prometon

Review Date: 03/24/2012

CAS #: 1610 18-0

Type	Non-selective pre- and post-emergent systemic herbicide
Controls	Grasses and broadleaf vegetation.
Mode of Action	Inhibits photosynthesis

Thurston County Review Summary:

Herbicide products containing prometon as an active ingredient are rated high in hazard and fail Thurston County's pesticide review criteria. Prometon is rated high in hazard because of the risk to applicators (for specific application methods) and the risk to birds and small animals foraging on treated vegetation or contaminated insects. Prometon is also rated high in hazard for chemical persistence and the risk of moving off the site of application with rain or irrigation water.

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	620	1	Moderate
Soil Sorption (Kd=mL/g)	0.16	2	High
Organic Sorption (Koc=mL/g)	43.2	2	High

Mobility Summary:

Prometon is moderately soluble in water and can be expected to adhere poorly to all soil types. The hazard for prometon to move off the site of application or leach into soil with rain or irrigation water is rated high.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.0000031	1	Moderate
Biotic or Aerobic Half-life (days)	462 to 932	1	High
Abiotic Half-life (days)	"Resistant"	1	High
Terrestrial Field Test Half-life (days)	>459 to 1,123	6	High
Hydrolysis Half-life (days)	>200	2	High
Anaerobic Half-life (days)	557	1	High
Aquatic Field Test Half-life (days)	Value not found		

Persistence Summary:

Prometon is resistant to abiotic degradation (hydrolysis and photodegradation) as well as aerobic and anaerobic soil metabolism (Reference 1). Prometon is rated very high in hazard for chemical persistence in both terrestrial and aquatic environments.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	69	2	Low
Octanol/Water Partition Coefficient	log Kow = 2.91	2	Moderate

Bioaccumulation Summary:

The octanol/water partition coeficient value indicates that prometon has a moderate potential to bind to fish or animal tissue. The calculated bioconcentration factor indicates that there is a low potential for bioaccumulation. Rat metabolism studies show that prometon is rapidly eliminated within the first 24-hours of administration with very little elimination after 72-hours. Based on a low predicted bioconcentration factor and rapid metabolism by animals, the hazard for prometon to bioaccumulate is rated low.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Value Rating
Mammalian (LD50)	1,518 mg/kg	1	Moderate
Avian (LD50)	>2,264 mg/kg bw	1	Low
Honey bee or insect (LD50)	36 ug/bee	1	Low
Annelida -worms (LC50)	Value not found		
Fish (LC50)	12 mg/L	1	Moderate
Crustacean (LC50)	25.7 mg/L	1	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 prometon is low in toxicity to birds and insects but moderately toxic to animals, fish, and other aquatic organisms (Reference 1).

Several of the post-application risk assessments for birds and small animals exceeded the EPA's level of concern when they forage on treated vegetation or insects that have been sprayed with prometon herbicides. To reduce the risk to non-target organisms the EPA lowered the highest allowable application rate by 10%. However, even with the lower application rates, the hazard for toxicity to non-target birds and animals that eat treated vegetation or insects is rated high. Worst-case scenarios (right-of-way aplications) predict that the risk to fish and other aquatic organisms from prometon runoff is low in hazard.

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Adult mixing and applying with hand-wand sprayer	Dermal (skin)	0.5 mg/kg/day	>0.5 mg/kg/day	<1	1	High
Mixing and applying with trigger-pump sprayer	Dermal	0.5 mg/kg/day	0.23 mg/kg/day	2.2	1	Moderate
Applying RTU product with hose-end sprayer	Dermal	0.5 mg/kg/day	0.015 mg/kg/day	33	1	Low
Occupational applicator using a backpack sprayer	Dermal	0.5 mg/kg/day	0.16 mg/kg/day	3.1	1	Moderate

Acute Toxicity Risk Assessment Summary:

Short-term risk assessments were calculated using a dose of concern derived from a Lowest Observeable Adverse Effect Level (LOAEL) with an additional ten-times safety factor for a total uncertainty factor of 1,000. The LOAEL was 500 mg/kg/day, setting the dose of concern for short-term and intermediate-term dermal exposures at 0.5 mg/kg/day.

The risk assessment for residential applicators assumed an application rate of 0.41 lb ai/1000 square foot. Seven application methods were compared (three granular application methods and four liquid applications) and the rating for the potential exposure to the applicator ranges from low in hazard to high in hazard. The high hazard exposures are calculated for granular products that are hand applied or with the use of a belly grinder, high hazard liquid applications are from mixing and applying with a low pressure hand wand. Mixing and applying with either a hand-held trigger pump sprayer, hose-end sprayer or a sprinkling can is rated moderate in hazard. Applying a Ready-To-Use product with a hose-end sprayer is rated low in hazard as is a push spreader application with granular products.

Because prometon products are intended to be watered into the soil after aplication, the EPA concluded that post-application exposures are not likely to be significant and therefore did not calculate risk assessments.

The risk assessment for occupational exposures were all calculated to be low in hazard (if one layer of chemically resistant gloves are worn when mixing and applying liquid prometon products). Without gloves the potential exposures to workers mixing and applying liquid products with a backpack sprayer (to 0.25 acres) or applying liquids using a right-of-way applicator (to 1 acre) are rated moderate in hazard.

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	"Not Likely to be Carcinogenic to Humans"	- -	1	Low
Mutagenicity	Negative	- -	1	Low
Neurotoxicity - (NOAEL)	Vale not found			
Endocrine Disruption	Not a known endocrine disruptor	- -	3, 4 and 5	Low to moderate
Developmental Toxicity (NOAEL)	Value not found	- -	1	Low
Reproductive Toxicity (NOAEL)	Value not found	- -	1	Low
Chronic Toxicity (NOAEL)	5 mg/kg/day	Emesis and body weight effects	1	

Chronic Toxicity Hazard Summary:

"Prometon was negative in the mutagenicity/genetic toxicity studies including a bacterial mutagenicity (Ames) test, rat micronucleus test and an unscheduled DNA synthesis test. There were no indications of increased susceptibility to the fetuses or neonatal animals in either the rat or rabbit developmental toxicity studies or in the rat multi-generation reproduction study." (Reference 1). Specific toxicity testing was performed with prometon to determine the potential for endocrine disruption. The study suggested that prometon may cause subtle endocrine and/or reproductive effects but there was no definitive mechanism of action was observed. Without direct evidence of endocrine disruption, the hazard is rated low to moderate.

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Long-term exposures were not evaluated						
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Chronic Toxicity Risk Assessment Summary:

Long-term exposures to prometon are not expected from non-dietary or drinking water sources, so the EPA did not require long-term applicator or post-application exposure risk assessments.

Metabolites and Degradation Products:

"Major degradation products of prometon include 2 amino-4-(isopropylamino)-6-methyoxy-s-triazine (GS-14626), 2,4-diamino-6-methoxy-s-triazine (GS-12853), and 2-hydroxy-4,6 bis (isopropylamino)-s-triazine (GS-11526). Although information on the toxicity of these degradates are not available, the Agency is assuming that degradates are of equal or lesser toxicity to that of the parent compound." (Reference 1).

Comments:

Prometon is considered a mild eye irritant (EPA Toxicity Category III), a very slight skin irritant (EPA Toxicity Category IV), but not a skin sensitizer (Reference 1).

References

1. USEPA. Office of Pesticides Programs. Reregistration Eligibility Decision for Prometon. March 25, 2008.
2. International Union of Pure & Applied Chemistry. Pesticide Properties Database. prometon (Ref: G 31435). Accessed 4/13/2012. http://sitem.herts.ac.uk/aeru/iupac/
3. Scorecard - The Pollution Information Site. Health Effects / Endocrine Toxicants (Accessed 4/13/2012). http://scorecard.goodguide.com/health-effects.
4. Illinois EPA. "Endocrine Disruptors Strategy". February, 1997.
5. USEPA. Office of Research and Development, National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Divison. "Evaluation of the methoxytriazine herbicide prometon using a short-term fathead minnow reproduction test and a suite of in vitro bioassays." Environmental Toxicology and Chemistry. 2006 Aug;25(8):2143-53.
6. USEPA. Office Of Drinking Water. Prometon Health Advisory. August 1987.