sulfometuron methyl

Review Date: 12/12/2013
CAS #: 74222-97-2

Type	Pre-emergent and post-emergent herbicide.
Controls	Controls a variety of broad-leaf weeds and grasses.
Mode of Action	Inhibits the activity of the enzyme acetolactate synthase (ALS), which in turn inhibits the synthesis of selected amino acids.

Thurston County Review Summary:

Sulfometuron methyl is rated conditional by Thurston County's pesticide review criteria, based on the combined hazards of high mobility and high persistence. The combination of these hazards indicates a potential that this chemical move off the site of application and get into surface or groundwater (as well as potentially injuring non-target plants). Sufometuron methyl is also rated high in hazard for risk to the applicator under specific application methods at maximum use rates, although this risk can be reduced to low hazard with the use of protective gloves and coveralls.

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	244	3	Moderate
Soil Sorption (Kd=mL/g)	Up to 2	2	High
Organic Sorption (Koc=mL/g)	73	2	High

Mobility Summary:

Sulfometuron methyl is fairly water soluble, but does not bind well to soil with or without organic matter. The hazard for sulfometuron methyl to move off the site of application (or to leach into soil) with rain or irrigation water is rated high.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.0000000000000005	2	High
Biotic or Aerobic Half-life (days)	52-58	2	Moderate
Abiotic Half-life (days)	72 soil photolysis	2	High
Terrestrial Field Test Half-life (days)	44-128	2	Moderate - high
Hydrolysis Half-life (days)	139 (pH =7)	2	High
Anaerobic Half-life (days)	283 (soil)	3	High
Aquatic Field Test Half-life (days)	9-187	2	Moderate - high

Persistence Summary:

The persistence of sulfometuron methyl varies in aquatic environments due to the faster rate of dissipation in acidic water and slower degradation in neutral or alkaline water. In soil, sulfometuron methyl is very mobile; field testing only took into account the chemical found in the upper 15cm of soil, which could account for the differences in degradation rates. When sulfometuron methyl leaches deeply into soil where there is little oxygen, it is expected to degrade very slowly. The persistence hazard for sulfometuron methyl is conservatively rated high.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	Vale not found		
Octanol/Water Partition Coefficient	Kow = 0.35	3	Low

Bioaccumulation Summary:

In rats, sulfometuron methyl is quickly absorbed, broken down and excreted with a half life of 1 to 2 days (Reference 3). Sulfometuron methyl has a very low Kow value (0.35), indicating that is binds very poorly to fat and tissue and is not likely to accumulate in animals. In a fish bioaccumulation study, sulfometuron methyl was determined not to accumulate (Reference 3). The hazard for bioaccumulation is rated low.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Toxicity Rating
Mammalian (LD50)	>5,000 mg/kg	1	Low
Avian (LD50)	>4,600 mg ai/kg diet	5	Low
Honey bee or insect (LD50)	>100 ug/bee	4	Low
Annelida -worms (LC50)	>1,000 mg/kg	4	Low
Fish (LC50)	13 ppm	3	Moderate
Crustacean (LC50)	13 ppm	3	Moderate
Mollusk (LC50)	Value not found		
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that sulfometuron methyl is low in toxicity to animals, birds, honeybees, and earthworms, but moderately toxic to fish and other aquatic organisms.

Risk to non-target organisms from exposures to sufometuron methyl following herbicidal use is calculated to be much lower than the EPA's level of concern and is rated low in hazard.

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Risk Rating
Low pressure wand application to turf or non-crop	Dermal	0.28 mg/kg/day	0.13 to 0.54 mg/kg/day	<1 to 2.1	5	High
Low pressure wand application to turf or non-crop	Dermal (gloves & coveralls)	0.28 mg/kg/day	0.0023 mg/kg/day	120	5	Low
US population	Ingestion of contaminated groundwater	0.28 mg/kg/day	0.0017 mg/kg/day	164	5	Low
Infant	Ingestion of contaminated groundwater	0.28 mg/kg/day	0.0064 mg/kg/day	43	5	Low

Acute Toxicity Risk Assessment Summary:

The tier I risk assessment for potential drinking water exposures calculated the upper-bound estimate for groundwater concentrations from the use of sulfometuron methyl for forestry or right of way uses. At the maximum application rate within a watershed concentrations of sulfometuron methyl and all degradation chemicals of concern are estimated to reach 0.33 ppb and 1.13 ppb (Reference 2).

Potential exposure to an applicator using a low-pressure handwand sprayer to turf grass or to non-crop land at maximum application rates was calculated to be nearly half of the dose of concern or more. These exposures assumed the applicator wore no personal protective equipment. The same applicator scenario calculated with the use of gloves and coveralls was 120 times less than the dose of concern. So, applicator risk is rated high without gloves and coveralls and low with the use of gloves and coveralls. These risk assessments assumed 100% dermal absorption, which is likely to be very conservative (Reference 5).

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Not classified by EPA	"Not carcinogenic"	3	Low
Mutagenicity	Up to 500 ug/plate	"Not mutagenic"	3 and 5	Low
Neurotoxicity - (NOAEL)	Value not found	"No indication of neurotoxicity"	5	Low
Endocrine Disruption	Not listed	- -	6	N/A
Developmental Toxicity (NOAEL)	>300 mg/kg/day	No toxicity noted	5	Low
Reproductive Toxicity (NOAEL)	433 mg/kg/day	No treatment related toxicity	7	Low
Chronic Toxicity (NOAEL)	27.5 mg/kg/day	Hemolytic anemia	5	Check risk

Chronic Toxicity Hazard Summary:

Toxicity testing indicates that sulfometuron methyl is not carcinogenic, mutagenic, neurotoxic, or known to cause developmental toxicity (References 3 and 5). Reproductive toxicity testing indicate that sulfometuron methyl is not a reproductive toxicant (Reference 7).

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Risk Rating
Long-term applicator exposures were not evaluated						
Post-application exposures were not evaluated						
Infant	Ingestion	0.28 mg/kg/day	<0.0028 mg/kg/day	>100	5	Low
Other long-term exposures were not evaluated						

Chronic Toxicity Risk Assessment Summary:

Risk from drinking contaminated groundwater was calculated for short-term exposures and for long-term exposures using the same dose of concern. The calculated long-term exposure is less than 1% of the EPA's dose of concern. The hazard of drinking contaminated groundwater following herbicide applications of sulfometuron methyl is rated low. No other long-term exposures are expected from herbicidal uses.

Metabolites and Degradation Products:

Major degradation chemicals of concern associated with sufometuron methyl are pyrimidine amine, a sulfonamide degradate, and saccharin (Reference 2).

Comments:

Sulfometuron methyl can cause minimal eye irritation (EPA Toxicity Category III), but is not considered a dermal irritant (EPA Toxicity Category IV) or dermal sensitizer (Reference 1).

References

1. USEPA. Office of Prevention, Pesticides and Toxic Substances. Sulfometuron Methyl: Addendum to "Sulfometuron Methyl: Occupational and Residential Exposure Assessment for the Reregistration Eligibility Decision (Non-Food)." August 11, 2008.
2. USEPA. Environmental Fate and Effects Division. Memorandum: "Tier I Sulfometuron Methyl Drinking Water Assessment for Reregistration Eligibility Decision Document (slightly revised)" February 14, 2008.
3. Odell, Shelley. California Department of Pesticide Regulation. Environmental Fate of Sulfometuron-Methyl. 1999.
4. International Union of Pure & Applied Chemistry. Pesticide Properties Database. Sulfometuron-methyl (Ref: DPX T5648). Date accessed 12/9/2013.
5. USEPA. Prevention, Pesticides and Toxic Substances. Reregistration Eligibility Decision Sulfometuron Methyl. September 2008.
6. Illinois EPA. "Endocrine Disruptors Strategy" February 1997.
7. TOXNET, Toxicology Data Network. Hazardous Substance Database - Sulfometuron-methy. Complete Update on 2010-01-27.