

Type	Insecticide
Controls	Termites, ants, roaches
Mode of Action	"Unknown" (Reference 2) Uncoupler of oxidative phosphorylation in mitochondria (Reference 3).

Thurston County Review Summary:

Sulfluramid is rated high in hazard and pesticide products containing it fail Thurston County's pesticide review criteria.

In the EPA's Final Decision Registration document for sulfluramid, they stated: "Because of the potential toxicity concern resulting from bioaccumulation of the perfluorooctylsulfonate degradate in animals, as well as evidence of developmental and reproductive effects in toxicity studies, EPA negotiated in 2001 with all U.S. registrants a phase-out of products containing sulfluramid, with all registrations set to expire by December 31, 2016. Additionally, DuPont, the sole technical registrant, agreed to discontinue producing any new sulfluramid manufacturing-use product and the acquisition or importation of any additional sulfluramid into the U.S." (Reference 1). The only remaining sulfluramid products are pre-filled bait stations and stakes for termite control around the outside of building perimeters (including residential buildings).

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	<0.003	2	Low
Soil Sorption (Kd=mL/g)	>100 - >2,000	3	
Organic Sorption (Koc=mL/g)	>22,000 - >200,000	3	

Mobility Summary:

Sulfluramid is not soluble in water and adheres strongly to all soil types. The hazard for sulfluramid to move off the site of application with rain or irrigation water is rated low.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.00000043	2	Moderate - low
Biotic or Aerobic Half-life (days)	Value not found		
Abiotic Half-life (days)	No photolysis and no hydrolysis	4	High
Terrestrial Field Test Half-life (days)	Value not found		
Hydrolysis Half-life (days)	Stable	3	High
Anaerobic Half-life (days)	Value not found		
Aquatic Field Test Half-life (days)	Value not found		

Persistence Summary:

Sulfluramid is not expected to dissipate into the air after application, although it may degrade with interaction with chemicals found in the air (Reference 4). Information about the rate of chemical degradation in the environment could not be found although its primary chemical degradate is perfluorooctylsulfonate which has a calculated half-life of over 40 years (Reference 7). The persistence of sulfluramid and its toxic metabolite is rated high in hazard.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	1,131	6	Moderate
Octanol/Water Partition Coefficient	log Kow = 3.1	2	Moderate

Bioaccumulation Summary:

Sulfluramid is quickly metabolized to perfluorooctylsulfonate which does not degrade, is slowly eliminated from animals, and can accumulate in organs (Reference 1). The half-life for perfluorooctylsulfonate in rats was greater than 90 days and the human blood serum half-life is 1 to 4 years (Reference 2). The hazard for bioaccumulation is rated high.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Value Rating
Mammalian (LD50)	>2,296 mg/kg	5	Low
Avian (LD50)	>4,733 mg/kg	5	Low
Honey bee or insect (LD50)	>5 ug/bee	5	Moderate
Annelida -worms (LC50)	>1,897 mg/kg	5	Low
Fish (LC50)	>8 mg/L	5	Moderate
Crustacean (LC50)	>0.37 mg/l	5	High
Mollusk (LC50)	Value not found		
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that sulfluramid is highly toxic to some aquatic organisms (invertebrae) but moderately toxic to fish and bees, and low in toxicity to animals, birds and worms.

In the environmental risk assessment, the EPA stated that: "Some of the sulfluramid environmental exposure scenarios resulted in potential acute risk to birds and small mammals," although the EPA also determined that use of sulfluramid bait stations will result in very little potential for wildlife exposures and therefore will not pose a risk to threatened or endangered species (Reference 1). Since the only remaining products are pre-filled bait stations the likelihood of an exposure to a non-target organism is low. The risk to pets and wildlife from the use of the remaining products (pre-filled bait stations for termite control) is rated low in hazard due to the limited access to the chemical bait.

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Applicator exposures were not evaluated						
Post-application exposures were not evaluated						
Post-application exposures were not evaluated						
Combined exposures were not evaluated						

Acute Toxicity Risk Assessment Summary:

All exposures to sulfluramid result in a potential long-term exposure to perfluorooctylsulfonate because our bodies cannot break it down and it persists for years in the body. Risk from potential human exposures has resulted in the EPA phasing out the use of sulfluramid products. All exposures to sulfluramid are rated high in hazard by Thurston County's pesticide review criteria.

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	No classification	"Not considered carcinogenic"	2 and 6	Low
Mutagenicity	Up to 10,000 ug/plate	Non-mutagenic	4	Low
Neurotoxicity - (NOAEL)	Value not found	No evidence of neurotoxicity	2	Low
Endocrine Disruption	Value not found			
Developmental Toxicity (NOAEL)	<0.3 mg/kg/day	Decreased viability and lactation indices	2	High
Reproductive Toxicity (NOAEL)	0.45 - 0.53 mg/kg/day	Reduced survival, delayed development +	2	High
Chronic Toxicity (NOAEL)	0.45 mg/kg/day	Decreased gland and organ weights	2	

Chronic Toxicity Hazard Summary:

There is known "systemic retention" associated with the metabolite perfluorooctylsulfonate that may cause a delayed toxic effect following a short or prolonged exposure to sulfluramid. Due to this unknown potential for delayed toxicity, the EPA included an additional safety factor of 3 to the human health risk assessments (Reference 2). In mutagenicity testing, sulfluramid was considered non-mutagenic in Ames tests up to 10,000 ug/plate (with and without metabolic activation), it was also negative in sister chromatid exchange tests (although the upper test concentration may not have been high enough to satisfy the EPA), and was not genotoxic in an unscheduled DNA synthesis assay (Reference 4). Although no specific neurotoxicity studies were performed, the EPA stated that other toxicity studies did not indicate evidence of neurotoxicity (Reference 2). Independent carcinogenicity testing indicated that there was no indication of carcinogenicity up to the 30 ppm dose level (Reference 6). No other cancer evaluation could be located. Dose-related developmental toxicity was observed without maternal toxicity (which is rated high in hazard by Thurston County's pesticide review criteria). Reproductive toxicity studies indicate that although toxicity to the pups was observed at the same dose that caused parental toxicity, the toxicity to the pups was more severe compared to the parental toxicity (Reference 2). This increased susceptibility to the pups is rated high in hazard by Thurston County's pesticide review criteria. No evaluation of endocrine disruption potential could be found.

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Applicator exposures were not evaluated						
Post-application exposures were not evaluated						
Post-application exposures were not evaluated						
Combined exposures were not evaluated						

Chronic Toxicity Risk Assessment Summary:

All exposures to sulfluramid are considered to result in a long-term exposure to perfluorooctylsulfonate because our bodies cannot break it down and it persists for years in the body. A long-term risk assessment is not evaluated here because the EPA considered the risk of toxicity from potential ongoing exposures to perfluorooctylsulfonate and there is a potential for delayed toxic effects due to its extremely long retention time in the body. Therefore, all human exposures to sulfluramid are rated high in hazard.

Metabolites and Degradation Products:

The major degradate of sulfluramid is perfluorooctylsulfonate (Reference 1).

Comments:

Sulfluramid is not considered an eye or skin irritant (EPA Toxicity Category IV) and is not a skin sensitizer (Reference 2).

References

- USEPA. Sulfluramid, Registration Review Final Decision Registration Review Case 7411. September 2008.
- USEPA. Office of Prevention, Pesticides and Toxic Substances. Sulfluramid: Human Health Risk Assessment for Sulfluramid. 3/27/2001.
- USEPA. Abromovich, Akiva D., Environmental Fate and Ground Water Branch Review of Sulfluramid. January 25, 1993.
- TOXNET. Toxicology Data Network. National Library of Medicine, Hazardous Substance Database. Sulfluramid. Revised 3/8/2013. <http://toxnet.nlm.nih.gov>.
- International Union of Pure & Applied Chemistry. Pesticide Properties Database. Sulfluramid (Ref: GX 071). Date accessed 9/10/2013.
- Secretariat of the Stockholm Convention - United Nations Environmental Programme. Toxicological Summary for Sulfluramid - Toxicity to Superior Animals. <http://chm.pops.int> (Accessed 9/11/2013).
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