
		deficiency: test fish were too old					
		NOA-407854 (degradate)	yes	no	none submitted	study required	
		NOA-447204 (degradate)	yes	no	none submitted	study required	
		Formulation + adjuvant	yes	no	none submitted	study required	

Guide. no.	Study description	Test material	Data required?	Data requirement satisfied?	MRID no.	Status	
72-1(c)	Fish Acute Toxicity, Rainbow Trout	Parent pinoxaden	yes	no	462030-34 + 464215-08	invalid - new study required	
		deficiency: test material was not stable					
		NOA-407854 (degrade)	yes	yes	462030-35	acceptable	
		NOA-447204 (degrade)	yes	no	462030-37	supplemental - new study required	
		deficiency: TOC was too high					
		Formulation + adjuvant	yes	no	462030-39	supplemental - new study required	
deficiency: precipitant present but not centrifuged prior to analytical determination							
72-2	Freshwater Invertebrate Acute Toxicity	NOA-447204 (degrade)	yes	no	462030-41	supplemental - new study required	
		deficiency: TOC was too high					
		Parent pinoxaden	yes	no	462030-29	unacceptable - see note below	
		note: the study is repairable if the following required information is available, otherwise a new study is required: (1) if information can be supplied by the testing laboratory on timing of analytical sampling (0, 24 and 48 hours) with stock solution renewal and this timing is appropriate for reflecting the stability of the test material, the study could be upgraded; (2) additionally, measured concentration results prior to correction for percent recovery and the amount of dilution water and stock solution flows into mixing chambers are needed to evaluate nominal and measured concentrations appropriately					
		NOA-407854 (degrade)	yes	yes	462030-30	acceptable	
		Formulation + adjuvant	yes	no	462030-31	supplemental - new study required	
deficiency: precipitant present but not centrifuged prior to analytical determination							
72-3(a)	Estuarine/Marine Fish Acute Toxicity	Parent pinoxaden	yes	no	462030-38	supplemental - see note below	

Guide. no.	Study description	Test material	Data required?	Data requirement satisfied?	MRID no.	Status
		note: the study is repairable if the following required information is available, otherwise a new study is required: samples were centrifuged before analysis for the test material as required for poor solubility test materials to obtain the concentration of soluble test material (EPA, 1994). However, the samples were also acidified before centrifuging which potentially re-dissolved particulate test material. Provide documentation that acidification under this circumstance did not re-dissolve pinoxaden prior to centrifuging. Also need information on TOC concentration in dilution water, age of fish, and details of the primary stock solution preparation				
72-3(b)	Estuarine/Marine Mollusc Acute Toxicity - Shell deposition	Parent pinoxaden	yes	yes	462030-32	acceptable
		NOA-407854 (degradate)	yes	no	none submitted	study required
		NOA-447204 (degradate)	yes	no	none submitted	study required
72-3(c)	Estuarine/Marine Shrimp Acute Toxicity	Parent pinoxaden	yes	no	462030-33	supplemental - see note below
		note: the study is repairable if the following required information is available, otherwise a new study is required: samples were centrifuged before analysis for the test material as required for poor solubility test materials to obtain the concentration of soluble test material (EPA, 1994). However, the samples were also acidified before centrifuging which potentially re-dissolved particulate test material. Repairable if the TOC concentration in the dilution water is provided and it is below guideline limits, and documentation is provided that acidification of water samples prior to centrifugation does not result in dissolution of pinoxaden precipitant back into solution.				
72-4(a)	Early Life Stage, Fish	NOA-407854 (degradate)	yes	no	462031-01	unacceptable - new study required
		note: Repairable to supplemental if the timing of use of a new stock batch (12 batches) with sample collection times is provided and the information supports the stability of the compound throughout exposure. The study is not upgradeable to acceptable because a NOAEC was not established and therefore a new study is required even if the stock batch and sample timing information is supplied.				
		Parent pinoxaden	yes	no	none submitted	study required
		NOA-447204 (degradate)	yes	no	none submitted	study required
72-4(b)	Life Cycle, Aquatic Invertebrate	NOA-407854 (degradate)	yes	no	462030-42	supplemental - new study required

Guide. no.	Study description	Test material	Data required?	Data requirement satisfied?	MRID no.	Status	
		Deficiency: Precipitant was present and no filtration or centrifugation was conducted on analytical samples collected from test chambers at the end of the each renewal cycle. Report states solubility of test material is >100 ppm but undissolved particles were observed after 2 to 3 days of mixing and approach described insufficient to support that insoluble material was not present or did not form during the exposure duration.					
		Parent pinoxaden	yes	no	none submitted	study required	
		NOA-447204 (degradate)	yes	no	none submitted	study required	
72-5	Life Cycle, Fish		reserved	n/a	none submitted	n/a	
72-6	Aquatic Bioaccumulation		reserved	n/a	none submitted	n/a	
72-7	Simulated or Actual Field Testing, Aquatic Animal		reserved	n/a	none submitted	n/a	
123-1(a)	Terrestrial Plants, Seedling Emergence	Formulation + adjuvant	yes	yes	462031-14	acceptable	
		NOA-407854 (degradate)	yes	no	none submitted	study required	
		NOA-447204 (degradate)	yes	no	none submitted	study required	
123-1(b)	Terrestrial Plants, Vegetative Vigor	Formulation + adjuvant	yes	yes	462031-15	acceptable	
		NOA-407854 (degradate)	yes	no	none submitted	study required	
		NOA-447204 (degradate)	yes	no	none submitted	study required	
123-2	Aquatic Plant Growth, Tier II	Parent pinoxaden	yes	no	462031-16 (<i>Lemna</i>)	supplemental - new study required	
		deficiency: test solutions were not renewed at least once. Perform new study at acidic to neutral pH					
		NOA-447204 (degradate)	yes	no	462031-17 (<i>Lemna</i>)	supplemental - new study required	
		deficiency: test solutions were not renewed at least once. Perform new study at acidic to neutral pH.					
		NOA-447204 (degradate)	yes	no	462031-18 (<i>Lemna</i>)	supplemental - new study required	
deficiency: test solutions were not renewed at least once. Perform new study at acidic to neutral pH.							

Guide. no.	Study description	Test material	Data required?	Data requirement satisfied?	MRID no.	Status
		Parent pinoxaden	yes	Tier I yes Tier II no	462031-19 (<i>Selenastrum</i>)	supplemental - new study required
		deficiency: study was conducted for only 72 hrs not 96 to 120 hrs. Perform new study at acidic to neutral pH				
		Parent pinoxaden	yes	no	462031-20 (<i>Anabaena</i>)	supplemental - new study required
		deficiency: study inoculum was 3 times greater than upper limit coupled with reduced growth rate in controls. Perform new study at acidic to neutral pH				
		Formulation + adjuvant	yes	no	462031-21 (<i>Pseudokirchneriella</i>)	supplemental - new study required
		Parent pinoxaden	yes	yes	462031-22 (<i>Skeletonema</i>)	acceptable
		Parent pinoxaden	yes	yes	462031-23 (<i>Navicula</i>)	acceptable
		NOA-407854 (degradate)	yes	Tier I yes Tier II no	462031-24 (<i>Selenastrum</i>)	supplemental - new study required
		deficiency: study was conducted for only 72 hrs not 96 to 120 hrs. Perform new study at acidic to neutral pH				
		NOA-447204 (degradate)	yes	yes	462031-25 (<i>Selenastrum</i>)	acceptable
		Formulation + adjuvant	yes	no	464215-09 (<i>Lemna</i>)	supplemental - new study required
		deficiency: precipitant formed but no filtering or centrifugation was conducted to measure soluble concentration. Perform new study at acidic to neutral pH				
124-1	Field testing, Terrestrial plants		reserved	n/a	none submitted	n/a
124-2	Field Testing, Aquatic plants		reserved	n/a	none submitted	n/a
141-1	Honey Bee Acute Contact Honey Bee Acute Oral		yes	yes	462031-13 462031-10 462031-09 462031-11 462031-12	acceptable supplemental supplemental supplemental
n/a	Earthworm toxicity		no	n/a	462031-26 462031-27 462031-28	supplemental supplemental supplemental

n/a: not applicable

reserved: not required for current assessment but reserve right to require if future conditions warrant

Environmental Fate Data Requirements:

Guideline no.	Study Description	Data required?	Data requirements satisfied?	MRID no.	Status
161-1	Hydrolysis	Yes	Yes	46203005	acceptable
161-2	Photodegradation in Water	Yes	Yes	46203008	acceptable
161-3	Photodegradation on Soil	Yes	Yes	46203009	acceptable
		Yes	Yes	46224803	acceptable
161-4	Photodegradation in Air	Waived	Yes	N/A	N/A
162-1	Aerobic Soil Metabolism	Yes	Yes	46203011	acceptable
			Yes	46203012	acceptable
			Yes	46203013	acceptable
162-3,4	Anaerobic Aquatic Metabolism	Yes	Yes	46203014	acceptable
162-4	Aerobic Aquatic Metabolism	Reserved	Yes	46203015	supplemental
		A new study is not required at this time; however, a new study may help refine the risk assessment and reduce uncertainty.			
163-2	Laboratory Volatility	Waived	Yes	N/A	N/A
163-1	Leaching – Adsorption/Desorption	No	Yes	46203016	unacceptable
		Yes	Yes	46203017	acceptable
		Yes	Yes	46203018	acceptable
		Yes	Yes	46203019	acceptable
164-1	Terrestrial Field Dissipation	Reserved	Yes	46203023	supplemental
			Yes	46203024	supplemental
			Yes	46203025	supplemental
			Yes	46203026	supplemental
		For the current use and application rate; no additional field dissipation studies are required. Any changes in the use pattern and/or application rate may necessitate a need for new field dissipation studies.			
164-2	Aquatic Field Dissipation	Reserved	N/A	00094799	unacceptable
		For the current use and application rate; no additional field dissipation studies are required. Any changes in the use pattern and/or application rate may necessitate a need for new field dissipation studies.			

N/A: Not applicable

Reserved: not required for current assessment but reserve right to require if future conditions warrant