



Sulfometuron-methyl

Roadside Vegetation Management Herbicide Fact Sheet



This fact sheet was developed by Oregon State University and Intertox, Inc. to assist interested parties in understanding the risks associated with pesticide use in Washington State Department of Transportation's (WSDOT) Integrated Vegetation Management program.

Introduction

Sulfometuron methyl is an herbicide used to control a wide range of annual and perennial grasses as well as broad-leaved weeds. Sulfometuron methyl stops cell division in the actively growing stems and root tips of plants causing them to die. Sulfometuron methyl is the active ingredient (75%) in the herbicide products **Oust XP** and **SFM 75**, and is mixed with the herbicide chlorsulfuron in the herbicide **Landmark XP** used by the Washington Department of Transportation (WSDOT) for pre-emergent (before growth begins), non-selective control of grasses and weeds in the maintenance of gravel shoulders. Sulfometuron methyl is also used in forestry.

WSDOT assessed the potential risks to humans, wildlife, and aquatic animals exposed to sulfometuron-methyl in their Integrated Vegetation Management (IVM) program. Evaluating potential risks takes into account both the toxicity of a pesticide and the characteristics of possible exposure.

Laboratory Testing: Before pesticides are registered by the U.S. Environmental Protection Agency (EPA), they must undergo laboratory testing for short-term (acute) and long-term (chronic) health effects. Laboratory animals are purposely fed doses high enough to cause toxic effects. These tests help scientists determine how chemicals might affect humans, domestic animals, or wildlife in cases of overexposure. Pesticide products used according to label directions are unlikely to cause toxic effects. The amount of pesticide that people and pets may be exposed to is low compared to the doses fed to laboratory animals.

Application Rates and Use Patterns on Highway Rights-of-Way

Typical rights-of-way application rates for Oust XP and SFM 75 range from 3 to 5 ounces of product per acre, or a maximum of about 0.2 pounds of active ingredient per acre. Landmark XP applications range from 4.5 to 9 ounces per acre, or a maximum of .28 pounds of active ingredient per acre.

Applicators use truck-mounted side booms mounted 18 inches from the ground to apply Oust XP, SFM 75 and Landmark XP in October and November, or from March to May. WSDOT workers applied an average of 390 pounds of sulfometuron methyl per year in 2004 and 2005.

Human Health Effects

The U.S. Environmental Protection Agency (EPA) classifies Oust XP and SFM 75 as toxicity class III (low toxicity) with a signal word CAUTION. (See Toxicity Category and Signal Word table).

Acute toxicity: Oust has low to very low toxicity if individuals accidentally eat, touch, or inhale residues. The material is slightly irritating to the eyes of laboratory rabbits, nonirritating to the skin, and not a sensitizer. (See Laboratory Testing text box).

Chronic toxicity: Sulfometuron methyl caused slight changes in body weight and food intake, some blood changes, excessive bile duct cell growth and cell hardening, and urinary bladder changes when fed to rats at moderate to high levels for 2 years. Rats fed very high levels of sulfometuron methyl had lower body weights, mild anemia (low red blood cell count), and higher levels of protein. Dogs fed sulfometuron methyl for one year had blood changes, liver weight increases, and urinary bladder changes.

Toxicity Category and Signal Word

	High Toxicity (<i>Danger</i>)	Moderate Toxicity (<i>Warning</i>)	Low Toxicity (<i>Caution</i>)	Very Low Toxicity (<i>Caution</i>)
Oral LD50	Less than 50 mg/kg	50-500 mg/kg	500-5000 mg/kg	Greater than 5000 mg/kg
Dermal LD50	Less than 200 mg/kg	200-2000 mg/kg	2000-5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC50	Less than 0.05 mg/l	0.05-0.5 mg/l	0.5-2.0 mg/l	Greater than 2.0 mg/l
Eye Effects	Corrosive	Irritation persisting for 7 days	Irritation reversible in 7 days	Minimal effects, gone in 24 hrs
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation

Highlighted categories specify the range for sulfometuron methyl use cited in this fact sheet.

Reproductive effects: Sulfometuron methyl did not cause reproductive effects when fed to rats over two generations in high doses. At the highest doses sulfometuron methyl did cause a decrease in offspring survivability. Sulfometuron methyl did not cause any birth defects in the offspring when fed to rats and rabbits during pregnancy. These findings suggest that sulfometuron methyl is unlikely to cause reproductive effects in humans when workers apply it at recommended levels.

Carcinogenic effects: Sulfometuron methyl did not cause an increase in the number of tumors when fed to rats and mice in moderate doses for two years. Rats and mice fed high doses showed a very slight increase in urinary bladder tumors. Multiple studies indicate that sulfometuron methyl is not a mutagen (does not cause mutation). The EPA has not evaluated sulfometuron methyl for its human carcinogenic potential.

Fate in humans and animals: Animals easily absorb sulfometuron-methyl through the gut and rapidly break down and eliminate it from the body. Rats eliminate sulfometuron methyl with a half-life ranging from 28 hours at low doses to 40 hours at high doses. The compound does not bioaccumulate (build up) in mammals.

LD50/LC50: Acute toxicity is commonly measured by the lethal dose (LD) or lethal concentration (LC) that causes death in 50 percent of treated laboratory animals. LD50 indicates the dose of a chemical per unit body weight of an animal and is expressed as milligrams per kilogram (mg/kg). LC50 is the concentration of a chemical per volume of air or water and is expressed as milligrams per liter (mg/L). Chemicals are highly toxic when the LD50 or LC50 value is small and practically nontoxic when the value is large. However, the LD50 and LC50 do not reflect potential health effects such as cancer, birth defects, or reproductive toxicity that may occur at levels of exposure below those that cause death.

Wildlife Effects

Effects on mammals: Sulfometuron methyl is practically nontoxic to mammals. The LD50 for rats fed sulfometuron methyl is greater than 5,000 milligrams per kilogram (mg/kg). The LD50 for rabbits exposed to sulfometuron methyl by skin contact ranges from 2,000 mg/kg to over 8,000 mg/kg. (See LD50/LC50 text box and Wildlife Toxicity Category table).

Effects on birds: Sulfometuron methyl is practically non-toxic to birds. The LC50 for mallard ducks and bobwhite quail exposed through their food is greater than 5,000 mg/kg.

Effects on fish: Sulfometuron methyl is slightly toxic to fish. The LC50 is greater than 12.5 mg/L for bluegill sunfish and rainbow trout. Sulfometuron methyl does not pose an

Wildlife Toxicity Category

Risk Category	Mammals	Birds	Fish or Aquatic Insects
	Acute Oral or Dermal LD ₅₀ (mg/kg)	Acute Oral LD ₅₀ (mg/kg)	Acute LC ₅₀ (mg/L)
Practically nontoxic	>2,000	>2,000	>100
Slightly toxic	501-2,000	501-2,000	>10-100
Moderately toxic	51-500	51-500	>1-10
Highly toxic	10-50	10-50	0.1-1
Very highly toxic	<10	<10	<0.1

Highlighted categories specify the range for sulfometuron methyl use cited in this fact sheet.

exposure threat to adult aquatic animals; however, embryos of fathead minnows may be affected by very low environmental concentrations (0.71 mg/L and above).

Effects on aquatic insects: Sulfometuron methyl is practically non-toxic to aquatic insects. The LC50 for water fleas (*Daphnia magna*) is >12.5 mg/L.

Environmental Fate

The half-life of sulfometuron methyl in soils ranges from 20 to 28 days with a typical time of 20 days. (See Half-life text box). It is broken down by microbes and by chemical reactions in water and in sunlight.

Sulfometuron methyl is moderately mobile in the environment but rapidly degraded and not expected to contaminate groundwater. Sulfometuron methyl is non-selective and can damage non-target plants on land or in water.

Half-life is the time required for half of the compound to degrade.

1 half-life = 50% degraded
2 half-lives = 75% degraded
3 half-lives = 88% degraded
4 half-lives = 94% degraded
5 half-lives = 97% degraded

Remember: the amount of a chemical remaining after a half-life will always depend on the amount of the chemical originally applied.

Human Health Risk Assessment

WSDOT evaluated several human exposure scenarios, including adults and children eating drift-contaminated garden vegetables or children directly touching drift-contaminated berries or sprayed vegetation. For each exposure scenario, WSDOT evaluated conditions of average exposure and extremely conservative conditions of maximum exposure. (See Human Cancer/Non-cancer text box and Human Risk Classification Under Conditions of Average Exposure table). Sulfometuron methyl poses a negligible risk of adverse non-cancer effects to WSDOT workers and the public under conditions of average and maximum exposure. All hazard quotients are below 1.

Human Cancer/Non-cancer Risk Classification: Scientists estimate non-cancer health risks by generating a hazard quotient (HQ). This number is the exposure divided by the toxicity. When the HQ is less than 1, exposures are unlikely to cause any adverse health effects. When the HQ is greater than 1, potential non-cancer health effects may be possible. Risk assessments for chemicals that cause cancer (carcinogens) estimate the probability of an individual developing cancer over a lifetime. Cancer risks estimated in this way are very conservative, and actual cancer risks are likely to be much lower. Cancer risk estimates of less than 1 in 100,000 are within the range considered negligible by most regulatory agencies.

Human Risk Classifications Under Conditions of Average Exposure

Hazard Quotient (Non-cancer Risk)	Cancer Risk	Potential Risks and Management Priority
Less than 1	Less than 1 in 100,000	Negligible
Between 1 and 10	Between 1 in 10,000 and 1 in 100,000	Low
Between 10 and 100	Between 4 in 1,000 and 1 in 10,000	Moderate
Greater than 100	Greater than 4 in 1,000	High

Note: Highlighted categories specify the range of potential risk for specific exposure scenarios involving sulfometuron methyl

Wildlife Risk Assessment

Wildlife risk assessment considers pesticide behavior in the environment and routes of exposure. Indirect exposure to mammals and birds can occur when they eat contaminated prey or vegetation. Direct exposure can occur when mammals and birds contact pesticide residues with their skin or eyes or when they inhale vapors or particulates. WSDOT's current application rates and use patterns for sulfometuron methyl pose a negligible risk to mammals. Estimated dietary exposures for rats, deer mice, and meadow voles are approximately 1,800 to 15,400 times lower than the rat LD50 of 5,000 mg/kg. WSDOT's current use of

sulfometuron methyl poses a negligible risk to birds. Estimated dietary exposures for bobwhite quail, marsh wrens, and American robins are approximately 950 to 11,000 times lower than the bobwhite LD50 of 5,000 mg/kg.

Aquatic Risk Assessment

WSDOT takes extra precautions applying herbicides near open water, wetlands, or wellhead protection zones. However, contamination may result from application drift, rainfall runoff, or residue leaching through the soil into groundwater. Fish and aquatic insect exposure to sulfometuron methyl occurs primarily through direct contact with contaminated surface waters. WSDOT's current application rates and use patterns for sulfometuron methyl poses a low risk to fish and aquatic insects in all areas of the state.

Additional Resources

- National Pesticide Information Center 1-800-858-PEST (7378) and <http://npic.orst.edu>
- Extension Toxicology Network (EXTOXNET) <http://extoxnet.orst.edu>
- Washington State Department of Transportation, Roadside Maintenance Branch 1-360-705-7865
- Washington Department of Agriculture, Pesticide Management Division 1-877-301-4555 (toll free)