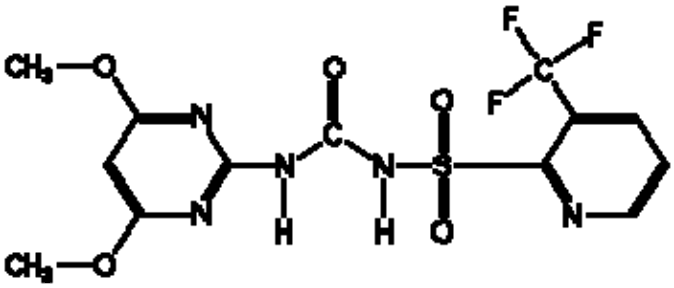
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Pesticide Fact Sheet
Name of Chemical: Flazasulfuron
Reason for Issuance: Conditional Registration
Date Issued: May 17, 2007

Description of Chemical:

Common Name:	Flazasulfuron
Chemical Name:	N-[[(4,6-dimethoxy-2-pyrimidinyl) amino]carbonyl] -3-(trifluoromethyl)-2-pyridinesulfonamide
Chemical Formula:	



EPA PC Code:	119011
Chemical Abstracts Service (CAS) Number:	104040-78-0
Year of Initial Registration:	2007
Pesticide Type:	Herbicide
Chemical Class:	Sulfonylurea
U.S. Producer:	ISK Biosciences Corp.

Use Patterns and Formulations

Application Sites:	Flazasulfuron is registered for use on non-residential areas including golf courses and non-residential turf areas such as industrial parks, tank farms, sod farms, seed farms, sports fields and commercial lawns.
Types of Formulations:	Technical grade manufacturing use product (96.9% active) Water-dispersible granule end-use product (25% active)
Application Methods And Rates:	Flazasulfuron 25 WG Herbicide is to be used as a selective herbicide for pre- and post-emergence. The product is proposed as a selective herbicide for post-emergence with some pre-emergence activity for control of a broadcast spectrum of annual and perennial grasses, sedges and broadleaf weeds in non-cropped areas growing on turf, including golf courses. The herbicide is only to be applied using ground application methods consisting of broadcast foliar spray and spot treatments with backpack sprayers. The maximum proposed application rate is 0.047 lb ai/acre, with three ground applications per season and 14-day reapplication intervals.

Data Deficiencies

Additional information is needed to fulfill data requirements in the following areas:

- Aerobic aquatic metabolism
- Aerobic soil metabolism
- Anaerobic aquatic metabolism
- Soil mobility – batch-equilibrium adsorption/desorption
- Analytical Chemistry Methods (Water; Soil)
  The submitted methods were not independently validated, as required.
- Fish early life-stage study
- Daphnid reproduction study
- Seedling emergence study
- Aquatic vascular plant (duckweed) study
- Acute neurotoxic study: HED is requesting historical positive control data, analytical data verifying homogeneity, and stability of formulated test material for this study.

Physical and Chemical Properties

Physicochemical Properties	
Molecular Weight	407.3 g/mol
Melting point/range	147 - 150 ^{o}C
pH	4.01
Density	0.79 g/cm^{3}
Water solubility (20 ^{o}C)	pH: 5, 7, 9 mg/ml: 0.027, 2.1, Not Stable
Solvent solubility (25 ^{o}C)	Solvent: Solubility hexanes: 0.50 □g/mL octanol: 0.20 mg/mL methanol: 4.2 mg/mL acetone: 22.7 mg/mL toluene: 0.56 mg/mL dichloromethane: 22.1 mg/mL ethyl acetate: 6.9 mg/mL acetonitrile: 8.7 mg/mL
Vapor pressure (25 ^{o}C)	< 1 x 10 $^{-7}$ torr
Dissociation constant, pKa	4.37
Octanol/water partition coefficient, logP_{OW} (25 ^{o}C)	pH 5 Buffer: 20 pH 7 Buffer: <10

Acute Toxicology

Technical flazasulfuron exhibits low acute toxicity.

Acute Toxicity Profile				
Guideline No.	Study Type	MRID(s)	Results	Toxicity Category
870.1100	Acute oral [rat]	46220908	LD_{50} > 5000 mg/kg (male and females)	IV
870.1200	Acute dermal [rat]	46220909	LD_{50} > 2000 mg/kg (male and females)	III

Acute Toxicity Profile				
870.1300	Acute inhalation [rat]	46220910	LC_{50} > 5 mg/L (male and females)	IV
870.2400	Acute eye irritation [rabbit]	46220911	Minimal conjunctivitis through 48 hours. Free by 72 hours.	III
870.2500	Acute dermal irritation [rabbit]	46220912	No erythema, edema, or dermal effects observed at application site.	IV
870.2600	Skin sensitization [guinea pig]	46220913	Not a sensitizer	-

Carcinogenicity

Based on lack of carcinogenic effects in the rat and mouse carcinogenicity studies and lack of a mutagenicity concern, flazasulfuron can be classified as "No evidence of carcinogenicity to humans".

Neurotoxicity

Neurotoxicity was observed using an acute neurotoxicity battery. A transient decrease in motor activity on Day 0 (5 hours post-dosing) was observed at the mid dose of 1000 mg/kg.

Developmental Toxicity

Developmental toxicity has been investigated in two rat studies and one rabbit study. The effects on reproduction have been examined in one rat study. Reduced fetal weights and retardation in ossification were the effects observed in a Sprague-Dawley rat developmental study. A second developmental rat study (Wistar) showed increased incidence of visceral malformations (interventricular septal defect). The developmental study in rabbits showed high incidences of abortion at the highest dose tested.

Reproductive Toxicity

Decreases in body weight and chronic nephropathy were observed in offspring in a 2-generation rat reproduction study.

FQPA Safety Factor

Because this is a non-food use pesticide, consideration of an FQPA Safety Factor is not required.

Toxicology Profile

Subchronic, Chronic and Other Toxicity Profile		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.3100 90-Day oral toxicity (rat)	46220920 (1988) M/F: 0, 40, 200, 1000, 5000 ppm M: 0, 2.31, 11.66, 57.1, 287 mg/kg/day F: 0, 2.53, 12.8, 61.5, 309 mg/kg/day Acceptable/Guideline	NOAEL (M/F) = 11.66/61.5 mg/kg/day LOAEL (M/F) = 57.1/309 mg/kg/day based on depression of body weight gain (M/F) and slight anemia due to decrease in hemoglobin (F).
870.3150 90-Day oral toxicity (dog)-capsule	46220921 (1994) M: 0, 2, 10, 50, 250 mg/kg/day F:0, 2, 10, 50, 100 mg/kg/day Acceptable/Guideline	NOAEL (M/F) = 2/10 mg/kg/day LOAEL (M/F) = 10/50 mg/kg/day based on changes in liver (increase in: deposition of brown pigments, glutamic pyruvic transaminase, creatine phosphokinase, inflammatory cell infiltration, microgranulomas).
870.3200 21-Day dermal toxicity (rabbit)	46220922 (1994) 0, 250, 500, 1000 mg/kg/day Acceptable/Guideline	NOAEL (M/F) = 1000/1000 mg/kg/day LOAEL (M/F) = No systemic toxicity was observed at the limit dose. No localized dermal effects were observed.
870.3700a Prenatal developmental in (rat): Wistar	46220924 (1988) 0, 100, 300, 1000 mg/kg/day Acceptable/Guideline	Maternal NOAEL = 100 mg/kg/day LOAEL = 300 mg/kg/day based on increase in maternal relative liver weight and decreased body weight gain and food consumption. Developmental NOAEL = 100 mg/kg/day LOAEL = 300 mg/kg/day based on increased incidence of visceral malformations (interventricular septal defect).
870.3700a Prenatal developmental in (rat): Sprague-Dawley	46220925 (1996) 0, 100, 300, 1000 mg/kg/day Acceptable/Guideline	Maternal NOAEL = 300 mg/kg/day LOAEL =1000 mg/kg/day based on transient decreased body weight gain and food consumption. Developmental NOAEL = 300 mg/kg/day LOAEL = 1000 mg/kg/day based on reduced fetal weights and retardation in ossification.

Subchronic, Chronic and Other Toxicity Profile		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.3700b Prenatal developmental in (rabbit)	46220923 (1988) 0, 50, 150, 450 mg/kg/day Acceptable/Guideline	Maternal NOAEL = 150 mg/kg/day LOAEL = 450 mg/kg/day based on high incidences of abortion and decrease in food consumption after initial administration. Developmental NOAEL = 150 mg/kg/day LOAEL = 450 mg/kg/day based on high incidences of abortion.
870.3800 Reproduction and fertility effects (rat)	46220926 (1995) 0, 200, 2000, 10000 ppm M: 0, 8.7, 87.5, 473.0 mg/kg/day F: 0, 11.7, 124.5, 613.7 mg/kg/day Acceptable/Guideline	Parental/Systemic NOAEL (M/F) = 8.7/124.5 mg/kg/day LOAEL (M/F) = 87.5/613.7 mg/kg/day based on changes in kidney parameters (M/F: Bilateral discoloration, enlargement, mild nephropathy) and reductions in body weight in both generations (F_0, F_1). Reproductive NOAEL (M/F) =473.0/613.7mg/kg/day LOAEL (M/F) =not established. Offspring NOAEL (M/F) = 87.5/124.5 mg/kg/day LOAEL (M/F) = 473.0/613.7 mg/kg/day based on reduction in lactational body weights of the F_1 and F_2 offspring.
870.4100b Chronic toxicity (dog)-capsule	46220927 (1995) M: 0, 0.4, 2, 10, 50 mg/kg/day F: 0, 2, 10, 50 mg/kg/day Acceptable/Guideline	NOAEL = 2 mg/kg/day LOAEL = 10 mg/kg/day based on changes in liver (increase in: inflammatory cell infiltration, hepatocellular necrosis, hepatocellular swelling, and bile duct proliferation).
870.4300 Combined Chronic Toxicity/ Carcinogenicity (rat)	46220929 (1995) M: 0, 40, 400, 2000 ppm F: 0, 40, 400, 4000 ppm M: 0, 1.3, 13.3, 70.1 mg/kg/day F: 0, 1.6, 16.4, 172.6 mg/kg/day Acceptable/Guideline	NOAEL = 1.3 mg/kg/day LOAEL = 13.3 mg/kg/day based on : Adverse change in kidney function (chronic nephropathy) and kidney physiology (enlargement, dark color of kidney) no evidence of carcinogenicity
870.4200 Carcinogenicity (mouse)	46220928 (1995) 0, 500, 3500, 7000 ppm M: 0, 77.3, 552.7, 1053.8 mg/kg/day F: 0, 93.7, 659.8, 1208.2 mg/kg/day Acceptable/Guideline	NOAEL (M/F) = 77.3/93.7 mg/kg/day LOAEL (M/F) = 552.7/659.8 mg/kg/day based on decrease in body weight, body weight gain, food consumption and an increase in liver effects (liver weight and hepatocellular hypertrophy). no evidence of carcinogenicity

Subchronic, Chronic and Other Toxicity Profile		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.5500 *Salmonella typhimurium* and *Escherichia coli* Reverse Mutation Assay	46220933 (1987) 0, 20, 50, 100, 200, 500, 1000 □g/ plate (*S. typhimurium*); 0, 100, 200, 500, 1000, 2000, 5000 (*E. coli*) in the presence and absence of metabolic activation (± S9) Acceptable/Guideline	Flazasulfuron was not cytotoxic with or without S9 activation in four *S. typhimurium* strains and one strain of *E. coli*, and did not induce a genotoxic response in any strain. Negative
870.5300 *in vitro* Mouse Lymphoma Mutagenesis Assay	46220930 (1993) 0, 20, 30, 40, 50, 60, 70, 80, 90, 100, 500 □g/ml in the presence and absence of metabolic activation (± S9) Acceptable/Guideline	There was no evidence of biologically significant induction of mutant colonies. Negative
870.5375 *in vitro* Cytogenetics Test	46220931 (1988) 0, 3.3×10^{-4}, 1.7×10^{-4}, 8.3×10^{-5}, 4.1×10^{-5}, 2.1×10^{-5} M, with and without metabolic activation (± S9) Acceptable/Guideline	Flazasulfuron did not induce chromosome aberrations in Chinese hamster lung cells, in the presence and absence of S9 activation. Negative
870.5395 *in vivo* Mammalian Erythrocyte Micronucleus Test: Mouse	46220932 (1995) 0, 1250, 2500, 5000 mg/kg Acceptable/Guideline	There was no statistically significant increase in the frequency of micronucleated polychromatic erythrocytes in mouse bone marrow at any dose or collection time. Negative
870.6200a Acute neurotoxicity screening battery (rat)	46220934 (2002) 0, 50, 1000, 2000 mg/kg/day Acceptable pending data submission /Guideline	NOAEL (M/F) = 50 mg/kg LOAEL = 1000 mg/kg based on: transient decrease in motor activity observed at Day 0 (5 hours post-dosing)

Subchronic, Chronic and Other Toxicity Profile		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.7485 Metabolism and pharmacokinetics (rat)	46220940 (1994), 46220941 (1995), 46220942 (1995), 46220943 (1995) single dose: 2, 50 mg/kg multiple dose: 2 mg/kg Radiolabel: (first ring: Pyridine second ring: Pyrimidine) Acceptable/Guideline	Radiolabeled flazasulfuron (Pyridine/Pyrimidine) was rapidly distributed and excreted in the urine and feces following multiple dosing. Urinary elimination, calculated from a total collection of 168 hours, occurred slower in males (74/73%) compared to females (90/91%). Fecal elimination, calculated from a total collection of 168 hours, was greater in males (23/23%) than in females (10/9%). Radiolabel was detected at low concentrations in carcass (M:1.7/1.1%; F:0.30/0.23%)), blood (M: 0.74/0.35%; F: 0.16/0.02), liver (M: 0.23/0.14%; F: 0.04/0.04%), and kidney (M: 0.13/0.02%; F: 0.02/ <0.005%). Peak plasma concentration following single dose administration occurred at 6 hours in both sexes.

Toxicological Endpoints

Toxicological Doses and Endpoints			
Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (Female 13-49)	NOAEL =50 mg/kg *UF = 100* Acute RfD = 0.5 mg/kg	FQPA SF = 1X aPAD = acute RfD / FQPA SF = 0.5 mg/kg	Acute neurotoxicity (rat) LOAEL = 1000 mg/kg based on: transient decrease in motor activity observed at Day 0 (5 hours post-dosing).
Chronic Dietary (all populations)	Oral NOAEL = 1.3 mg/kg/day *UF = 100* Chronic RfD = 0.013 mg/kg/day	FQPA SF = 1X cPAD=chronic RfD / FQPA SF = 0.013 mg/kg/day	Combined Chronic Toxicity/ Carcinogenicity rats LOAEL= 13.3 mg/kg/day based on: Adverse change in kidney function (chronic nephropathy)
Incidental Oral Short-Term (1 - 30 days)	NOAEL = 50 mg/kg	Occupational: LOC for MOE = 100	Acute neurotoxicity (rat) LOAEL = 1000 mg/kg based on: transient decrease in motor activity observed at Day 0 (5 hours post-dosing).

Toxicological Doses and Endpoints			
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 = 2 mg/kg/day	Occupational: LOC for MOE= 100	90-Day oral toxicity in (dog) LOAEL= 10 mg/kg/day based on changes in liver (increase in: deposition of brown pigments, glutamic pyruvic transaminase, creatine phosphokinase, inflammatory cell infiltration, microgranulomas).
Dermal Short-Term (1 - 30 days)	Oral NOAEL = 50 mg/kg (dermal absorption rate = 45%)	Occupational: LOC for MOE= 100	Acute neurotoxicity (rat) LOAEL = 1000 mg/kg based on: transient decrease in motor activity observed at Day 0 (5 hours post-dosing).
Dermal Intermediate-Term (1 - 6 months)	Oral NOAEL = 2 mg/kg/day (dermal absorption rate = 45%)	Occupational: LOC for MOE = 100	90-Day oral toxicity in (dog) LOAEL = 10 mg/kg/day based on changes in liver (increase in: deposition of brown pigments, glutamic pyruvic transaminase, creatine phosphokinase, inflammatory cell infiltration, microgranulomas).
Dermal Long-Term (> 6 months)	Oral NOAEL = 1.3 mg/kg/day (dermal absorption rate = 45%)	Occupational: LOC for MOE = 100	Combined Chronic Toxicity/ Carcinogenicity rats LOAEL= 13.3 mg/kg/day based on: Adverse change in kidney function (chronic nephropathy)
Inhalation Short-Term (1 - 30 days)	NOAEL = 50 mg/kg (inhalation absorption rate = 100%)	Occupational: LOC for MOE = 100	Acute neurotoxicity (rat) LOAEL = 1000 mg/kg based on: transient decrease in motor activity observed at Day 0 (5 hours post-dosing).
Inhalation Intermediate-Term (1 - 6 months)	NOAEL = 2 mg/kg/day (inhalation absorption rate = 100%)	Occupational: LOC for MOE = 100	90-Day oral toxicity in (dog) LOAEL = 10 mg/kg/day based on changes in liver (increase in: deposition of brown pigments, glutamic pyruvic transaminase, creatine phosphokinase, inflammatory cell infiltration, microgranulomas).

Toxicological Doses and Endpoints			
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)	Oral NOAEL = 1.3 mg/kg/day (inhalation absorption rate = 100%)	Occupational: LOC for MOE = 100	Combined Chronic Toxicity/ Carcinogenicity rats LOAEL= 13.3 mg/kg/day based on: Adverse change in kidney function (chronic nephropathy) and kidney physiology (enlargement, dark color of kidney)
Cancer (oral, dermal, inhalation)	Classification: No evidence of carcinogenicity to humans		

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose, MOE = margin of exposure, LOC = level of concern, NA = Not Applicable

Metabolism

Metabolism studies in the rat indicate that flazasulfuron is rapidly distributed and excreted in the urine and feces. Excretion in urine occurred more slowly in males (73%) than females (90%). Fecal elimination was greater in males (23%) than females (10%).

The most prevalent metabolites (expressed as percent of administered dose) were HDTG+TPPG (~6.5-17.7% in urine, ~0.4-9.7% in feces, and ~6.5-14% in bile), with minor amounts (<5%) of other compounds. Individually, unidentified fractions generally accounted for less than 2% of the administered dose in the urine and biliary metabolite profile. The fecal metabolite profile had up to 35% unidentified of the recovered dose.

Drinking Water Exposure

Only acute and chronic dietary assessments were conducted for drinking water exposure because flazasulfuron is not used on agricultural crops. Acute and chronic drinking water risk assessments were conducted using the DEEM (DEEM-FCID™, Ver 2.03) which use water consumption data from the USDA's Continuing Surveys of Food Intakes by Individuals (CSFII) from 1994-1996 and 1998. The acute and chronic drinking water exposure/risk analyses for flazasulfuron were conducted using unrefined Tier 1 drinking water exposure assumptions for all uses. An estimated ground water concentration of 92 ppb was used for both the acute and chronic drinking water assessments.

Results of the Tier I DEEM acute drinking water exposure analyses conclude that the acute and chronic drinking water exposure estimates are below the Agency's level of concern. The DEEM

acute drinking water exposure estimates at the 95th percentile for the highest exposed population subgroup, all infants (< 1 year old), is 4% of the aPAD. The DEEM chronic drinking water exposure estimates for the highest exposed population subgroup, all infants (< 1 year old), is 49% of the cPAD.

Based on the FIFRA Index Reservoir Screening Tool (FIRST) and the Screening Concentration in Ground Water (SC-GROW) model the estimated environmental concentration (EECs) of flazasulfuron in surface water are an acute EEC of 14.7 ug/L and a chronic EEC of 5.1 ug/L and in ground water the acute and chronic EEC are 92 ug/L. These values are below the Agency's level of concern.

Residential Exposure

Flazasulfuron is proposed for use on golf courses and athletic fields. Application of flazasulfuron is to be made by professional pest control operators (PCOs) only. Therefore, non-occupational handler exposure was not evaluated. Recreational post-application exposure via the dermal route is likely for adults and children using golf courses or athletic fields.

Postapplication exposure is possible for recreational golfers who use the course after flazasulfuron has been applied. The short-term MOE is greater than 100 on the day of application, and therefore, is not of concern.

Post-application Short-Term MOEs for Golfers					
Application Rate (AR) (lbs ai/A)	TTR ($\mu g/cm^2$)[a]	Transfer Coefficient (Tc) (cm^2/hr)	Exposure Time (ET) (hrs/day)	Short-Term Dermal	
				ADD (mg/kg/day)[b]	MOE[c]
0.047	0.026	500	4	0.00034	150,000

[1] Dislodgeable Foliar Residue $_{\text{Postapplication day zero}}$ (ug/cm^2) = Application rate (lb ai/A) x Fraction of ai Retained on the Foliage (0.05) x 4.54E+8 µg/lb x 2.47E-8 A/cm^2

[a] Default TTR value based on standard assumption of 5% of application rate for fraction of ai initially available.

[b] Average daily dose (ADD) (mg/kg/day) = [(TTR (µg/cm^2) * Tc (cm^2/hr) * 45% dermal absorption * mg/1,000 µg * ET (hrs/day)] / [70-kg BW]

[c] Short-Term MOE = NOAEL / ADD; Short-Term NOAEL = 50 mg/kg/day. The LOC is 100.

Postapplication exposure is also possible for people who use sports fields after flazasulfuron has been applied. The short-term MOE for this scenario is above the LOC of 100, and is not of concern.

Postapplication Dermal Exposure and Risk From Treated Turf						
Subgroup Exposed	Application Rate (lb ai/A)	Dislodgeable Foliar Residue (ug/cm^2)	Dermal Transfer Coefficient (cm^2/hr)	Body Wt (kg)	Daily Dose[2] (mg/kg/day)	Dermal MOE[3]
					Short-term	Short-term
Adults	0.047	0.026	43,000	70	0.015	3,400

[1] Dislodgeable Foliar Residue $_{\text{Postapplication day zero}}$ (ug/cm^2) = Application rate (lb ai/A) x Fraction of ai Retained on the Foliage (0.05) x 4.54E+8 µg/lb x 2.47E-8 A/cm^2
[2] Daily Dose = [Dislodgeable Foliar Residue x Absorption Factor (0.45) x 0.001 mg/ug x Dermal Transfer Coefficient x Exposure Time (2 hrs/day)]/Body weight
[3] Dermal MOE = Dermal NOAEL/Daily Dose; where Short-term NOAEL = 50 mg/kg/day.

Occupational Exposure

Occupational Exposure is not of concern (MOEs > 100). There is a potential for exposure to flazasulfuron during mixing, loading, and application activities.

Summary of MOEs for Occupational Handlers of Flazasulfuron							
Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai) [1]		Inhalation Unit Exposure (µg/lb ai) [2]	Application Rate (lb ai/A) [3]	Area Treated (A/day) [4]	Total Short-term MOE [5]	
	Baseline	PPE (gloves)				Baseline	PPE (gloves)
Mixer/Loader							
(1) Mixing/Loading Dry Flowables for Groundboom application	0.066	-	0.77	0.047	40	61,000	-
Applicator							
(2) Applying Sprays with Open Cab Groundboom	0.014	-	0.74	0.047	40	270,000	-
Mixer/Loader/Applicator							
(3) Mixing/Loading Dry Flowables and Applying with Handgun Sprayer	no data	0.59	2.2	0.047	5	no data	56,000
(4) Mixing/Loading Dry Flowables and Applying with Low-Pressure Handwand	100	0.43	30	0.00053 (lb ai/gal)	40 (gal/day)	3,700	-
(3) Mixing/Loading Dry Flowables and Applying with Backpack Sprayer	no data	2.5	30	0.00053 (lb ai/gal)	40 (gal/day)	no data	140,000

[1] Baseline dermal unit exposure values represent long pants, long sleeved shirts, shoes, and socks; PPE values represent the addition of chemical-resistant gloves for those scenarios for which data are not available without gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998, except for the handgun value which was obtained from ORETF.
[2] Inhalation unit exposure values represent no respirator. Values are reported in the PHED Surrogate Exposure Guide dated August 1998.
[3] Application rates are based on maximum values found in label: Flazasulfruon 25WG (Reg No: 71512-XXX).
[4] Daily area treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (standard EPA/OPP/HED values).
[5] Short-/Intermediate-Term MOE = NOAEL (50 mg/kg/day) / Total Daily Absorbed Short-Term Dose. The LOC is 100.
Total Daily Absorbed Dose (mg/kg/day) = {[(Dermal unit exposure * 45% Dermal absorption) + (Inhalation unit exposure * 100% absorption)] * Application rate * Area treated} / 70-kg Body weight.

Postapplication inhalation exposure is expected to be negligible; however, dermal exposure is possible for workers mowing/maintaining the turfgrass.

Post-application Short-Term MOEs for Turf Maintenance Workers					
				Short-Term Dermal	
Scenario	TTR (µg/cm^2)[a]	Transfer Coefficient (Tc) (cm^2/hr)	Exposure Time (ET) (hrs/day)	ADD (mg/kg/day)[b]	MOE[c]
Maintenance Activities Turfgrass	0.026	3,400	8	0.0046	11,000

[a] Default TTR value based on standard assumption of 5% of ai initially available from the application rate of 0.047 lb ai/A.
[b] Average daily dose (ADD) (mg/kg/day) = [(TTR (µg/cm^2) * Tc (cm^2/hr) *45% dermal absorption * mg/1,000 µg * ET (hrs/day)] / [70-kg BW]
[c] Short-Term MOE = NOAEL / ADD; Short-Term NOAEL = 50 mg/kg/day. The LOC is 100.

Residue Chemistry

There are no proposed tolerances for flazasulfuron.

Environmental Fate Characterization

Flazasulfuron is expected to be relatively persistent in soil and water (half-life about one month). Flazasulfuron's persistence is likely to increase with increasing pH of the media. Chemical and enzyme-mediated hydrolysis is a major route of transformation of flazasulfuron in water, soil, and water-sediment systems. Both the rate (half-life) and mechanism of hydrolysis (i.e., how products are formed) are pH dependent. There are four major hydrolytic and five metabolic products. Flazasulfuron primarily forms bridge-contraction products. Flazasulfuron does not sob strongly to soils and has the potential to leach to ground water and/or reach surface water during runoff events. Flazasulfuron is a weak acid (pKa of 4.37). The mobility of flazasulfuron is expected to increase with increasing pH. Flazasulfuron has low potential to volatilize from soil or water or to bioaccumulate. A potential transport route is the wind erosion of soil particulates containing flazasulfuron.

Environmental Effects Characterization

Flazasulfuron is practically non-toxic to freshwater and marine/estuarine fish and invertebrates, birds, mammals, and bees and toxic to terrestrial and nonvascular aquatic plants.

Potential Risks to Non-Target Organisms

There is potential for direct adverse effects to non-target terrestrial and aquatic vascular plants. There is potential for indirect adverse effects to animal species associated with the use of flazasulfuron and indirect effects may result as a consequence of potential direct effects on plants. Functionally, estimated risks may translate to reduced survival, reproduction, or growth in affected species with the potential for subsequent effects at higher levels of biological

organization.

For federally listed endangered or threatened species, direct effect LOCs were exceeded for aquatic and terrestrial plants. There is potential for indirect effects to animals that depend on plants for survival, growth, or reproduction.

RQs That Exceed the Acute Risk LOC

The listed and non-listed acute risk LOCs were exceeded for aquatic vascular plants (RQ = 13 & 5.66). The listed and non-listed LOCs were exceeded for terrestrial plants (see table below).

Terrestrial Plant Risk Quotient Summary for Flazasulfuron

Taxa	Non-endangered RQs			Endangered RQs		
	Terrestrial Adjacent area	Semi-aquatic Adjacent area	Drift	Terrestrial Adjacent area	Semi-aquatic Adjacent area	Drift
Turf (0.047 lbs ai/A) *Ground spray application*						
Monocot	94*	800*	16*	67173**	570714**	11190**
Dicot	1.1*	9.2*	11.8*	2**	17**	22**

* RQ exceeds the Non-Endangered Species LOC; RQ >1.0.
** RQ exceeds the Endangered Species LOC; RQ >1.0.

The RQs for non-target plants in semi-aquatic and terrestrial areas adjacent to agricultural fields irrigated with water containing flazasulfuron exceeded the non-listed plant species LOCs (RQ = 2.4).

Label Modifications

The label will prominently state that flazasulfuron is not for use in areas where children can contact treated turf.

The label will be clear that only 3 applications may be made per year.

Label language will be included stating that there is a potential for injury to crops irrigated with run-off water containing flazasulfuron.

The following labeling will be required:

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.

Surface Water Label Advisories

> This product may contaminate water through drift of spray in wind, or drift of soil from treated areas.
>
> 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.

Spray Drift Management

The following label statements concerning spray drift reduction should appear on the label:

> AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR. The interaction of many equipment-and-weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making decisions. Where states have more stringent regulations, they should be observed.
>
> Do not treat areas where either possible downwind movement into the soil or surface washing may cause contact of Flazasulfuron 25WG herbicide with bentgrass greens and stressed grasses.
>
> Avoid making applications when spray particles may be carried by air currents to areas where sensitive crops and plants are growing. Do not spray near sensitive plants if windy is gusty, below 2 mph, or in excess of 10 mph and moving in the direction of adjacent areas of sensitive crops or plants. Do not apply during temperature inversions. Always make applications when there is some air movement to determine the direction and distance of possible spray drift. Leave an adequate buffer zone of 100 feet between area to be treated and sensitive plants.
>
> To avoid injury to desirable plants, equipment used to apply Flazasulfuron 25WG herbicide should be thoroughly cleaned (see PROCEDURE FOR CLEANING SPRAY EQUIPMENT) before reusing to apply any other chemicals.

A label statement pertaining to mandatory spray drift reduction is required for all end use products that allow for ground applications. Additional advisory language on spray drift reduction may also be included. This advisory language will not supersede the mandatory label requirements. The following risk reduction measures for spray drift are suggested for such a label advisory.

(1) INFORMATION ON DROPLET SIZE

The best drift management strategy is to apply large droplets and to limit or eliminate small droplets. Applying large droplets reduces drift potential, but will not prevent drift if applications are made improperly or under unfavorable environmental conditions (see sections below).

(2) CONTROLLING DROPLET SIZE

- o Volume - Use sufficient volume to form droplets large enough to avoid drift potential.
- o Pressure - Pressure and nozzle type and orientation should be carefully managed to avoid formation of fine droplets.
- o Number of nozzles - Use the minimum number of nozzles that provide uniform coverage.
- o Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low- drift nozzles. Properly designed solid stream nozzles should produce the lowest drift potential. Select nozzles, which do not have a wide discharge profile.

(3) CALIBRATION

Equipment should be calibrated regularly according to the manufacturer's specifications.

(4) WIND

Applications should not be made when wind speed exceeds 10 mph. Use caution when applying in wind speeds less than 2-3 mph because a temperature inversion may be present and wind direction may vary. Many factors, including droplet size and equipment, determine drift potential at any wind speed. The applicator should be familiar with local wind patterns and should monitor wind conditions at the site at time of application.

(7) SENSITIVE AREAS

It is the applicator's responsibility to exercise reasonable prudence when considering the potential for drift into any area, including sensitive areas (e.g. areas where people or nontarget plants may be present, bodies of water, known habitat for threatened or endangered species, etc.).

(8) TEMPERATURE AND HUMIDITY

Low humidity and high temperature increase the evaporation rate of droplets and therefore increase spray drift potential. The applicator should compensate for temperature and humidity.

(9) TEMPERATURE INVERSIONS

Because of high drift potential, applications should not be made when droplets may reach a temperature inversion layer. It is the applicator's responsibility to identify the presence of a temperature inversion at the time of application. Accurate measurements of temperature, relative humidity, and wind speed help determine if an inversion exists.

Local sources of weather information may help identify the presence of temperature inversions.

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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.