

MCPA dimethylamine salt

Review Date: 6/23/2009

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|----------------|--|
| Type | Terrestrial - systemic, post-emergent herbicide. |
| Controls | Selective control of annual and perennial broad leaved weeds in cereals and other specific crops, grassland, turf, under fruit trees, along roadsides and embankments. |
| Mode of Action | MCPA interferes with protein synthesis, cell division, and ultimately the growth of non-resistant plants (Reference 2) |

Thurston County Review Summary:

MCPA dimethylamine salt will quickly break down in the environment to create the herbicidally active chemical MCPA acid. MCPA acid is considered high in hazard for mobility, moderately persistent, and is not considered a hazard for bioaccumulation. The potential chemical exposures to adults mixing and applying herbicides containing MCPA dimethylamine salt and to women working in treated turf grass, are considered high in hazard for toxicity.

The risk to birds eating short grass that has been treated with MCPA exceeds the EPA's level of concern which Thurston County rates as high in hazard for non-target toxicity.

Herbicides containing MCPA dimethylamine salt fail Thurston County's review criteria due to the risks to non-target organisms at expected environmental concentrations.

MOBILITY

| Property | Value | Reference | Rating |
|-----------------------------|-------|-----------|----------|
| Solubility (mg/L) | 825 | 2 | Moderate |
| Soil Sorption (Kd=mL/g) | 0.6 | 1 | High |
| Organic Sorption (Koc=mL/g) | 50-60 | 5 | High |

Mobility Summary:

MCPA dimethylamine salt will rapidly breakdown to MCPA acid which is moderately soluble in water and adheres poorly to all soil types. MCPA dimethylamine salt, with its metabolite MCPA acid, is considered high in hazard for mobility.

PERSISTENCE

| Property | Value | Reference | Rating |
|---|-----------|-----------|----------|
| Vapor Pressure (mm Hg) | 0.000006 | 1 | Moderate |
| Biotic or Aerobic Half-life (days) | 24 | 1 | Moderate |
| Abiotic Half-life (days) | Not found | | |
| Terrestrial Field Test Half-life (days) | <30 | 2 | Moderate |
| Hydrolysis Half-life (days) | Stable | 6 | High |
| Anaerobic Half-life (days) | Not found | | |
| Aquatic Field Test Half-life (days) | >30 | 1 | Moderate |

Persistence Summary:

After an herbicide application of MCPA dimethylamine salt, it will quickly convert to MCPA acid which will be degraded mainly by soil organisms to half of its applied concentration within 60 days (Reference 1). Therefore, MCPA dimethylamine salt herbicides are considered moderately persistent in the environment.

BIOACCUMULATION

| Property | Value | Reference | Rating |
|-------------------------------------|---------------|-----------|----------|
| Bioaccumulation Factor | Not found | | |
| Bioconcentration Factor | 39 | 1 | Low |
| Octanol/Water Partition Coefficient | log Kow = 2.8 | 1 | Moderate |

Bioaccumulation Summary:

MCPA acid has a moderate affinity to fats and oils although the bioconcentration rating by the EPA indicates that there is little potential for bioaccumulation. The bioaccumulation hazard for MCPA is considered low.

ACUTE TOXICITY

| Test Subject | Value | Reference | Rating |
|----------------------------|----------------|-----------|----------|
| Mammalian (LD50) | 1,876 mg/kg | 1 | Moderate |
| Avian (LD50) | 314 mg/kg | 1 | Moderate |
| Honey bee or insect (LD50) | 104 ug/bee | 2 | Low |
| Annelida -worms (LC50) | Not found | | |
| Fish (LC50) | 117 mg/L | 2 | Low |
| Crustacean (LC50) | "highly toxic" | 1 | High |
| Mollusk (LC50) | Not found | | |
| Amphibian (LD50 or LC50) | Not found | | |

Acute Toxicity Summary:

Single-dose toxicity testing of MCPA acid indicates that it is moderately toxic to animals and birds, practically non-toxic to bees and fish, but highly toxic to other aquatic organisms. Ecotoxicity studies show that there is a potential short-term exposure to birds that eat short grass that exceeds the EPA's level of concern at application rates of 1.5 pounds of active ingredient per acre or greater.

ACUTE TOXICITY - Risk Assessment

| Subject and Scenario | Dose of Concern | Exposure | Margin of Safety | Route | Reference | Rating |
|--|-----------------|--------------|------------------|----------------------------------|-----------|----------|
| Applicator applying herbicide to right of ways | Not provided | Not provided | <2 | Dermal, ingestion inhalation | 1 | High |
| Adult mixing/applying with hose end sprayer | Not provided | Not provided | Calculated as <3 | Dermal + inhalation | 1 | Moderate |
| Woman performing yardwork in treated turf | Not provided | Not provided | Calculated as <2 | Dermal + incidental ingestion | 1 | High |
| Infant playing in treated turf grass | Not provided | Not provided | <1 | Dermal + ingestion | 1 | High |

Acute Toxicity Risk Assessment Summary

The EPA evaluated the potential worst-case exposures to MCPA for 4 different occupational applicator scenarios. Since the minimum application area was 40 acres, the scenarios truly only reflect non-residential applicator exposures. Following all label safety precautions, the exposure to an applicator performing a right-of-way application is considered high in hazard. Groundboom and broadcast spreader applications are considered low in hazard to the applicator (aerial applications are not applicable).

Seven homeowner applicator scenarios were reviewed and two were considered low in hazard, applying granules with a broadcast spreader and applying liquids with a hand-held pump. All other homeowner application exposure scenarios (shaker can, belly grinder, hose-end sprayer, and ready-to-use sprayer) rated as a moderate hazard for toxicity.

The EPA's exposure evaluation to treated turf was confusing. The tables provided in the EPA review indicate that the exposure to both women and toddlers are above the calculated dose of concern. However, the EPA states that the skin absorption factor was overstated and exposures were recalculated and are likely to be at least 3 times less than what was listed in their tables (the uncertainty factor was lowered from 10 to 3). Even with this revision, the potential exposures to toddlers are still above the EPA dose of concern and are rated as high in hazard.

CHRONIC TOXICITY

| Property | Value | Adverse Effect | Reference | Rating |
|--------------------------------|---------------|---|-----------|------------|
| Carcinogenicity | Not likely | No human data suggesting potential for cancer | 3 | Low |
| Mutagenicity | Not mutagenic | - - | 7 | Low |
| Neurotoxicity - (NOAEL) | Data gap | - - | 1 | Moderate |
| Endocrine Disruption | Not listed | - - | 4 | Low |
| Developmental Toxicity (NOAEL) | 50 mg/kg/day | "clinical signs" | 1 | Check risk |
| Reproductive Toxicity (NOAEL) | 150 mg/kg/day | Decreased pup weight | 1 | Check risk |
| Chronic Toxicity (NOAEL) | 4.4 mg/kg/day | Hepatotoxicity | 1 | Check risk |

Chronic Toxicity Summary:

MCPA acid is not considered carcinogenic, mutagenic nor is it a known endocrine disruptor. Reproductive and developmental toxicity was seen at concentration above those that caused maternal toxicity.

CHRONIC TOXICITY - Risk Assessment

| Subject and Scenario | Dose of Concern | Exposure | Margin of Safety | Route | Reference | Rating |
|--|-----------------|----------|------------------|-------|-----------|--------|
| Post-application contact exposure was not assessed | | | | | | |
| Aggregate exposure not evaluated | | | | | | |
| Drinking water exposure not evaluated | | | | | | |
| Dietary exposures were not evaluated | | | | | | |

Chronic Toxicity Risk Assessment Summary:

The long-term exposures to MCPA acid from herbicidal use that were identified by the EPA involved using these products on food crops. Thurston County's pesticide reviews do not look at the potential exposures from food and no other long-term exposures are expected from County uses. The hazard for toxicity from long-term exposures to MCPA acid, from non-crop herbicidal use, is considered low.

Degradation Products:

In plants and animals, MCPA acid's major metabolite is 2-methyl-4-chlorophenol (Reference 2). 4-Chloro-o-cresol and 3-methyl-5-chlorocatechol are the two major metabolites of MCPA acid by microbial degradation in soil (Reference 5).

Comments:

MCPA dimethylamine salt is not considered a skin sensitizer, but is considered a severe eye irritant (EPA toxicity category I) and a slight skin irritant (EPA toxicity category III)- Reference 1.

References

1. USEPA. Office of Prevention, Pesticides and Toxic Substances. Reregistration Eligibility Document (RED) ; MCPA, List A Case 0017. September 9, 2004.
2. EXTTOXNET PIP - MCPA. <http://exttoxnet.orst.edu/pips/MCPA.htm>. Revised June 1996.
3. USEPA. Science Information Management Branch, Health Effects Division, Office of Pesticide Programs. Chemicals Evaluated for Carcinogenic Potential. July 19, 2004.
4. http://www.scorecard.org/health-effects/chemicals-2.tcl?short_hazard_name=endo&all_p=t
5. Spectrum Laboratories, Inc. Chemical Fact Sheet, Chemical Abstract Number (CAS #) 94746, MCPA. <http://www.speclab.com/compound/c94746.htm>
6. Federal-Provincial-Territorial Committee on Drinking Water, Health Canada. 2-Methyl-4-chlorophenoxyacetic Acid (MCPA) in Drinking Water. October 2006.