

|                |  |
|----------------|--|
| Type           | Systemic pre- and post- emergent herbicide |
| Controls       | Controls broadleaf and grass weeds.        |
| Mode of Action | Mimics the plant growth hormone auxin.     |

**Thurston County Review Summary:**

Quinclorac is rated high in hazard and herbicide products containing it as an active ingredient fail Thurston County's review criteria. Quinclorac is rated high in hazard because applications to turf grass can result in exposures to birds that exceed the EPA's level of concern for toxicity.

Quinclorac is rated high in hazard for chemical mobility and persistence (making it a potential groundwater and surface water contaminant). Risk assessments indicate that toxicity to humans from expected exposures is rated low in hazard. Quinclorac is not expected to bioaccumulate in fish or animals.

## MOBILITY

| Property                    | Value | Reference | Value Rating |
|-----------------------------|-------|-----------|--------------|
| Water Solubility (mg/L)     | 0.065 | 5         | Low          |
| Soil Sorption (Kd=mL/g)     | <1    | 1         | High         |
| Organic Sorption (Koc=mL/g) | 50    | 5         | High         |

**Mobility Summary:**

Quinclorac is not soluble in water and adheres poorly soil with or without organic matter. The hazard for quinclorac to leach into the soil or move off the site of application with rain or irrigation water is rated high.

## PERSISTENCE

| Property                                | Value           | Reference | Value Rating     |
|---|-----------------|-----------|------------------|
| Vapor Pressure (mm Hg)                  | 0.000000075     | 1         | High             |
| Biotic or Aerobic Half-life (days)      | Value not found |           |                  |
| Abiotic Half-life (days)                | Value not found |           |                  |
| Terrestrial Field Test Half-life (days) | 18 - 176        | 1         | Moderate to high |
| Hydrolysis Half-life (days)             | Stable          | 1         | High             |
| Anaerobic Half-life (days)              | Value not found |           |                  |
| Aquatic Field Test Half-life (days)     | 5 - 10          | 1         | Low to moderate  |

**Persistence Summary:**

Quinclorac is not expected to dissipate into the air or breakdown with interaction with water (hydrolysis). In sterile water it is resistant to breakdown by sunlight but in muddy water it degrades much faster (5-10 days). In soil, quinclorac has dissipation values that range from 18 days to over 500 days (References 1 and 5). Because quinclorac does not bind well to soil, some dissipation noted in field testing could be due to chemical leaching. The persistence hazard of quinclorac is rated high (likely to take over 60 days to degrade to half of the applied concentration).

## BIOACCUMULATION

| Property                            | Value           | Reference | Value Rating |
|-------------------------------------|-----------------|-----------|--------------|
| Bioaccumulation Factor              | Value not found |           |              |
| Bioconcentration Factor             | 0.8             | 5         | Low          |
| Octanol/Water Partition Coefficient | Kow = 0.266     | 1         | Low          |

**Bioaccumulation Summary:**

In a fish accumulation study submitted to the EPA, there was "no accumulation" in catfish after a 28 day exposure although no bioaccumulation factor was reported (Reference 1). European data calculates a bioconcentration factor of 0.8 which indicates very little potential for bioaccumulation (Reference 5). Quinclorac has a low octanol/water partition coefficient value (Kow less than 300) indicating that it is unlikely to accumulate in fish or animal tissue. The hazard for bioaccumulation is rated low.

# ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

| Test Subject               | Value           | Reference | Value Rating |
|----------------------------|-----------------|-----------|--------------|
| Mammalian (LD50)           | 2,190 mg/kg-bw  | 1         | Low          |
| Avian (LD50)               | >1,900 mg/kg-bw | 1         | Low          |
| Honey bee or insect (LD50) | >181 ug/bee     | 1         | Low          |
| Annelida -worms (LC50)     | Value not found |           |              |
| Fish (LC50)                | 31.6 mg/L       | 1         | Moderate     |
| Crustacean (LC50)          | 29.8 mg/L       | 1         | Moderate     |
| Mollusk (LC50)             | >96.1 mg/L      | 1         | Low          |
| Amphibian (LD50 or LC50)   | Value not found |           |              |

## Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that quinclorac is low in toxicity to birds, bees, and animals; but moderately toxic to fish and other aquatic organisms (Reference 1). Risk of toxicity from exposures to quinclorac following herbicide applications was evaluated by the EPA for non-target organisms and they found that the level of concern was exceeded for birds. The data that was used for the risk assessment assumed an application to turf (1.5 pounds of active ingredient/acre per season with 2 applications at 0.75 per application and a 14 day interval). Because the EPA did not provide the numerical evaluation of these potential exposures to birds, the margin of safety could not be evaluated. Without the ability to evaluate the margin of safety, the risk to birds is rated high in hazard (a lower rating could be used if the margin of safety indicates that potential exposures could only be incurred with specific applications). The EPA plans to re-evaluate this risk assessment to incorporate changes in product use during the next registration review for quinclorac (about 2015). Until there is a new risk assessment evaluated and published, the hazard for toxicity to birds, at product label rates, is rated high. Use of quinclorac is not expected to harm beneficial insects (Reference 1).

Risk assessments also indicate that level of concern for birds and small animals is exceeded from aquatic weed control applications at 3 pounds of active ingredient per season.

# ACUTE HUMAN TOXICITY - Risk Assessment

| Subject and Scenario                             | Route          | Dose of Concern | Exposure         | Margin of Safety | Reference | Value Rating |
|--|----------------|-----------------|------------------|------------------|-----------|--------------|
| All populations                                  | Drinking water | 0.7 mg/kg/day   | <0.007 mg/kg/day | >100             | 1         | Low          |
| Child hand and object-to-mouth, + soil ingestion | Ingestion      | 0.7 mg/kg/day   | 0.014 mg/kg/day  | 50               | 1         | Low          |
| Other short-term exposures were not evaluated    |                |                 |                  |                  |           |              |
| Other short-term exposures were not evaluated    |                |                 |                  |                  |           |              |

## Acute Toxicity Risk Assessment Summary:

A risk assessment was performed for post-application exposure to treated residential turf grass with an application rate of 0.0172 pounds of active ingredient per 1000 square feet. Potential exposures calculated for children's hand-to-mouth, object-to-mouth, and soil ingestion activities concluded that the potential exposure is less than 2% of the dose of concern and is rated low in hazard. Risk was also calculated for contaminated drinking water and was determined to be low in hazard as well. Exposures from contacting quinclorac were not evaluated because dermal (skin) toxicity testing did not produce any adverse effects.

# CHRONIC HUMAN TOXICITY HAZARDS

| Property                       | Value                                   | Adverse Effect              | Reference | Rating     |
|--------------------------------|---|-----------------------------|-----------|------------|
| Carcinogenicity                | Not likely to be carcinogenic to humans | --                          | 1         | Low        |
| Mutagenicity                   | 2000 ug/mL                              | No forward mutations        | 5         | Low        |
| Neurotoxicity - (NOAEL)        | Value not found                         |                             |           |            |
| Endocrine Disruption           | Not listed                              | --                          | 3 and 4   | N/A        |
| Developmental Toxicity (NOAEL) | 200 mg/kg-bw/day                        | Increased fetal resorptions | 1         | Check risk |
| Reproductive Toxicity (NOAEL)  | 160 mg/kg-bw/day                        | Reduced pup viability       | 1         | Check risk |
| Chronic Toxicity (NOAEL)       | 70 mg/kg/day                            | Decreased body weight       | 1         | Check risk |

## Chronic Toxicity Hazard Summary:

Developmental toxicity was observed only at concentrations much higher than maternally toxic doses and the EPA concluded from developmental and reproductive toxicity testing that there is no increased susceptibility to offspring or developing fetuses from exposures to quinclorac (Reference 1). Mutagenicity testing produced positive and negative test results. One positive mutation test was accepted by the EPA, although the mutation was only observed at doses that were also toxic to the cells (therefore it is not rated high in hazard). The other positive mutations were observed in tests that the EPA rejected because the testing procedures did not meet the EPA's testing specifications (Reference 2). Quinclorac is not a known endocrine disruptor (References 3 and 4) and is not likely to be carcinogenic to humans (Reference 1).

# CHRONIC HUMAN TOXICITY - Risk Assessment

| Subject and Scenario                         | Route          | Dose of Concern | Exposure         | Margin of Safety | Reference | Value Rating |
|--|----------------|-----------------|------------------|------------------|-----------|--------------|
| All populations                              | Drinking water | 0.4 mg/kg/day   | <0.008 mg/kg/day | At least 50      | 1         | Low          |
| Other long-term exposures were not evaluated |                |                 |                  |                  |           |              |
| Other long-term exposures were not evaluated |                |                 |                  |                  |           |              |
| Other long-term exposures were not evaluated |                |                 |                  |                  |           |              |

## Chronic Toxicity Risk Assessment Summary:

Risk of toxicity from potential long-term exposures was evaluated for treated food sources and contaminated drinking water. Risk from contaminated food sources is not included in Thurston County reviews (because no crop applications are expected from County or residential uses). Potential exposures from contaminated drinking water (surface water or groundwater) is less than 2% of the dose of concern and is rated low in hazard. No other long-term risk assessments were evaluated by the EPA.

## Metabolites and Degradation Products:

Three metabolite chemicals were identified for quinclorac; 3-chloro-8-quinoline carboxylic acid (BH 514-1), 2 hydroxy-3-chloro-8-quinoline carboxylic acid (BH 514 2-OH), and BH 514-HMe-ester (Reference 1).

## Comments:

Quinclorac is a mild eye irritant and is considered a skin sensitizer although not a skin irritant (Reference 1).

## References

- USEPA. Docket Number: EPA-HQ-EPA- OPP-2007-1135. Quinclorac Summary Document, Registration Review: Initial Docket. December 2007. Case # 7222
- USEPA. Office of Pesticides and Toxic Substances. Memorandum. From: William B. Greear (Health Effects Div.). To: Vickie Walters/ Robert J. Taylor (Registration Div.). Subject: PP#9F03775/FAP#9H05583 - Quinclorac. 9/31/1991.
- Illinois EPA. "Endocrine Disruptors Strategy". February, 1997.
- Scorecard - The Pollution Information Site. Health Effects (Accessed 12/27/2011) <http://www.scorecard.org/health-effects/>
- International Union of Pure & Applied Chemistry. Pesticide Properties Database. quinclorac (Ref: BAS 514H). Accessed 12/22/2011. <http://sitem.herts.ac.uk/aeru/iupac/>