Date: April 21, 2003
Calculator: Elisabeth Harrahy, Ph.D.

SECONDARY VALUES FOR CLOPYRALID (CAS No. 1702-17-6)

A search was conducted for information on the chemical properties and toxicity of clopyralid to human health and to fish and aquatic life using the following databases and search engines: ECOTOX (toxicity to fish and aquatic life), IRIS (Integrated Risk Information System; toxicity to human health), CHEMFATE (environmental fate), BIOLOG (microbial degradation/toxicity), DATALOG (environmental fate bibliography), HSDB (Hazardous Substances Data Bank), CCRIS (Chemical Carcinogenesis Research Info System), GENE-TOX (mutagenicity database), TOXLINE (toxicology bibliography), and Ingenta (journal article search engine; since 1988). This search yielded some information on clopyralid's properties (vapor pressure, log octanol/water partition coefficient, Henry's Law, and water solubility) and its toxicity.

Fish and Aquatic Life Secondary Values

To derive an acute toxicity criterion for aquatic life, acute toxicity test results are required for at least one species in each of eight different families. Specific requirements and the data available to meet these requirements are found in Table 1. Following a search for information on the toxicity of clopyralid to fish and other aquatic life, it was determined that data are available to meet four out of the eight requirements. Because data are available for a Daphnid species, it was possible to calculate a secondary acute value for clopyralid.

Secondary acute values were calculated for both cold water and warm water designated water bodies. If the secondary values are lower for warm water than for cold water, then the secondary values for cold water (complete database) will apply for the warm water. If the secondary values for warm water are higher than for cold water, then the secondary values for warm water will apply (and will offer some relief to warm water dischargers). (Clopyralid is not considered to be a bioaccumulative chemical of concern (BCC) by the U.S. EPA; therefore, it will not be necessary to automatically apply cold water criteria.)

Cold Water

To calculate a secondary acute value (SAV), the lowest genus mean acute value (GMAV) in the database is divided by the secondary acute factor (SAF; an adjustment factor corresponding to the number of satisfied requirements).

SAF for four out of eight requirements met = 7.0

Lowest GMAV = 103,000 µg/L (*Oncorhynchus mykiss*)

SAV = GMAV/SAF
= 103,000 µg/L / 7.0
= 14,714.28 µg/L

No chronic data are available for clopyralid which meet acceptability requirements. Therefore, a secondary chronic value (SCV) may be calculated using default ratios only.

SACR (secondary acute-chronic ratio) = Geometric mean of three species mean acute-chronic ratios (SMACRs).

SACR = geometric mean of 18, 18, and 18 = 18

SCV = SAV/SACR
= 14,714.28 µg/L /18
= 817.44 µg/L

So, for cold water, the secondary acute value is 14,714 µg/L and the secondary chronic value is 817 µg/L for clopyralid.

Warm Water Sportfish

The salmonid category of fish drops out of the database when calculating secondary values for warm water.

Lowest GMAV = 125,000 µg/L (*Lepomis macrochirus*)

SAV = GMAV/SAF
= 125,000 µg/L / 7.0
= 17,857.14 µg/L

SCV = SAV/SACR
= 17,857.14 µg/L /18
= 992.06 µg/L

So, for warm water, the secondary acute value is 17,857 µg/L and the secondary chronic value is 992 µg/L for clopyralid.

Warm Water Forage Fish, Limited Forage Fish, and Limited Aquatic Life

The most sensitive non-fish species is *Daphnia magna*, so for these designated uses the SAV and SCV are calculated as follows:

Lowest GMAV = 232,000 µg/L (*Daphnia magna*)

SAV = GMAV/SAF
= 232,000 µg/L / 7.0
= 33,143 µg/L

SCV = SAV/SACR
= 33,143 µg/L /18
= 1,841 µg/L

So, for warm water forage, limited forage, and limited aquatic life, the secondary acute value is 33,143 µg/L and the secondary chronic value is 1,841 µg/L for clopyralid.

Table 1. Requirements for calculation of an acute toxicity criterion for protection of aquatic life for **clopyralid (technical)**, and corresponding acute toxicity data.

Species Name	Common Name	Duration/ Endpoint	Value µg/L	Reference #[a]	Source
1. At least one salmonid fish in the family Salmonidae, in the class Osteichthyes.					
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**103,000**	**1**	**Dow AgroSci.**
2. At least one non-salmonid fish from another family in the class Osteichthyes, preferably a commercially or recreationally important warmwater species.					
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**125,000**	**1**	**Dow AgroSci.**
3. At least one planktonic crustacean (e.g., cladoceran, copepod).					
Daphnia magna	**water flea**	**48-h/LC50**	**232,000**	**1**	**Dow AgroSci.**
4. At least one benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish).					
5. At least one insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge).					
***Chironomus* sp.**	**midge**	**48-h/LC50**	**750,200**	**2**	**AQUIRE**
6. At least one fish or amphibian from a family in the phylum Chordata not already represented in one of the other subdivisions.					
7. At least one organism from a family in a phylum other than Arthropoda or Chordata (e.g., Rotifera, Annelida, Mollusca).					
8. At least one organism from a family in any order of insect or any other phylum not already represented in subdivisions 1 through 7.					

[1]Dow AgroSciences, LLC. July 1998. Clopyralid: A North American Technical Profile. Dow AgroSciences, LLC, 9330 Zionsville Road, Indianapolis, IN 46268.

[2]Vardia, H.K. and P.S. Rao. 1986. Pesticidal effects on chironomid larvae. Rev. Biol. (Lisb.) 13(1-4):113-115.

HUMAN HEALTH

To calculate a criteria or secondary value for the protection of human health, it is first necessary to determine if the substance has been shown to be carcinogenic (which will result in the calculation of a human cancer criteria or secondary value) or not (which will result in the calculation of a human threshold criteria or secondary value). Clopyralid is not currently listed in the IRIS database; however, in chronic studies conducted with rats and mice, no tumorigenic responses were observed. Therefore, a human threshold criteria or secondary value should be calculated (rather than a human cancer criteria or secondary value). However, no oral reference dose (RfD) is available; therefore, a human threshold secondary value may not be calculated for clopyralid at this time.