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

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Pesticide Fact Sheet

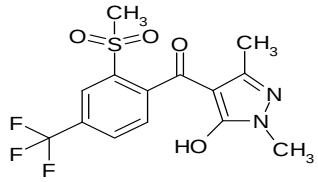
Name of Chemical: Pyrasulfotole
Reason for Issuance: Conditional Registration
Date Issued: August, 2007

I. Description of Chemical

Chemical Name: (5-hydroxyl-1,3-dimethyl-1H-pyrazol-4-yl)[2-(methylsulfonyl)-4-(trifluoromethyl)phenyl]methanone

Common Name: Pyrasulfatole

Chemical Formula:



EPA PC Code: 000692

Chemical Abstracts Service (CAS) Number: 365400-11-9

Year of Initial Registration: 2007

Pesticide Type: Herbicide

Chemical Class: Pyrazole

U.S. Producer: Bayer CropScience

II. Use Patterns and Formulations

Application Sites: Pyrasulfotole is registered for use on cereal grains including wheat, barley, oats, rye, and triticale.

Types of Formulations: Technical grade manufacturing use product (98.6% pyrasulfatole)
Liquid end-use product (4.4% pyrasulfatole)
Liquid end-use product (3.3% pyrasulfatole; 26.3% bromoxynil)

Application Methods And Rates: Pyrasulfatole may be applied as a single application to wheat, barley, oats, and triticale at 0.045 pounds of active ingredient per acre. It may be applied as a single application to rye at 0.0037 pounds of active ingredient per acre. It may be applied preplant, preemergence, or postemergence between from the 1 leaf stage up to flag leaf stage. Ground or aerial equipment may be used. Ground sprinkler irrigation is also permitted.

III. Physical and Chemical Properties:

Table 1 -- Physical and Chemical Properties of Pyrasulfotole	
Melting point	Pure: 201°C No boiling point, decomposition starts at 245°C
pH	3.03 at 22.9°C (1% aqueous dispersion)
Density	1.53
Water solubility at 20°C	pH 4 buffer: 4.2 g/L pH 7 buffer: 69.1 g/L pH 9 buffer: 49 g/L
Solvent solubility at 20°C	ethanol: 21.6 g/L n-hexane: 0.038 g/L tolune: 6.86 g/L acetone: 89.2 g/L dichloromethane: 120-150 g/L ethyl acetate: 37.2 g/L dimethyl sulfoxide: $\geq$ 600
Vapor pressure	2.7×10^{-7} Pa (20°C)
Dissociation constant, pK_a	4.2
n-Octanol/water partition coefficient, Log(K_{OW}) at 23°C	pH 4: 0.276 pH 7: -1.362 pH 9: -1.580
UV/visible absorption spectrum	λ_{max}=264,241 nm in water, 0.1M HCl, 0.1M NaOH respectively

IV. HUMAN HEALTH RISK ASSESSMENT

A. Toxicity

1. Acute Toxicity: Pyrasulfotole has a low to moderate order of acute toxicity via the oral, dermal, and inhalation routes (Category III or IV). Pyrasulfotole is not a dermal sensitizer or irritant (Category IV) and has been shown to be a moderate eye irritant (Category III). The acute toxicity findings for pyrasulfatole are summarized below in Table 2:

Table 2 -- Acute Toxicity

Acute Toxicity of Pyrasulfotole			
Guideline No.	**Study Type**	**Results**	**Toxicity Category**
870.1100	Acute Oral – rat	LD_{50} > 2000 mg/kg	III
870.1200	Acute Dermal - rat	LD_{50} > 2000 mg/kg	III
870.1300	Acute Inhalation - rat	LC_{50} > 5.03 mg/L	IV
870.2400	Primary Eye Irritation – rabbit	Formulation is moderately irritating to the eye	III
870.2500	Primary Skin Irritation – rabbit	Not an irritant to the skin	IV
870.2600	Dermal sensitization - guinea pig	Not a dermal sensitizer	N/A

2. Subchronic Toxicity: Ocular toxicity was observed in male and female rats exposed to pyrasulfotole for 90 days (subchronic oral exposure) either in the diet or by gavage. Mortality and multi-organ histopathology in the kidney, urinary bladder, thyroid, and ureters were also observed in the dietary study. In mice, toxicity of the urinary bladder was observed in males, while toxicity of the adrenal glands was observed in females treated in the diet for 28 days. Neither effect was reproduced in the 90-day toxicity study in mice; however, urinary bladder toxicity was observed in the 29-day toxicity study in the dog, the 90-day toxicity study in the rat, and the mouse carcinogenicity study. Rats treated with pyrasulfotole for 28 days by the dermal route demonstrated toxicity of the thyroid and pancreas.

3. Chronic Toxicity: Chronic oral exposure of rats to pyrasulfotole resulted in extensive eye toxicity at almost all doses tested. These included corneal opacity, neovascularization of the cornea, inflammation of the cornea, regenerative corneal hyperplasia, corneal atrophy, and/or retinal atrophy. Ocular toxicity is believed to be

an indirect result of tyrosinemia caused by inhibition of the liver enzyme 4-hydroxyphenylpyruvate dioxygenase (HPPD). In mice, ocular toxicity was not observed at any dose, thereby reflecting accepted differences in effects among rodent species for HPPD inhibitors. Long-term exposure of mice to pyrasulfotole did cause toxicity of the urinary system, including the kidney, urinary bladder, and ureters at the highest dose tested, as well as gallstone formation at all doses tested. Dogs treated with pyrasulfotole for one year exhibited toxicity of the urinary system (kidneys and bladder) at mid and high doses, as well as cataracts at a very low incidence at the highest dose tested.

4. **Carcinogenicity:** Pyrasulfotole is classified as "Suggestive Evidence of Carcinogenic Potential", based on increased incidences of corneal tumors in male rats at the highest dose tested (2500 ppm) in the chronic toxicity/carcinogenicity study in rat and urinary bladder transitional cell tumors in male and female mice at the highest dose tested (4000 ppm) in the mouse carcinogenicity study. These tumors were observed at doses that were considered excessive due to increased mortality caused by urinary bladder stones. In addition, the progression of non-neoplastic related lesions in both the rats and mice was biologically plausible by non-genotoxic modes of action for both the corneal tumors and the bladder tumors. The chronic RfD of 0.01 mg/kg/day, based on the rat chronic toxicity/carcinogenicity study (NOAAEL=25 ppm [1 mg/kg/day] and LOAEL of 250 ppm [10 mg/kg/day]) would be protective of both non-cancer and potential cancer precursor effects. Therefore, quantifications of separate cancer risk was not required.

5. **Prenatal and Postnatal Sensitivity:** Increased quantitative susceptibility of offspring was observed in the rabbit developmental toxicity study, since offspring toxicity (skeletal anomalies/variations) was observed at a lower dose than maternal toxicity (decreased body weight gain, food consumption). No evidence of quantitative susceptibility following *in utero* and/or postnatal exposure was observed in the prenatal developmental toxicity study in rats, the developmental neurotoxicity (DNT) study in rats, or in the 2-generation rat reproductive toxicity study. Offspring toxicity [skeletal variations; decreased body weight (males)] was observed at the same dose as maternal toxicity (clinical signs, decreased body weight, enlarged placenta) in the prenatal developmental toxicity study in rats. Offspring toxicity (e.g., ocular toxicity, effects on learning/memory, effects on brain morphometry) was also observed at the same dose as maternal toxicity (ocular opacity) in the DNT study. Finally, offspring toxicity (ocular toxicity) was observed at the same as or higher doses than parental toxicity (thyroid effects) in the 2-generation rat reproductive toxicity study

6. **Metabolism:** Following oral administration of 10 mg/kg phenyl or pyrazole ring-labeled pyrasulfotole, ~60% of radiolabeled compound was excreted in the urine after 6 hours, while ~73% of the administered dose was recovered in the urine by the time of sacrifice (52 hours). Therefore, approximately 60% of the compound was absorbed within 6 hours of exposure. Less than 2% of the administered dose remained in the residual carcass and tissues at sacrifice, and the highest residues were

7. **Mutagenicity:** Pyrasulfotole was negative for mutations and chromosomal aberrations across four in vitro/in vivo genotoxicity studies and was considered not to pose a mutagenic concern.

8. **Toxicology Profile:** The toxicological profile for pyrasulfatole is discussed in Table 3 below:

Table 3 -- Toxicology Profile

Subchronic, Chronic and Other Toxicity Profile for Pyrasulfotole			
Guideline No.	**Study Type**	**MRID No./Doses**	**Results**
N/A	28-day oral toxicity (mouse; dietary)	46801843 0, 200, 1000, or 5000 ppm (equal to 0/0, 35.8/45.0, 192/233, or 961/1082 mg/kg bw/day [M/F])	LOAEL = 961/1082 mg/kg/day [M/F], based on gritty content in the urinary bladder and histopathology (urothelial hyperplasia, diffuse submucosal granulation tissue, diffuse suburothelial mixed-cell infiltrate) in the urinary bladder (males) and subcapsular hyperplasia of the adrenal gland (females) NOAEL = 192/233 mg/kg/day [M/F].
870.3100	90-day oral toxicity (mouse; dietary)	46801844 0, 100, 1500, or 3000 ppm (equal to 0/0, 16.5/19.7, 124/152, 259/326, or 500/617 mg/kg bw/day [M/F])	LOAEL not observed NOAEL = 500/617 mg/kg/day (M/F).
870.3200	28-day dermal toxicity (rat)	46801904 0, 10, 100, or 1000 mg/kg bw/day	LOAEL = 100 mg/kg/day based on focal degeneration of the pancreas (both sexes) and alteration of thyroid colloid (males) NOAEL = 10 mg/kg/day.
870.6200	Subchronic neurotoxicity (rat; dietary)	46801916 0, 500, 2500, or 5000 ppm (equivalent to 0/0, 32/42, 166/206, or 345/416 mg/kg bw/day [M/F])	LOAEL = 42 mg/kg bw/day in females based on increased incidences of corneal opacity and corneal neovascularization; not observed in males The NOAEL was not observed in females; 345 mg/kg bw/day in males.

870.6300	Developmental neurotoxicity (rat; dietary)	46801917 0, 3.8, 37, or 354 mg/kg bw/day (gestation and lactation)	Maternal LOAEL = 37 mg/kg/day, based on ocular opacities during lactation Maternal NOAEL = 3.8 mg/kg/day. Offspring LOAEL = 37 mg/kg/day based on ocular opacity (post-weaning), decreased body weight, delayed preputial separation (males), increase in number of trials to criterion and decreases in trial latencies (passive avoidance; PND 22 males), retinal degeneration at ophthalmoscopy (females), decreased brain weight (PND 21 females), decreased cerebrum length (PND 21 females), and decreased cerebellum height (PND 21 males) Offspring NOAEL = 3.8 mg/kg/day.
870.6200	Acute neurotoxicity (rat; gavage)	46801915 0, 200, 500, or 2000 mg/kg bw	LOAEL = 200 mg/kg bw (F) and 2000 mg/kg bw (M) based on decreased locomotor activity on day 0 NOAEL not observed in females; 500 mg/kg bw in males.
870.4300	Combined chronic toxicity/carcinogenicity (rat; dietary)	46801910 0, 25, 250, 1000, or 2500 ppm (equivalent to 0/0, 1.0/1.4, 10/14, 41/57, or 104/140 mg/kg bw/day [M/F])	LOAEL = 10/14 mg/kg (M/F) based on corneal opacity, neovascularization of the cornea, inflammation of the cornea, regenerative corneal hyperplasia, corneal atrophy, and/or retinal atrophy (both sexes), hepatocellular hypertrophy along with increased serum cholesterol (males) and an increased incidence of chronic progressive nephropathy (males) NOAEL = 1.0/1.4 mg/kg (M/F).
N/A	28-day oral toxicity (dog; dietary)	46801845 0, 5000, 13000 or 26000 ppm (equivalent to 0/0, 174/171, 469/440 or 860/782 mg/kg bw/day [M/F])	LOAEL = 171/174 mg/kg bw/day (F/M) based on increases in serum triglycerides and elevated liver weights (M&F), and increased midzonal multifocal vacuolation of liver (M) NOAEL not observed.
870.3150	29/90-day oral toxicity (dog; dietary)	46801901 0, 1500, 9000 or 18000 ppm; study terminated on day 29	N/A

870.3150	90-day oral toxicity (dog; dietary)	46801902 0, 100, 500, or 1000 ppm (equivalent to 0/0, 3/3, 17/17, or 40/33 mg/kg bw/day [M/F])	LOAEL not established NOAEL = 40/33 mg/kg bw/day (M/F).
870.3100	90-day oral toxicity (rat; dietary)	46801842 0, 2, 30, 1000, 7000, or 12000 ppm (equivalent to 0/0, 0.13/0.15, 1.96/2.32, 66/77, 454/537, or 830/956 mg/kg bw/day [M/F])	LOAEL = 77 mg/kg bw/day (F) and 454 mg/kg bw/day (M), based on increased incidences of corneal opacity (M&F), mortality, and histopathology in the kidney, urinary bladder, thyroid, and ureters (M) NOAEL = 2.32 mg/kg bw/day (F) and 66 mg/kg bw/day (M).
870.3700	Prenatal developmental toxicity (rat; gavage)	46801905 0, 10, 100, or 300 mg/kg bw/day	Maternal LOAEL = 100 mg/kg/day based on increased incidence of salivation, decreased corrected body weight gain, decreased body weight during GD 6-8 and enlarged placenta. Maternal NOAEL = 10 mg/kg/day. Developmental LOAEL = 100 mg/kg/day based on increased fetal and/or litter skeletal variations; and decreased body weight (males); Developmental NOAEL = 10 mg/kg/day.
870.3700	Prenatal developmental toxicity (rabbit; gavage)	46801906 0, 10, 75, or 250 mg/kg bw/day	Maternal LOAEL = 250 mg/kg bw/day based on decreased body weight gain during GD 8-10 and decreased food consumption Maternal NOAEL = 75 mg/kg bw/day. Developmental LOAEL = 75 mg/kg bw/day based on increased incidences of fetal/litter skeletal variations Developmental NOAEL = 10 mg/kg/day.

870.3800	Reproduction and fertility effects (rat; dietary)	46801907 0, 30, 300 or 3000 ppm (equivalent to premating doses of 0/0, 2.5/3.1, 26.3/32.6, or 272.4/345.7 mg/kg bw/day [F_0 M/F]; and 0/0, 3.68/4.2, 34.1/38.9 or 353.6/393.4 mg/kg bw/day [F_1 M/F])	Parental LOAEL = 2.5/3.1 mg/kg bw/day (M/F), based on colloid alteration and/or pigment deposition in the thyroid Parental NOAEL not observed. Offspring LOAEL = 26.3/32.6 mg/kg bw/day [M/F] based on corneal opacity and/or corneal neovascularization (F1 and F2 generations) Offspring NOAEL = 2.5/3.1 mg/kg bw/day [M/F]. Reproductive LOAEL = 26.3/32.6 mg/kg bw/day (M/F), based on delayed balano-preputial separation in F_1 pups. Reproductive NOAEL = 2.5/3.1 mg/kg bw/day (M/F).
870.4100	Chronic toxicity (dog; dietary)	46801908 0, 250, 1000, or 3000 ppm (equivalent to 0/0, 7/9, 34/33, or 101/93 mg/kg bw/day [M/F])	LOAEL = 34 (M) & 93 (F) mg/kg/day, based on increased incidence and severity of kidney tubular dilatation (M) and cataracts (F). NOAEL = 7 (M) & 33 (F) mg/kg/day.
870.4200	Carcinogenicity (mouse; dietary)	46801909 0/0, 13.6/16.7, 137/168 and 560/713 mg/kg bw/day (M/F)	LOAEL = 13.6/16.7 mg/kg bw/day (M/F) based on increased incidences of gallstones NOAEL not observed.
870.5100	Gene mutation (bacterial; *in vitro*)	46801911 0, 16, 50, 158, 500, 1581 or 5000 µg/plate (+/- S9)	Negative
870.5300	Gene mutation (mammalian; *in vitro*)	46801912 0, 30, 60, 120, 240, 480, or 960 µg/mL (+/- S9)	Negative
870.5375	Chromosome aberration (mammalian; *in vitro*)	46801913 0, 200, 400, 500, 600, 800, 1000, 1500, 2000, or 2500 µg/mL (+/- S9)	Negative (chromosome isodeletions observed at cytotoxic concentration only).
870.5395	Erythrocyte micronucleus (mouse; *in vivo*)	46801914 0/0, 125/250, 250/500 or 500/1000 mg/kg bw (M/F)	Negative

870.7485	Metabolism and Pharmacokinetics	46801918 0 or 10 mg/kg bw (single low dose; dietary and iv); high dose and repeated dosing not tested	Following oral administration, ~60% of radioactivity absorbed and excreted in urine in 6 hrs; ~70% of radioactivity excreted in urine and 30% in feces by 52 hrs; hydroxymethyl AE 0317309 (2%), desmethyl AE 0317309 (<9%), and AE B197555 (benzoic acid; <2%) observed as metabolites in urine & feces; further metabolism unknown; <2% of administered dose remained in residual carcass and tissues after 52 hrs, highest residues in liver and kidney.

9. **FQPA Hazard Considerations:** EPA has determined that reliable data show that it would be safe for infants and children to reduce the FQPA safety factor to 1X. That decision is based on the following findings:

   - The toxicology database is complete.

   - There are no residual uncertainties concerning pre- and postnatal toxicity. Clear NOAELs were established for all exposure scenarios and these are considered protective of the offspring susceptibility observed in the rabbit developmental toxicity study. The concern for increased susceptibility seen in rabbit developmental toxicity study is low because a) there is well established developmental NOAEL in the rabbit developmental toxicity study in rabbits protecting fetuses from skeletal anomalies/variations, b) the increased succeptibility was not seen in rat developmental toxicity study, developmental neurotoxicity study in rats and two generation reproduction study in rats, c) the NOAEL of the study chosen for the chronic RfD is 10x lower than the rabbit developmental toxicity study NOAEL (10 mg/kg/day).

   - There are no registered or proposed uses of pyrasulfotole which would result in residential exposure.

   - There are no residual uncertainties identified in the exposure databases. The dietary food exposure assessments were performed based on 100% crop treated and tolerance-level residues for all proposed commodities. By using this screening-level assessment, the acute and chronic exposures/risks will not be underestimated. The dietary drinking water assessment (unrefined estimates) utilizes values generated by model and associated modeling parameters which are designed to provide conservative, health protective, high-end estimates of water concentrations.

10. Toxicological Endpoints: A summary of the toxicological endpoints and doses chosen for the relevant exposure scenarios for dietary and occupational human health risk assessments is provided in the table below. The conventional interspecies extrapolation (10X) and intraspecies variation (10X) uncertainty factors were applied for all exposure scenarios. As stated above, the FQPA SF for increased susceptibility was reduced to 1X for all exposures scenarios. A summary of the toxicological endpoints are shown below in Table 4:

Table 4 -- Summary of Toxicological Doses and Endpoints for Pyrasulfotole for Use in Human Health Risk Assessments

Exposure/Scenario	Dose Used in Risk Assessment	Uncertainty/FQPA Safety Factors	Study and Toxicological Effects
Acute Dietary (All populations)	NOAEL = 3.8 mg/kg/day	UF_A = 10X UF_H = 10X UF_{FQPA} = 1X	Developmental neurotoxicity (rat; dietary) Offspring LOAEL = 37 mg/kg/day based on delayed preputial separation (males), decreased cerebrum length (PND 21 females), and decreased cerebellum height (PND 21 males)
Chronic Dietary (All populations)	NOAEL= 1.0 mg/kg/day	UF_A = 10X UF_H = 10X UF_{FQPA} = 1X	Combined chronic toxicity/carcinogenicity (rat; dietary) LOAEL = 10/14 mg/kg/day (M/F) based on corneal opacity, neovascularization of the cornea, inflammation of the cornea, regenerative corneal hyperplasia, corneal atrophy, and /or retinal atrophy (both sexes), and hepatocellar hypertrophy along with increased serum cholesterol (males)
Incidental Oral Short- and Intermediate-Term (1-30 days and 1-6 months)	NOAEL= 2.5 mg/kg/day	UF_A = 10X UF_H = 10X UF_{FQPA} = 1X	Reproduction and fertility effects (rat; dietary) Offspring LOAEL = 26.3/32.6 mg/kg bw/day [M/F] based on corneal opacity and/or corneal neovascularization (F1 and F2 generations)
Dermal Short- and Intermediate-Term (1-30 days and 1-6 months)	NOAEL = 10 mg/kg/day	UF_A = 10X UF_H = 10X	28-day dermal toxicity (rat) LOAEL = 100 mg/kg bw/day (M/F) based on focal degeneration of pancreas (both sexes) and alteration of thyroid colloid (males)

Exposure/Scenario	Dose Used in Risk Assessment	Uncertainty/FQPA Safety Factors	Study and Toxicological Effects
Dermal Long-Term (>6 months)	NOAEL= 1.0 mg/kg/day Estimated dermal absorption factor = 2.5%	UF_A = 10X UF_H = 10X	Combined chronic toxicity/carcinogenicity (rat; dietary) LOAEL = 10/14 mg/kg/day (M/F) based on corneal opacity, neovascularization of the cornea, inflammation of the cornea, regenerative corneal hyperplasia, corneal atrophy, and/or retinal atrophy (both sexes), and hepatocellular hypertrophy along with increased serum cholesterol (males)
Inhalation (All durations)	NOAEL = 1.0 mg/kg/day 100% inhalation asumed	UF_A = 10X UF_H = 10X	Combined chronic toxicity/ carcinogenicity (rat; dietary) LOAEL = 10/14 mg/kg/day (M/F) based on corneal opacity, neovascularization of the cornea, inflammation of the cornea, regenerative corneal hyperplasia, corneal atrophy, and/ or retinal atrophy (both sexes), and hepatocellular hypertrophy along with increased serum cholesterol (males)
Cancer (oral, dermal, inhalation)	Classification: "Suggestive Evidence of Carcinogenic Potential" based on increased incidences of corneal tumors in male rats (oral carcinogenicity study) and urinary bladder tumors in male and female mice (oral carcinogenicity study).		

UF = uncertainty factor, UF_A = extrapolation from animal to human (interspecies), UF_H = potential variation in sensitivity among members of the human population (intraspecies), UF_{FQPA} = FQPA Safety Factor

B. Dietary Exposure and Risk

1. **Dietary Exposure from Food:** As to residues in food, EPA relied upon tolerance level residues and assumed 100% crop treated for all commodities for both acute and chronic exposures.

2. **Dietary Exposure from Water:** In both acute and chronic dietary drinking water was incorporated directly into the dietary assessment using the chronic concentration for surface water generated by the FIRST model. Modeled estimates of drinking water concentrations were directly entered into the dietary exposure model. For acute dietary risk assessment, the water concentration value of 4.0 ppb was used

to access the contribution to drinking water. For chronic dietary risk assessment, the water concentration of value 2.8 ppb was used to access the contribution to drinking water.

The pyrasulfotole risk assessment team determined that the residue of concern in drinking water for risk assessment purposes is parent only. Pyrasulfotole-benzoic acid was identified as the only environmental degradate in the soil metabolism and terrestrial field dissipation studies. Based on available toxicology studies on pyrasulfotole-benzoic acid, EPA determined that it is not of toxicological concern; and, thus should not be included in the drinking water assessment for pyrasulfotole.

3. **Aggregate Exposure Risk Assessments:** For pyrasulfotole, aggregate exposure risk assessments were performed for the following scenarios: acute aggregate exposure (food and drinking water), and chronic aggregate exposure (food and drinking water). Short- and intermediate-term assessments, which are used to evaluate aggregate dietary and residential exposures, were not performed because there are no registered or proposed residential non-food uses. Although pyrasulfotole is classified as "Suggestive Evidence of Carcinogenicity", it was determined that separate quantifications of cancer risks is not required, and that the chronic RfD will be protective of cancer and non-cancer effects (please refer to the section above for Carcinogenicity).

4. **Acute Aggregate Risk:** From food and water, pyrasulfotole and its metabolites pyrasulfotole-desmethyl, will occupy 2% of the aPAD for the general U.S. population and at 4% of the aPAD for children 1-2 years old, the most highly exposed population subgroup. Therefore, the acute aggregate risk associated with the proposed uses of pyrasulfatole are not of concern to the general U.S. population or any subgroup.

5. **Chronic Aggregate Risk:** The exposure to pyrasulfotole and pyrasulfotole-desmethyl from food and water will utilize 2% of the cPAD for the general U.S. population and at 7% of the cPAD for children 1-2 years old, the most highly exposed population subgroup. Therefore, the chronic aggregate risk associated with the proposed uses of pyrasulfatole are not of concern to the general U.S. population or any subgroup.

6. **Cancer Aggregate Risk:** Pyrasulfotole is classified as "Suggestive Evidence of Carcinogenicity". However, for the reasons stated above in the Section for Carcinogenicity, it was determined that separate quantifications of cancer risks is not required, and that the chronic RfD will be protective of cancer and non-cancer effects.

   A summary of the acute and chronic dietary exposure analyses are shown in Table 5 below:

Table 5 -- Summary of the Dietary Exposure and Risk to Pyrasulfatole

Population Subgroup	Acute Dietary Risk		Chronic Dietary Risk	
	Dietary Exposure (mg/kg/day)	% aPAD	Dietary Exposure (mg/kg/day)	% cPAD
General U.S. Population	0.000633	2	0.000224	2
All Infants (< 1 year old)	0.001259	3	0.000410	4
Children 1 – 2 years old	0.001393	4	0.000698	7
Youth 13 – 19 years old	0.000431	1	0.000190	2
Adults 20 – 49 years old	0.000378	1	0.000168	2
Females 13 – 49 years old	0.000431	1	0.000190	2
Adults 50 + years old	0.000331	1	0.000160	2

7. **Cumulative Risk:** Pyrasulfotole belongs to a class of herbicides (including mesotrione, isoxaflutole, and topramezone) that inhibit the liver enzyme 4-hydroxyphenylpyruvate dioxygenase (HPPD), which is involved in the catabolism (metabolic breakdown) of tyrosine (an amino acid derived from proteins in the diet). Inhibition of HPPD can result in elevated tyrosine levels in the blood, a condition called tyrosinemia. HPPD-inhibiting herbicides have been found to cause a number of toxicities in laboratory animal studies including ocular, developmental, liver and kidney effects. Of these toxicities, it is the ocular effect (corneal opacity) that is highly correlated with the elevated blood tyrosine levels. In fact, rats dosed with tyrosine alone show ocular opacities similar to those seen with HPPD inhibitors. Although the other toxicities may be associated with chemically-induced tyrosinemia, other mechanisms may also be involved.

   There are marked differences among species in the ocular toxicity associated with inhibition of HPPD. Ocular effects following treatment with HPPD inhibitor herbicides are seen in the rat but not in the mouse. Monkeys also seem to be recalcitrant to the ocular toxicity induced by HPPD inhibition. The explanation of this species-specific response in ocular opacity is related to the species differences in the clearance of tyrosine. A metabolic pathway exists to remove tyrosine from the blood that involves a liver enzyme called tyrosine aminotransferase (TAT). In contrast to rats where ocular toxicity is observed following exposure to HPPD-inhibiting herbicides, mice and human are unlikely to achieve the levels of plasma tyrosine necessary to produce ocular opacities because the activity of TAT in these

species is much greater compared to rats. Thus, humans and mice have a highly effective metabolic process for handling excess tyrosine.

HPPD inhibitors (e.g., Nitisinone) are used as an effective therapeutic agent to treat patients suffering from rare genetic diseases of tyrosine catabolism. Treatment starts in childhood but is often sustained throughout patient's lifetime. The human experience indicates that a therapeutic dose (1 mg/kg/day dose) of Nitisinone has an excellent safety record in infants, children and adults and that serious adverse health outcomes have not been observed in a population followed for approximately a decade. Rarely, ocular effects are seen in patients with high plasma tyrosine levels; however these effects are transient and can be readily reversed upon adherence to a restricted protein diet. This indicates that an HPPD inhibitor in it of itself cannot easily overwhelm the tyrosine-clearance mechanism in humans.

Therefore, exposure to environmental residues of HPPD-inhibiting herbicides are unlikely to result in the high blood levels of tyrosine and ocular toxicity in humans due to an efficient metabolic process to handle excess tyrosine. In the future, assessment of HPPD-inhibiting herbicides will consider more appropriate models and cross species extrapolation methods.

C. Handler and Worker Risk Assessments

1. **Worker Exposure:** Based on the proposed use patterns, short-term (1-30 days), dermal and inhalation exposures are expected for applicators, especially mixer/loaders using open-pour loading of liquids for aerial applications, and applicators using groundboom equipment. In addition, there is a possibility for agricultural workers to experience post-application exposures to dislodgeable pesticide residues.

2. **Applicator and Mixer Loader Risk Assessment:** Exposure/risks for short-term dermal and inhalation handler mixer/loader exposures were presented at baseline (workers wearing a single layer of work clothing consisting of a long-sleeved shirt, long pants, shoes plus socks and no protective gloves). Risks to pilots are assessed using the engineering control (enclosed cockpits) and baseline attire (long-sleeve shirt, long pants, shoes, and socks). A Margin of Exposure (MOE) of 100 is adequate to protect occupational pesticide handlers. All MOEs are greater than 100 provided mixer/loaders wear protective gloves as specified on the labels, and therefore are below EPA's level of concern. Exposure/risks for short and intermediate-term dermal and inhalation exposures at baseline are presented in Table 6 below:

Table 6 -- Summary of Short-Term Occupational Exposure and Risk Estimates for Pyrasulfatole

Table 9.1. Short-Term Occupational Exposure and Risk Estimates for use of Pyrasulfotole on Small Cereal Grains.[1]						
Exposure Scenario	**Mitigation[2]**	**Daily Dermal Dose (mg/kg/day)[3]**	**Daily Inhalation Dose (mg/kg/day)[3]**	**Dermal MOE[4]**	**Inhalation MOE[4]**	**Combined MOE[5]**
Mixer/Loader						
Aerial Applications	Baseline	0.056	0.00093	180	1,100	150
Applicator						
Aerial Equipment	Engineering control	0.000096	0.000052	100,000	19,000	16,000

1. Short-term handler assessment was conducted assuming 1) the maximum proposed application rate for cereal grains (0.045 lb ai/A); and 2) 1200 and 200 acres treated per day for mixer/loaders and applicators, respectively (based on Exposure SAC SOP #9 "Standard Values for Daily Acres Treated in Agriculture," industry sources, and HED estimates).
2. Baseline Dermal: Long-sleeve shirt, long pants, and no gloves. Baseline Inhalation: no respirator. Engineering control: enclosed cockpit and baseline attire (long-sleeve shirt, long pants, shoes, and socks).
3. Dose (mg/kg/day) = Unit exposure(mg/lb ai) x App Rate (lb ai/acre) x Area Treated (acres/day) x %Absorption (2.5% dermal and 100% inhalation) / Body weight (70 kg).
4. MOE = NOAEL/Dose; where the short-term dermal NOAEL = 10 mg/kg/day and the short-term inhalation NOAEL = 1.0 mg/kg/day
5. Combined MOE = NOAEL / (dermal + inhalation daily dose)

3. **Postapplication Handler Risk Assessment:** Post-application inhalation exposure is expected to be negligible due to the low vapor pressure of pyrasulfotole, and therefore not of concern. Post-application dermal exposure to workers was estimated using the EPA's Science Advisory Council for Exposure Policy (ExpoSAC; Policy 003.1, Rev. 7 Aug. 2000, Regarding Agricultural Transfer Coefficients (TCs); Amended ExpoSAC Meeting notes - 13 Sept 01), which lists scouting and irrigating as the activities with the highest (*i.e.*, most conservative) TCs related to the proposed uses. A MOE of 100 is adequate to protect postapplication handlers. All MOEs are greater than 100 and therefore below EPA's level of concern. A summary of occupational short-term post-application risks associated with the proposed uses of pyrasulfotole are presented in Table 7 below:

Table 7 -- Summary of Short-Term Occupational Post-Application Risks for Pyrasulfatole

Table 9.2. Summary of Short-Term Occupational Post-Application Risks for Pyrasulfotole on Small Cereal Grains.				
Activities	**TC (cm^2/hr)[1]**	**Maximum Application Rate (lb ai/acre)**	**MOE at Day 0**	**REI (days) (Target MOE= 100)**
Scouting, irrigation	100	0.045	350,000	12 hours
	1500		23,000	12 hours

1. TC = transfer coefficient.

4. **Residential Exposure:** Currently there are no proposed residential uses for pyrasulfotole.

V. ENVIRONMENTAL CHARACTERIZATION

A. Environmental Fate Characterization

Pyrasulfotole is highly soluble in water (69 g/L), has a low vapor pressure (6.8×10^{-7} Pa) and low octanol-water partitioning coefficient (0.04). Therefore, volatilization from water and soil surfaces is not expected to be an important route of environmental dissipation and bioaccumulation is unlikely. Pyrasulfotole is expected to be persistent under certain conditions and moderately mobile to mobile in the environment. It is stable to hydrolysis and photolysis and moderately susceptible to microbial degradation under aerobic conditions in soils. Depending on soil, site and meteorological conditions pyrasulfotole may be transported off-site via runoff, leaching and spry drift. In terrestrial field dissipation studies, pyrasulfatole showed half-lives that ranged from 6 to 18 days, and dissipated from the soil profile between 44 and 531 days. The amount of total residues carried over to the following growing season ranged from 4.7 to 37%. To address concerns with the potential leaching of pyrasulfatole that may result from the persistence and mobility described above, label language will be required in the form of a surface water advisories that stresses the potential of runoff after treatment, describes conditions that may promote leaching to groundwater, and suggests practices that may reduce contamination of water. This label language is described in more detail in the following section for Required Labeling.

B. Potential Risks to Non-Target Plants

As would be expected with any herbicide, Agency levels of concern were exceeded for non-target terrestrial and aquatic vascular plants. The results of this screening-level assessment indicate that the proposed uses of pyrasulfotole have the potential for direct adverse effects for terrestrial and semi-aquatic dicotyledonous plants, and listed freshwater vascular plants. The non-listed species LOC for aquatic vascular plants was not exceeded in any of the use scenarios modeled, however, the listed species LOC was exceeded at application rates greater than 0.040 lb ai/A, indicating the potential for risk to listed aquatic vascular plants exposed to pyrasulfotole. Regarding listed species, EFED's screening level analysis shows the possibility of direct effects to listed aquatic vascular plants, terrestrial and semi-aquatic dicotyledonous plants. For indirect effects, all other taxa will be considered since there is a potential for indirect effects to taxa that might rely on plants for some stage of their life-cycle. Therefore, at this time, no Federally listed can be excluded from the potential for direct and/or indirect effects from the proposed uses of pyrasulfotole.

The Agency strategy to mitigate these risks involve label language that is intended to keep the pesticide on the intended treatment area, and therefore reducing the potential for exposure to non-target plants. For example, spray drift management language will be required on the labeling, which advises users of applicator responsibilities and offers specific techniques to reduce the possibility of spray drift. In addition, the use of buffer strips will be discussed in the surface water advisory language, which may further reduce

possible exposure to non-target plants.

C. Potential Risks to Non-Target Animals

Pyrasulfotole is classified as practically nontoxic to fish and freshwater invertebrates, and 'highly toxic' to estuarine/marine invertebrates, on an acute basis (the risk mitigation measures described above regarding labeling intended to keep the pesticide on the intended treatment area are also expected to mitigate risks to estuarine/marine invertebrates). No acute LOCs for aquatic animals were exceeded for the proposed use. Laboratory studies demonstrate chronic growth effects in fish at 0.58 mg a.i./L, and effects on freshwater invertebrate survival at 12.8 mg a.i./L. None of the freshwater aquatic animal RQs for chronic exposure exceeded the Agency's LOC, however, chronic toxicity data are not available for estuarine/marine invertebrates, the most acutely sensitive aquatic animal taxon. These data are not required for the currently proposed use. However, this requirement is reserved, and may be required for future proposed uses of pyrasulfotole.

Pyrasulfotole is classified as 'practically nontoxic' to birds and mammals on an acute exposure basis. No acute risks are expected to these taxa from the proposed use. Avian reproduction studies indicated only slight effects on growth at levels greater than 167 mg a.i./kg. No chronic avian RQs exceed the Agency LOC. At application rates > 0.023 lb a.i./A, some mammalian chronic risks are indicated for the proposed use of pyrasusulfatole (RQ's range from 1.05 to 1.87). Chronic risk to mammals is not expected at the lower labeled application rates.

VI. Regulatory Decision

A. Conditional Registration: A conditional registration is recommended for pyrasulfotole for use as a selective herbicide for control of broadleaf weeds in wheat, barley, oats, rye and triticale.

1. Conditional data needed to confirm

- In vivo dermal penetration study
- Revisions to the analytical methods
- Submission of an analytical reference standard for pyrasulfotole, pyrasulfotole-desmethyl and labeled internal standards to the EPA National Pesticide Standards Repository
- Toxicity of residues in sediment to benthic organisms (freshwater and marine)

2. Public Interest Finding: A conditional registration under FIFRA Section 3(c)(7)(C) may be granted if EPA determines that use of the pesticide during such period will not cause any unreasonable adverse effect on the environment, and that use of the

pesticide is in the public interest.

B. TOLERANCES

1. **Tolerance Levels:** The tolerance is established for residues of pyrasulfotole and pyrasulfotole-desmethyl, in or on aspirated grain fractions, at 0.40 ppm, barley, grain at 0.02 ppm, barley, hay at 0.30 ppm, barley, straw at 0.20 ppm, cattle, meat byproducts, except liver at 0.06 ppm, eggs at 0.02 ppm, goat, fat at 0.02 ppm, goat meat at 0.02 ppm, goat, meat byproducts, except liver at 0.06 ppm, hog, fat at 0.02 ppm, hog, meat at 0.02 ppm, hog, meat byproducts at 0.02 ppm, horse, fat at 0.02 ppm, horse, liver at 0.35 ppm, horse, meat at 0.02 ppm, horse, meat byproducts, except liver at 0.06 ppm, milk at 0.01 ppm, oat, forage at 0.10 ppm, oat, grain at 0.08 ppm, oat, hay at 0.50 ppm, oat, straw at 0.20 ppm, poultry, fat at 0.02 ppm, poultry, meat at 0.02 ppm, poultry, meat byproducts at 0.02 ppm, rye, forage at 0.20 ppm, rye, grain at 0.02 ppm, rye, straw at 0.20 ppm, sheep, fat at 0.02 ppm, sheep, liver at 0.35 ppm, sheep, meat at 0.02 ppm, sheep, meat byproducts, except liver at 0.06 ppm, wheat, forage at 0.20 ppm, wheat, grain at 0.02 ppm, wheat, hay at 0.80 ppm, and wheat, straw at 0.20 ppm.

2. **International MRLs:** All EPA recommended tolerances are harmonized with those being established in Canada and Australia.

C. REQUIRED ENVIRONMENTAL LABEL STATEMENTS:

End use products containing pyrasulfatole as an active ingredient will be required to add the following protective language on the product labeling:

1. **Environmental Hazards:** "Do not apply directly to water, or 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 washwater or rinsate."

2. **Ground Water Advisory:** "Pyrasulfatole is known to leach through soil into ground water under certain conditions as a result of label use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination."

3. **Surface Water Advisory:** "This product may contaminate water through drift of spray in wind. This product has a high potential for runoff for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination of water from rainfall runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours."

4. Spray Drift Management

Spray drift is always a potential source of exposure to residents nearby to spraying operations. This is particularly the case with aerial application, but, to a lesser extent, could also be a potential source of exposure from the ground application method employed for pyrasulfotole. The Agency has been working with the Spray Drift Task Force, EPA Regional Offices and State Lead Agencies for pesticide regulation and other parties to develop the best spray drift management practices. On a chemical by chemical basis, the Agency is now requiring interim mitigation measures for aerial applications that must be placed on product labels/labeling. The Agency has completed its evaluation of the new database submitted by the Spray Drift Task Force, a membership of U.S. pesticide registrants, and is developing a policy on how to appropriately apply the data and computer model to its risk assessments for pesticides applied by air, orchard airblast and ground hydraulic methods. After the policy is in place, the Agency may impose further refinements in spray drift management practices to reduce off-target drift with specific products with significant risks associated with drift.

Contact Person at EPA

Joanne I. Miller
Product Manager 23
Herbicide Branch
Registration Division (7505P)
Office of Pesticide Programs
Environmental Protection Agency
Aerial Rios Building
1200 Pennsylvania Ave., NW
Washington, DC 20460

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Certification of limits

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Oct/Water partition Coef.

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pH

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Oxidizing/Reducting Action

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Aerobic aquatic metab.

MRID	Citation Reference
46801713	Allan, J.; Cheung, C. (2006) [Pyrazol-3-(Carbon 14)] AE 0317309 and [Phenyl-UL-(Carbon 14)] AE 0317309: Aerobic Aquatic Metabolism. Project Number: MEAIM008, A9042104. Unpublished study prepared by Bayer Corp. 101 p.

Leach/adsorp/desorption

MRID	Citation Reference
46801703	Maurer, T.; Eyrich, U.; Fliege, R. (2003) Adsorption/Desorption of AE 0317309 on Five Soils and One Sediment. Project Number: CP/02/014, MO/03/012996, MEF/186/03. Unpublished study prepared by Bayer Cropscience Gmbh. 84 p.

Terrestrial field dissipation

MRID	Citation Reference
46801716	Lenz, M. (2006) Terrestrial Field Dissipation of AE 0317309 in Kansas Soil, 2004. Project Number: MEAIY008, AI/002/S05/02. Unpublished study prepared by Bayer Corp., Agvise Inc. and Diamond Ag Research, Inc. 191 p.
46801717	Lenz, M. (2006) Terrestrial Field Dissipation of AE 0317309 in North Dakota Soil, 2004. Project Number: MEAIY007, AI/002/S05/02. Unpublished study prepared by Bayer Corp. and Agvise Inc. 188 p.
46801718	Lenz, M. (2006) Terrestrial Field Dissipation of AE 0317309 in Washington Soil, 2004. Project Number: MEAIY009, AI/002/S05/02. Unpublished study prepared by Bayer Corp., Agvise Inc. and Qualls Agricultural Laboratories, I. 195 p.

Product Identity and composition

MRID	Citation Reference
46801701	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2469, AF04/086, AM006904FP1. Unpublished study prepared by Bayer Corp. 325 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer

	Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Description of materials used to produce the product

MRID	Citation Reference
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Description of production process

MRID	Citation Reference
46801701	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2469, AF04/086, AM006904FP1. Unpublished study prepared by Bayer Corp. 325 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Description of formulation process

MRID	Citation Reference
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Discussion of formation of impurities

MRID	Citation Reference
46801701	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2469, AF04/086, AM006904FP1. Unpublished study prepared by Bayer Corp. 325 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Preliminary analysis

MRID	Citation Reference
46801701	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2469, AF04/086, AM006904FP1. Unpublished study prepared by Bayer Corp. 325 p.

Certified limits

MRID	Citation Reference
46801701	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2469, AF04/086, AM006904FP1. Unpublished study prepared by Bayer Corp. 325 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Enforcement analytical method

MRID	Citation Reference

46801701 Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2469, AF04/086, AM006904FP1. Unpublished study prepared by Bayer Corp. 325 p.

46801924 Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.

46801934 Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Color

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Physical state

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Odor

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Stability to sunlight, normal and elevated temperatures, metals, and metal ions

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Oxidizing or reducing action

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Flammability

MRID	Citation Reference
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Explodability

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Storage stability of product

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801925	Swan, J. (2006) Stability of AE 0317309 02 SE06 A105. Project Number: 201423/1. Unpublished study prepared by Bayer Corp. 6 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.
46801935	Swan, J. (2006) Stability of AE 0317309 + Bromoxynil EC23. Project Number: 201394/1. Unpublished study prepared by Bayer Corp. 6 p.

Corrosion characteristics

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801925	Swan, J. (2006) Stability of AE 0317309 02 SE06 A105. Project Number: 201423/1. Unpublished study prepared by Bayer Corp. 6 p.

46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.
46801935	Swan, J. (2006) Stability of AE 0317309 + Bromoxynil EC23. Project Number: 201394/1. Unpublished study prepared by Bayer Corp. 6 p.

pH of water solutions or suspensions

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

UV/Visible absorption

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Viscosity

MRID	Citation Reference
46801924	Frank, J. (2006) Product Chemistry of AE 0317309 SE 06 Herbicide. Project Number: BR/2463, 201207, ANR/03206. Unpublished study prepared by Bayer Corp. 235 p.
46801934	Frank, J. (2006) Product Chemistry of AE 0317309 + Bromo Herbicide. Project Number: BR/2464, ANR/03906, ANR/04006. Unpublished study prepared by Bayer Corp. 381 p.

Melting point/melting range

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Density/relative density

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Dissociation constant in water

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Partition coefficient (n-octanol/water), generator column method

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Water solubility: Column elution method, shake flask method

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer

Corp. 323 p.

Vapor pressure

MRID	Citation Reference
46801702	Fontaine, L. (2006) Product Chemistry of Pyrasulfotole Technical. Project Number: BR/2470, PA03/044, PA05/102. Unpublished study prepared by Bayer Corp. 323 p.

Sediment and soil absorption/desorption for parent and degradates

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Hydrolysis of parent and degradates as a function of pH at 25 C

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Direct photolysis rate of parent and degradates in water

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Photodegradation of parent and degradates in soil

MRID	Citation Reference

46801720 Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Aerobic soil metabolism

MRID	Citation Reference
46801710	Fliege, R. (2004) [Phenyl-U-(Carbon 14)]- and [Pyrazole-3-(Carbon 14)]-AE 0317309: Aerobic Soil Metabolism in a Silt Loam Soil of US Origin Under Laboratory Conditions at 25 degrees C. Project Number: MEF/387/03, CB/02/012. Unpublished study prepared by Bayer Cropscience Gmbh. 116 p.
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Anaerobic soil metabolism

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Aerobic aquatic metabolism

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Anaerobic aquatic metabolism

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP.

309 p.

Terrestrial field dissipation

MRID	Citation Reference
46801720	Wolford, V. (2006) Study Profiles for AE 0317309, Environmental Fate. Project Number: 001VEW2006. Unpublished study prepared by Bayer CropScience LP. 309 p.

Aquatic invertebrate acute toxicity, test, freshwater daphnids

MRID	Citation Reference
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Oyster acute toxicity test (shell deposition)

MRID	Citation Reference
46801722	Dionne, E. (2004) AE 0317309 - Acute Toxicity to Eastern Oysters (Crassostrea Virginica) Under Flow-Through Conditions. Project Number: 13798/6159, EBAIX013. Unpublished study prepared by Springborn Smithers Laboratories. 55 p.

Fish acute toxicity test, freshwater and marine

MRID	Citation Reference
46801726	Banman, C.; Kern, M.; Lam, C. (2004) Acute Toxicity of AE 0317309 Technical to the Sheepshead Minnow (Cyprinodon Variegatus) Under Static Conditions. Project Number: EBAIX012, 200820. Unpublished study prepared by Bayer Corp. 30 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Daphnid chronic toxicity test

MRID	Citation Reference
46801727	Kern, M.; Lam, C. (2004) Chronic Toxicity of AE 0317309 Technical to the Daphnia Magna Under Static Renewal Conditions. Project Number: EBAIX014. Unpublished study prepared by Bayer Corp. 55 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Fish early-life stage toxicity test

MRID	Citation Reference
46801728	Kern, M.; Lam, C. (2004) Early Life Stage Toxicity of AE 0317309 Technical to the Fathead Minnow (Pimephales Promelas) Under Flow-Through Conditions. Project Number: EBAIX015, A9841201. Unpublished study prepared by Bayer Corp. 77 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Avian acute oral toxicity test

MRID	Citation Reference
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Avian dietary toxicity test

MRID	Citation Reference
46801730	Stoughton, T. (2005) Technical AE0317309: A Subacute Dietary LC50 With Northern Bobwhite. Project Number: EBAIM002, A9721701. Unpublished study prepared by Bayer Corp. 47 p.

46801731	Stoughton, T. (2005) Technical AE0317309: A Subacute Dietary LC550 With Mallards. Project Number: A9720801, EBAIM003. Unpublished study prepared by Bayer Corp. 48 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Avian reproduction test

MRID	Citation Reference
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Honey bee acute contact toxicity

MRID	Citation Reference
46801735	Waltersdorfer, A. (2002) Contact Toxicity (LD50) to Honey Bees (Apis Mellifera L.) Substance Technical. Project Number: AE/0317309/00/1C98/0, CW02/048. Unpublished study prepared by Bayer Cropscience Gmbh. 18 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Terrestrial plant toxicity, Tier 1 (seeding emergence)

MRID	Citation Reference
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Terrestrial plant toxicity, Tier 1 (vegetative vigor)

MRID	Citation Reference

46801747 Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Aquatic plant toxicity test using Lemna spp. Tiers I and II

MRID	Citation Reference
46801736	Kern, M.; Banman, C.; Lam, C. (2004) Toxicity of AD 0317309 Technical to Duckweed (lemma gibba G3) Under Static Conditions. Project Number: EBAIX009, A9883701, 200641. Unpublished study prepared by Bayer Corp. 40 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Algal toxicity, Tiers 1 and II

MRID	Citation Reference
46801737	Kern, M.; Lam, C. (2004) Toxicity of AE 0317309 Technical to the Green Alga Pseudokirchneriella subcpitata (AKA Selenastrum capricornutum). Project Number: EBAIX005, A9883501, 200714. Unpublished study prepared by Bayer Corp. 41 p.
46801738	Kern, M.; Lam, C. (2004) Toxicity of AE 0317309 Technical to the Freshwater Diatom Navicula pelliculosa. Project Number: 200761, EBAIX006, A9883401. Unpublished study prepared by Bayer Corp. 41 p.
46801739	Kern, M.; Roberts, J.; Lam, C. (2004) Toxicity of AE 0317309 Technical to the Blue-Green Algae Anabaena flos-aquae. Project Number: 200752, EBAIX008, A9883801. Unpublished study prepared by Bayer Corp. 40 p.
46801740	Kern, M.; Banman, C.; Lam, C. (2004) Toxicity of AE 0317309 Technical to the Saltwater Diatom Skeletonema Costatum. Project Number: 200697, EBAIX007, A9883601. Unpublished study prepared by Bayer Corp. 37 p.
46801747	Dykes, J. (2006) Study Profiles for AE 0317309, Ecological Effects. Project Number: 001JAD2006, 02DT35542/A, 200820. Unpublished study prepared by Bayer CropScience LP. 326 p.

Nature of the residue - plants, livestock

MRID	Citation Reference
46801748	Koehn, D.; Haas, M. (2004) Metabolism of [Phenyl-U-(Carbon 14)] AE 0317309 in Wheat (Triticum aestivum) Following Treatment at a Nominal Application Rate of 100 g a.s./ha. Project Number: MEF/193/03, CM/02/006, CM02/006. Unpublished study prepared by Bayer Cropscience Gmbh. 108 p.
46801749	Koehn, D.; Haas, M. (2004) Metabolism of [Pyrazole-3-(Carbon 14)] AE 0317309 in Wheat (Triticum Aestium) Following Treatment at a Nominal Application Rate of 100 g a.s./ha. Project Number: MEF/194/03, CM/02/007, CM02/007. Unpublished study prepared by Bayer Cropscience Gmbh. 115 p.
46801801	Koehn, D.; Haas, M. (2004) Metabolism of [Phenyl-U-(Carbon 14)]AE 0317309 in Wheat Following Treatment at an Application Rate of 100 g/ha with and without Safener. Project Number: M1731265/5, MEF/322/03. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal.. 126 p.
46801802	Rupprecht, J. (2006) Metabolism of [Phenyl-U-(Carbon 14)]-AE 0317309 in the Laying Hen. Project Number: MEAIM012, 204/0734C, ELECTRONIC/COPY. Unpublished study prepared by Bayer Corp. and Southwest Bio-Labs, Inc. 93 p.
46801803	Rupprecht, J. (2006) Metabolism of [Pyrazole-3-(Carbon 14)]-AE 0317309 in the Laying Hen. Project Number: MEAIM011, 204/0733C, . Unpublished study prepared by Bayer Corp. and Southwest Bio-Labs, Inc. 91 p.
46801804	Rupprecht, J. (2006) Metabolism of [Phenyl-U-)Carbon 14)]-AE 0317309 in the Lactating Goat. Project Number: MEAIM009, 205/007/12, MEAIM009/GML. Unpublished study prepared by Bayer Corp. 102 p.
46801805	Rupprecht, J. (2006) Metabolism of [Pyrazole-3-(Carbon 14)]-AE 0317309 in the Lactating Goat. Project Number: MEAIM010, 205/008/12, A9041001. Unpublished study prepared by Bayer Corp. 98 p.
46801835	Dykes, J. (2006) Study Profiles for AE 0317309: Residue Chemistry. Project Number: 002JAD2006, CM/02/006, CM/02/007. Unpublished study prepared by Bayer Cropscience LP, Bayer Ag, Institute of Product Info. & Residue Anal. and Bayer Corp. 739 p.

Residue analytical method

MRID	Citation Reference
46801716	Lenz, M. (2006) Terrestrial Field Dissipation of AE 0317309 in Kansas Soil, 2004. Project Number: MEAIY008, AI/002/S05/02. Unpublished study prepared by Bayer Corp., Agvise Inc. and Diamond Ag Research, Inc. 191 p.
46801717	Lenz, M. (2006) Terrestrial Field Dissipation of AE 0317309 in North Dakota

Soil, 2004. Project Number: MEAIY007, AI/002/S05/02. Unpublished study prepared by Bayer Corp. and Agvise Inc. 188 p.

46801718 Lenz, M. (2006) Terrestrial Field Dissipation of AE 0317309 in Washington Soil, 2004. Project Number: MEAIY009, AI/002/S05/02. Unpublished study prepared by Bayer Corp., Agvise Inc. and Qualls Agricultural Laboratories, I. 195 p.

46801806 Gould, T.; Brungardt, J.; Timberlake, B. (2006) Validation of Bayer CropScience Method AI-001-P04-01: An Analytical Method for the Determination of Residues of AE 0317309, AE 1073910, and AE B197555 in Wheat Corn, and Soybean Matrices Using LC/MS/MS. Project Number: RAAIX005, AI0141221A/13, AI041217A/17. Unpublished study prepared by Bayer Corp. 210 p.

46801807 Billian, P. (2005) Independent Laboratory Validation of the Analytical Method AI-001-P04-01 for the Determination of Residues of AE 0317309, AE 1073910 and AE B197555 in Plant Material. Project Number: P612050574, MR/097/05, AI/001/P04/01. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 72 p.

46801808 Gould, T.; Brungardt, J. (2006) Extraction Efficiency of AE B197555, AE 1073910, and AE 0317309 by Method AI-001-P04-01. Project Number: RAAIX011, AI/0001/P04/01. Unpublished study prepared by Bayer Corp. 60 p.

46801809 Lam, C.; Qadri, S. (2006) Validation of Bayer CropScience Method AI-004-A05-01: Analytical Method for the Determination of Residues of AE 0317309 in Animal Tissues and Milk Using LC-MS/MS. Project Number: RAAIX006, AI/004/A05/01. Unpublished study prepared by Bayer Corp. 100 p.

46801810 Billian, P.; Wirkner, H. (2005) Independent Laboratory Validation of the Analytical Method AI-004-A05-01 for the Determination of Residues of AE 0317309 in Animal Tissues and Milk Using LC-MS/MS. Project Number: P613050577, MR/122/05, AI/004/A05/01. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 56 p.

46801811 Lam, C.; Qadri, S. (2006) "Extraction Efficiency of Bayer CropScience Method AI-004-A05-01" Analytical Method for the Determination of Residues of AE 0317309 in Animal Tissue and Milk Using LC-MS/MS. Project Number: RAAAIX010, AI/004/A05/01, RAAIX006. Unpublished study prepared by Bayer Corp. 47 p.

46801812 Lam, C.; Qadri, S. (2006) Validation of Bayer CropScience Method AI-005-A05-01: Analytical Method for the Determination of Residues of AE B197555 in Poultry and Eggs Using LC-MS/MS. Project Number: RAAIP012, AI/005/A05/01, MWAIM012. Unpublished study prepared by Bayer Corp.. 91 p.

46801813 Nelson, S. (2006) Independent Laboratory Validation of Method AI-005-A05-01 - "An Analytical Method for the Determinaiton of AE B197555 in Poultry

	and Eggs Using LC/MS/MS". Project Number: 06ILV01BAY, 06BAY27/REP, RAAIP011. Unpublished study prepared by Enviro-Test Laboratories (ETL). 78 p.
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Multiresidue method

MRID	Citation Reference
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Storage stability data

MRID	Citation Reference

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MRID	Citation Reference
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Crop field trials

MRID	Citation Reference
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46801835 Dykes, J. (2006) Study Profiles for AE 0317309: Residue Chemistry. Project Number: 002JAD2006, CM/02/006, CM/02/007. Unpublished study prepared by Bayer Cropscience LP, Bayer Ag, Institute of Product Info. & Residue Anal. and Bayer Corp. 739 p.

Processed food/feed

MRID	Citation Reference
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Confined accumulation in rotational crops

MRID	Citation Reference
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Field accumulation in rotational crops

MRID	Citation Reference
46801834	Milo, J.; Harbin, A. (2006) AE 0317309: Magnitude of the Residue in Corn and Soybeans Planted as Rotational Crops Following Treatment of Wheat with AE 0317309 02 SE06 A1 (120-Day Plant-back Interval). Project Number: RAAIM021, AI089/04RA, AI089/04RB. Unpublished study prepared by: Bayer Corp. and Bayer CropScience and Aventis CropScience. 220 p.
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Acute oral toxicity

MRID	Citation Reference
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Acute dermal toxicity

MRID	Citation Reference
46801837	Schungel, M. (2004) AE 0317309: Acute Toxicity in the Rat After Dermal Application. Project Number: AT01069, T/4073707, TXAIM002. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 26 p.
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Acute inhalation toxicity

MRID	Citation Reference
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MRID	Citation Reference

46801839	Moore, G. (2006) AE 0317309 Technical: Primary Eye Irritation Study in Rabbits. Project Number: 18739, 051202/5D. Unpublished study prepared by Product Safety Laboratories. 14 p.
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46801941	Schungel, M. (2005) AE 0317309 03 EC23 A8: Acute Eye Irritation on Rabbits. Project Number: AT01910, T/5074437. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 23 p.

Acute dermal irritation

MRID	Citation Reference
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46801942	Schungel, M. (2005) AE 0317309 03 EC23 A8: Acute Skin Irritation/Corrosion on Rabbits. Project Number: AT01911, TXAIX034, T/2074434. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 23 p.

Skin sensitization

MRID	Citation Reference
46801841	Vohr, H. (2004) AE 0317309: Study for the Skin Sensitization Effect in Guinea Pigs. Project Number: AT01261, T/4073013. Unpublished study prepared by

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90-Day oral toxicity in rodents

MRID	Citation Reference
46801842	Langrand-Lerche, C. (2003) AE 0317309: 90-Day Toxicity Study in the Rat by Dietary Administration. Project Number: SA/02017. Unpublished study prepared by Bayer CropScience LP. 476 p.
46801844	Steiblen, G. (2003) AE 0317309: 90-Day Toxicity Study in the Mouse by Dietary Administration. Project Number: SA/03015. Unpublished study prepared by Bayer Cropscience. 324 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

90-day oral toxicity in nonrodents

MRID	Citation Reference
46801901	Eigenberg, D. (2006) Technical Grade AE 0317309: A 90-Day Subchronic Toxicity Feeding Study in the Beagle Dog: Revised Report. Project Number: 03/S76/PB, 201019/1. Unpublished study prepared by Bayer Corp. 15 p.
46801902	Eigenberg, D. (2005) Technical Grade AE 0317309: A 90-Day Subchronic Toxicity Feeding Study in the Beagle Dog. Project Number: 03/S76/UG, 201210. Unpublished study prepared by Bayer Corp. and Charles River Laboratories, Inc. 382 p.

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21/28-day dermal toxicity

MRID	Citation Reference
46801843	McElligott, A. (2002) AE 0317309: Preliminary 28-Day Toxicity Study in the Mouse By Dietary Administration. Project Number: C/026381, SA/02080, 605657. Unpublished study prepared by Bayer Cropscience. 254 p.
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46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Prenatal developmental toxicity study

MRID	Citation Reference
46801905	Wason, S. (2006) AE 0317309: Developmental Toxicity Study in the Rat by Gavage. Project Number: SA/03174. Unpublished study prepared by Bayer Cropscience. 218 p.
46801906	Wason, S. (2006) AE 0317309: Developmental Toxicity Study in the Rabbit by Gavage. Project Number: SA/03131. Unpublished study prepared by Bayer Cropscience. 270 p.
46801921	Kennel, P. (2006) Effect of Tyrosinaemia on Pregnancy and Embryo-Fetal Development in the Rat. Project Number: SA/05192. Unpublished study prepared by Bayer Cropscience. 207 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Reproduction and fertility effects

MRID	Citation Reference
46801907	Eiben, R. (2005) Two-Generation Reproduction Study in the Wistar Rat by Administration in the Diet. Project Number: T2063193, TXAIX005, AT02705. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 1328 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Chronic toxicity

MRID	Citation Reference
46801908	Eigenberg, D. (2006) A Chronic Toxicity Feeding Study in the Beagle Dog with Technical Grade AE 0317309. Project Number: 04C76/VB, 201450, AZ/10346. Unpublished study prepared by Bayer Corp. 966 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Carcinogenicity

MRID	Citation Reference
46801909	Steiblen, G. (2006) Carcinogenicity Study of AE 0317309 in the C57BL/6J Mouse by Dietary Administration. Project Number: SA/03172. Unpublished study prepared by Bayer Cropscience. 2431 p.
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Combined chronic toxicity/carcinogenicity

MRID	Citation Reference

46801910	Wason, S. (2006) 6-Month Toxicity, Chronic Toxicity and Carcinogenicity Study of AE 0317309 in the Wistar Rat by Dietary Administration. Project Number: SA/02453, K04/004, K03/046. Unpublished study prepared by Bayer Cropscience. 3775 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Bacterial reverse mutation test

MRID	Citation Reference
46801911	Herbold, B. (2004) Salmonella/Microsome Test: Plate Incorporation and Preincubation Method: AE 0317309. Project Number: AT01030, T/8072955. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 53 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

In vitro mammalian cell gene mutation test

MRID	Citation Reference
46801912	Herbold, B. (2004) V79/HPRT-Test In Vitro for the Detection of Induced Forward Mutations: AE 0317309. Project Number: TXAIM008, T/0072957, AT01401A. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 46 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

In vitro mammalian chromosome aberration test

MRID	Citation Reference
46801913	Thum, M. (2004) In Vitro Chromosome Aberration Test with the Chinese Hamster V79 Cells: AE 0317309. Project Number: AT01285, T/9072956,

	TXAIM009. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 46 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Mammalian erythrocyte micronucleus test

MRID	Citation Reference
46801914	Herbold, B. (2003) Micronucleus-Test Using Mice: AE 0317309. Project Number: AT00719, T/2063346. Unpublished study prepared by Bayer Ag Inst. of Toxicology. 47 p.
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Neurotoxicity screening battery

MRID	Citation Reference
46801915	Gilmore, R.; Sheets, L. (2005) An Acute Oral Neurotoxicity Screening Study with Technical Grade AE 0317309 in Wistar Rats. Project Number: 04/N12/WL, 201392. Unpublished study prepared by Bayer Corp. 463 p.
46801916	Gilmore, R.; Hoss, H. (2005) A Subchronic Neurotoxicity Screening Study with Technical Grade AE 0137309 in Wistar Rats. Project Number: 04/N72/VU, 201381, E/205. Unpublished study prepared by Bayer Corp. 574 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Developmental neurotoxicity study

MRID	Citation Reference
46801917	Gilmore, R.; Sheets, L.; Hoss, H. (2006) A Developmental Neurotoxicity Screening Study with Technical Grade AE 0317309 in Wistar Rats. Project

	Number: 04/D72/YE, 201439. Unpublished study prepared by Bayer Corp. 1083 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Metabolism and pharmacokinetics

MRID	Citation Reference
46801918	Fischer, D.; Roensch, W. (2005) The Metabolism of [Phenyl-UL-(Carbon 14)] and [Pyrazole-3-(Carbon 14)] AE 0317309 in Rats. Project Number: MEAIX021. Unpublished study prepared by Bayer Corp. 218 p.
46801923	Wolford, V. (2006) Study Profiles for AE 0317309: Toxicology. Project Number: AT01067, AT01069, AT00964. Unpublished study prepared by Bayer Ag Inst. of Toxicology, Bayer Cropscience LP and Product Safety Laboratories. 420 p.

Data reporting for environmental chemistry methods

MRID	Citation Reference
46801815	Netzband, D. (2006) In House Laboratory Validation of an Analytical Method for the Determination of Residues of AE 0317309 and its Metabolites AE B197555 in Soil and Sediment Using LC/MS/MS. Project Number: 04MEAIX017, AI002/S05/02. Unpublished study prepared by Bayer Corp. 94 p.
46801816	Brumhard, B. (2005) Independent Laboratory Validation of Method AI002-S05-01 for the Determination of AE 0317309 and its Metabolite AE B197555 in Soil and Sediment by LC/MS/MS. Project Number: P611050012, MR/112/05, AI002/S05/01. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 30 p.
46801821	Netzband, D. (2006) In House Laboratory Validation of an Analytical Method for the Determination of Residues of AE 0317309 and its Metabolite AE B197555 in Water Using LC/MS/MS. Project Number: MEAIX018, AI/003/W05/02. Unpublished study prepared by Bayer Corp. 79 p.
46801822	Krebber, R. (2005) Independent Laboratory Validation of Method AI-003-W05-01 for the Determination of AE 0317309 and its Metabolites AE B197555 in Water. Project Number: P/614/047066, MR/139/05, AI/003/W05/01. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue

Anal. 29 p.

Non-Guideline Study

MRID	Citation Reference
46801700	Bayer CropScience LP (2006) Submission of Product Chemistry, Residue, Toxicity and Environmental Fate Data in Support of the Application for Registrations of Pyrasulfotole Technical, AE 0317309 + Bromo Herbicide and AE 0317309 SE06 Herbicide and the Petition for Tolerance of Broxoxynil For Use on Cereal Grains. Transmittal of 49 Studies.
46801711	Fliege, R. (2005) [Phenyl-UL-(Carbon 14)] and [Pyrazole-3-(Carbon 14)] AE 0317309: Aerobic Soil Metabolism in a European Soil. Project Number: MEF/05/459, M1251487/8. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 108 p.
46801719	Belyk, M. (2006) Terrestrial Field Dissipation of AE 0317309 in Canada, 2003-2004. Project Number: 03BCS01, MEAIM004, AI/002/S05/01. Unpublished study prepared by Bayer Corp., Vaughn Agricultural Research Serv., Ltd. and Ag-Quest Inc. 333 p.
46801741	Lechelt-Kunze, C. (2004) AE 0317309, Substance, Technical (Code: AE 0317309 00 1C96/001): Acute Toxicity to Earthworm (Eisenia fetida) Tested in Artificial Soil. Project Number: E/310/2671/0, LKC/RG/A/27/04, 05/04. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 23 p.
46801744	Lechelt-Kunze, C. (2004) AE 0317309 Tech. (AE 0317309 00 1C96 0001): Determination of Effects on Nitrogen Transformation in Soil. Project Number: E/337/2699/9, LKC/N/26/03, 2979. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 25 p.
46801746	Lechelt-Kunze, C. (2004) AE 0317309 Tech. (AE 0317309 00 1C96 0001): Determination of Effects on Carbon Transformation in Soil. Project Number: E/330/2698/1, 2978, LKC/C/23/04. Unpublished study prepared by Bayer Ag, Institute of Product Info. & Residue Anal. 31 p.
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