fluroxypyr

Review Date: 02/21/2016

CAS #: 69377-81-7

Type	Terrestrial - selective, systemic, post-emergent, herbicide
Controls	Controls annual and perennial broadleaf weeds in grasses
Mode of Action	Mimics a plant growth hormone (similar to indolacetic acid) which results in disrupted plant cell growth

Thurston County Review Summary:

Fluroxypyr is an active ingredient in terrestrial herbicide products and can be in the form of fluroxypyr acid or fluroxypyr 1-methylheptyl ester (MHE). Fluroxypyr products are rated high in hazard and fail Thurston County's IPM review criteria. Fluroxypyr is rated high in hazard because testing indicates that it can cause developmental toxicity without maternal toxicity.

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	6500 mg/L	4	High
Soil Sorption (Kd=mL/g)	0.1 to 2	3	High
Organic Sorption (Koc=mL/g)	51 to 81	3	High

Mobility Summary:

Fluroxypyr is soluble in water and is expected to bind poorly to all soil types. The potential for fluroxypyr to move off the site of application with rain or irrigation water is rated high.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.00000094	3	Moderate - low
Biotic or Aerobic Half-life (days)	13	4	Moderate
Photolysis Half-life (days)	Stable (in water)	4	High
Terrestrial Field Test Half-life (days)	13 to 36	2	Moderate
Hydrolysis Half-life (days)	223	4	High
Anaerobic Half-life (days)	35 (water/sediment)	4	Moderate
Aquatic Field Test Half-life (days)	10.5	4	Moderate

Persistence Summary:

Products containing fluroxypyr MHE is rapidly converted to fluroxypyr acid, which is expected to degrade to half of the applied concentration between 2 weeks to 5 weeks. Although fluroxypyr does not hydrolyze quickly, it is expected to degrade in water in about the same amount of time as on land (2-5 weeks). The hazard for persistence is rated moderate.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	167 L/kg whole fish and 21 L/kg fillet	3	Moderate to low
Octanol/Water Partition Coefficient	log Kow = 1.16	3	Low

Bioaccumulation Summary:

The octanol/water partition coefficient (log Kow = 1.16) of fluroxypyr acid indicates that it has a low potential to accumulate in fish or animal tissue and bioconcentration studies have shown that it does not accumulate. Fluroxypyr is rapidly metabolized by mammals with up to 90% being excreted within 12 hours (Reference 3).The hazard for bioaccumulation potential is rated low.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Toxicity Rating
Mammalian (LD50)	880 mg/kg	6	Moderate
Avian (LD50)	>2,000 mg/kg	2	Low
Honey bee or insect (LD50)	>25 ug/bee	2	Low
Annelida -worms (LC50)	>1,000 mg/kg	4	Low
Fish (LC50)	>0.09,g/L	2	High
Crustacean (LC50)	0.135 mg/L	2	High
Mollusk (LC50)	51 mg/L (acid) and 0.07 mg/L (MHE)	2	Moderate (acid) - High (MHE)
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Fluroxypyr is moderately toxic to small mammals but low in toxicity to birds, bees, and worms. Fluroxypyr acid is more toxic to aquatic life than fluroxypyr MHE (which becomes fluroxypyr acid when it contacts water). Fluroxypyr acid is highly toxic to fish and other aquatic organisms (Reference 6).

Based on information from risk assessments for Threatened, Endangered and Potential species, the herbicide active ingredient fluroxypyr would pose a low toxicological risk to fish and aquatic invertebrates from direct spray, off-site drift, or from surface runoff of herbicide into a stream or pond. Risks to terrestrial vertebrates, invertebrates, and herpetofauna from potential dermal exposures to fluroxypyr is considered low. Risk to birds or mammals from eating treated or contaminated vegetation, vertebrates, invertebrates or fish is also considered low (Reference 7).

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Risk Rating
Applicator risk not calculated	Dermal	1 mg/kg/day	0.005 mg/kg	200	3	Low
Young woman contacting treated vegetation	Dermal	1 mg/kg bw/day	0.01 mg/kg bw	100	3	Low
No other risk assessment was relevant						
Risk from combined exposures were not found						

Acute Toxicity Risk Assessment Summary:

Fluroxypyr did not produce a toxic effect when tested on the skin of animals therefore, risk assessments from skin exposures were not performed by the EPA (Reference 3). Single dose testing of fluroxypyr did not produce a toxic effect, so the EPA did not calculate risk from short-term exposures to fluroxypyr herbicides (Reference 6).

The US Forest Service performed risk assessments for potential short-term exposures using the same dose of concern as was used for long-term exposures (1mg/kg bw/day). Risk from all relevant short term or single exposures (non-accidental) were rated low in hazard.

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Not likely to be carcinogenic to humans	- -	1	Low
Mutagenicity	Value not provided	Forward gene mutation	6	Low (read summary)
Neurotoxicity - (NOAEL)	Value not provided	No specific neurotoxicity	3	Low
Endocrine Disruption	Reduced teste weights	Suggestive evidence	3	Not rated
Developmental Toxicity (NOAEL)	100 mg/kg	Post-implantation loss	6	High
Reproductive Toxicity (NOAEL)	1,000 mg/kg/day	No reproductive toxicity observed	6	Low
Chronic Toxicity (NOAEL)	100 mg/kg/day (dog)	Kidney toxicity	6	Check risk

Chronic Toxicity Hazard Summary:

In developmental toxicity testing, an increased incidence of post-implantation loss was observed without maternal toxicity (Reference 6). Developmental toxicity that is not related to maternal toxicity is rated high in hazard by Thurston County's pesticide review process. Reproductive toxicity was not observed up to the highest testing doses although maternal toxicity was induced at lower concentrations. Fluroxypyr induced forward gene mutation in a mouse lymphoma cell that was not confirmed with other mammalian cell tests (Reference 6). Toxicity testing indicates that there is a potential for endocrine toxicity although the toxicity observed may not be directly related to toxicity to the endocrine system, instead it may be a result of kidney toxicity (Reference 3). It is still unknown if fluroxypyr is an endocrine disrupting chemical. Indirect signs of neurotoxicity were observed in animal testing although there were no indications of direct neurotoxicity (Reference 3).

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Risk Rating
1-6 months of backpack sprayer applications	Dermal + inhalation	1mg/kg/day	0.04 mg/kg/day	25	3	Low
1-6 months of truck boom sprayer applications	Dermal + inhalation	1mg/kg/day	0.08 mg/kg/day	12.5	3	Low
Long-term eating of treated vegetation	Ingestion	1mg/kg/day	0.065 mg/kg/day	15	3	Low
Long-term eating of treated fruit	Ingestion	1mg/kg/day	0.008 mg/kg/day	125	3	Low

Chronic Toxicity Risk Assessment Summary:

Risk from potential occupational exposures 1 to 6 months in duration were calculated for the US Forest Service using very conservative exposure scenarios (Reference 3).

Upper estimates of worker applicator exposures range from approximately 0.04 mg/kg/day for backpack and aerial workers, and 0.08 mg/kg/day for broadcast ground spray workers. Backpack and ground boom spray applications were calculated using the maximum application rate of 0.5 pounds of acid equivalents per acre. Backpack applicators are assumed to apply up to 1 acre an hour. Truck mounted boom sprayers are assumed to spray about 200-gallons of herbicide to 8-acres per hour.

The highest longer-term post-application exposure came from the scenario of a person eating contaminated vegetation is about 0.065 mg/kg/day, which is followed by the scenario for the longer-term consumption of contaminated fruit which is caculated at 0.008 mg/kg/day (Reference 3). These unlikely exposures are less than 10% of the dose of concern and is rated low in hazard. All other post-application exposures are also rated low in hazard.

Metabolites and Degradation Products:

In soil, fluroxypyr degrades to 4-amino-3,5-dichloro-6-fluoro-pyridinol and 4-amino-3,5-dichloro-6-fluoro-2-pirydynil-2-methoxypyridine (Reference 4).

Comments:

Fluroxypyr is not considered a skin sensitizer but it is slightly irritating to the skin and can cause severe eye irritation (Reference 5).

References

1. National Library of Medicine. Hazardous Substance Database. TOXNET, Toxicology Data Network. Fluroxypyr. 1/4/2011.
2. USEPA. DATA EVALUATION RECORD. Study 6. CHEM 128959 Fluroxypyr 9164-.1.CAS NO. 69377-8 1-7. FORMULATION--00--Emulsifiable Concentrate. STUDY ID 44080347.3/30/1998.
3. Syracuse Environmental Research Associates, Inc. SERA TR-052-13-03a. Fluroxypyr. Human Health and Ecological Risk Assessment. June 12, 2009.
4. International Union of Pure & Applied Chemistry. Pesticide Properties Database. Fluroxypyr (Ref: DOW 43304-H). Record last updated: 22 July 2013.
5. Washington State Department of Transportation. Fluroxypyr, Roadside Vegetation Management Herbicide Fact Sheet. February 2006.
6. USEPA. Office of Prevention, Pesticides and Toxic Substances. Pesticide Fact Sheet, Fluroxypyr. Conditional Registration. Issued:9/30/1998.
7. U.S. Department of Interior Bureau of Land Management. Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States. April 2015.