

# MCPP-p (Mecoprop-p)

Review Date: 8/10/2010

CAS #: 16484-77-8

Type	Post-emergent systemic selective herbicide for broadleaf weeds.
Controls	Controls annual and perennial broadleaf weeds in lawns, turf, sports fields, sod farms, roadsides, rights-of way, and industrial sites.
Mode of Action	Plants undergo excessive cell division and growth that damages vascular tissue.

## Thurston County Review Summary:

Originally, products that were produced with MCPP as an active ingredient contained 50% MCPP (R) isomer and 50% (S) isomer - later, the (R) isomer was found to be the isomer with herbicidal action. All of these products now contain MCPP-p which is an enriched isomer that contains up to 95% of the (R) isomer. Since MCPP-p in its salt forms (MCPP-p potassium salt and MCPP-p dimethylamine salt) dissociate to the acid form very rapidly in the environment, the EPA concluded that the assessment for the acid form is toxicologically and environmentally relevant for the other two salt formulations as well.

MCPP-p is considered mobile and moderately persistent, but is not a hazard for bioaccumulation. The risk of toxicity to humans is considered low in hazard for mixing, applying, contacting treated vegetation or contaminated objects, drinking contaminated water, or even for a child eating applied granular herbicide containing MCPP-p as the sole active ingredient. The risk of toxicity to birds from exposures to MCPP-p at concentrations expected from herbicidal use is considered high in hazard and results in herbicides with MCPP-p as an active ingredient to fail the Thurston County review criteria.

## MOBILITY

Property	Value	Reference	Rating
Solubility (mg/L)	620 mg/L	1	Moderate
Soil Sorption (Kd=mL/g)	0.41	2	High
Organic Sorption (Koc=mL/g)	31	2	High

### Mobility Summary:

MCPP-p is soluble in water and adheres poorly to soil with and without organic material. The hazard for MCPP-p to move off the site of application with rain or irrigation water is high.

## PERSISTENCE

Property	Value	Reference	Rating
Vapor Pressure (mm Hg)	0.000014	1	Moderate
Biotic or Aerobic Half-life (days)	8	2	Low
Abiotic Half-life (days)	6.8	2	Low
Terrestrial Field Test Half-life (days)	35	1	Moderate
Hydrolysis Half-life (days)	Stable	2	High
Anaerobic Half-life (days)	50	2	Moderate
Aquatic Field Test Half-life (days)	5 - 7	1	Low

### Persistence Summary:

The major route of degradation of MCPP-p is microbial breakdown in soil and photodegradation in water. If MCPP-p leaches deeply into the soil with excessive rain or irrigation water it is likely to persist much longer. MCPP-p is likely to reach half of the applied concentration within 30 days and is rated moderate in persistence hazard.

## BIOACCUMULATION

Property	Value	Reference	Rating
Bioaccumulation Factor	Not found		
Bioconcentration Factor	3	2	Low
Octanol/Water Partition Coefficient	0.02	2	Low

### Bioaccumulation Summary:

MCPP-p has a very low octanol/water partition coefficient which means it does not bind well to fats and oils. Bioaccumulation studies also indicate that there is little accumulation potential. The hazard for bioaccumulation is low.

# ACUTE TOXICITY HAZARD - ECOTOXICITY

Test Subject	Value	Reference	Rating
Mammalian (LD50)	431 mg ae/kg	2	Moderate
Avian (LD50)	491 mg ae/kg bw	1	Moderate
Honey bee or insect (LD50)	>100 ug/bee	1	Low
Annelida -worms (LC50)	>988 mg/kg	2	Low
Fish (LC50)	>93 mg ae/L	1	Low
Crustacean (LC50)	>91 mg ae/L	1	Low
Mollusk (LC50)	Not found		
Amphibian (LD50 or LC50)	Not found		

## Acute Toxicity Summary:

Single dose toxicity studies indicate that MCP-p is moderately toxic to mammals and birds but low in toxicity to bees, worms, fish and other aquatic organisms. To calculate the risk to non-target organisms, the EPA compared expected environmental concentrations of MCP-p on grasses, fruit, seeds, and insects to the concentrations of MCP-p that are likely to cause harm to each organism group (based on expected diet). Residential use of MCP-p herbicides can leave concentrations on grasses, broadleaf plants, and small insects that exceed the EPA's level of concern for foraging birds (based on single dose concentrations and long-term dietary exposures). The level of concern is only exceeded for small mammals based on the dose-based concentrations for granular applications (maximum application rate) and liquid applications - even at the residential rate (but not at the expected dietary concentrations). The risk to all aquatic organisms is below the level of concern for all application scenarios and is rated as low in hazard.

The risk of toxicity from exposures to MCP-p from herbicidal use is considered high in hazard for birds and moderate in hazard for small mammals.

# ACUTE TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Adult applying granules by hand to 1000 sq. feet	0.35 mg/kg/day	0.00018 mg/kg/day	1,900	Inhalation	1	Low
Child eating granules	1.75 mg/kg/day	0.14 mg/kg/day	12.5	Ingestion	1	Low
Child hand, object-to-mouth + soil ingestion	0.35 mg/kg/day	0.023 mg/kg/day	15	Ingestion	1	Low
Child hand, object-to-mouth + soil + water	0.35 mg/kg/day	0.024 mg/kg/day	14	Ingestion	1	Low

## Acute Toxicity Risk Assessment Summary

There were no adverse effects noted during the acute dermal toxicity testing so the residential exposure assessments only include exposures from inhalation and ingestion. The risk of a child eating granules was considered to be a one-time event and was calculated to create a dose twelve times less than the EPA's dose of concern and is rated low in hazard. Exposures that combine hand-to-mouth, object-to-mouth, soil ingestion and consumption of contaminated surface water are ten times less than the EPA's dose of concern and are rated low in hazard.

All short-term occupational exposures for mixing / loading and applying were considered low in hazard with the exception of a mixer of the wettable powder products for a 100 acre turfgun application (which is rated as a moderate hazard).

# CHRONIC TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Suggestive evidence - but not sufficient		1	Pass
Mutagenicity	Not found	--	--	Data gap
Neurotoxicity - (NOAEL)	--	"known not to cause a problem"	2	Low
Endocrine Disruption	--	"known not to cause a problem"	2	Low
Developmental Toxicity (NOAEL)	50 mg/kg/day	Increase of rudimentary cervical rib	1	Check risk
Reproductive Toxicity (NOAEL)	Not found	--	--	Data gap
Chronic Toxicity (NOAEL)	4 mg/kg/day	Liver weight, nephropathy	1	Check risk

## Chronic Toxicity Summary:

There are two data gaps in the long-term toxicity review - no mutagenicity or reproductive toxicity assessments could be found. Reproductive toxicity is implied that it was not found in long-term testing because the Food Protection Quality Act (FPQA) requires an assessment for pre-natal and post-natal toxicity be evaluated to determine an adequate safety factor in risk assessments. Since there was no additional safety factor placed on the dietary exposure safety factor, it implies that developmental and reproductive toxicity testing did not produce toxicity to the developing fetuses without toxicity to the parent. Carcinogenicity testing produced suggestive evidence of carcinogenicity that was not sufficient to assess human carcinogenicity potential.

## CHRONIC TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Contact with treated vegetation was not evaluated						
Combined exposures were not evaluated						
Infant <1 drinking contaminated surface water	0.04 mg/kg/day	0.0013 mg/kg/day	30	Ingestion	1	Low
Dietary exposures were not evaluated						

## Chronic Toxicity Risk Assessment Summary:

Since these products are to be used only once or twice a year, intermediate and long-term exposures are not expected in a residential setting (only short-term inhalation exposures and exposures from eating treated crops or contaminated water). Exposures to MCP-p from treated crops are not evaluated by Thurston County. The long-term exposure scenario of drinking surface water that is contaminated from runoff and overspray following a sod farm turf application is considered low in hazard. Since the drinking water exposure is the only potential long-term exposure, the hazard for toxicity from the herbicidal use of MCP-p products by the County or homeowners is considered low in hazard.

## Degradation Products:

4-chloro-2-methylphenol, o-cresol, and carbon dioxide (Reference 1).

## Comments:

MCP-p is considered a severe eye irritant (EPA category I - for causing opacity, redness and discharge for 72 hours), it is also considered a skin irritant (EPA category III - for redness and sloughing after ten days). MCP-p is not considered a skin sensitizer (Reference 1).

## References

1. USEPA. Prevention, Pesticide and Toxic Substances. Reregistration Eligibility Decision (RED) for Mecoprop-p (MCP-p). EPA738-R-07-009, August 29, 2007.
2. International Union of Pure & Applied Chemistry (IUPAC). Pesticide Properties Database (Accessed 8/10/2010). <http://sitem.herts.ac.uk/aeru/iupac/>