

**DERIVATION OF ACUTE AND CHRONIC TOXICITY CRITERIA
FOR CHLORPYRIFOS
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EPA SPECIES MEAN ACUTE VALUES

(values from 9/86 EPA AWQC document, EPA 440/5-80-005 and 3/95 GLI Criteria Update, EPA-820-B-95-004)

Pygmy backswimmer (*Neoplea striola*)

VALUE (ug/L)	METHOD	REFERENCE
1.22	S M	Siefert et al. 1984
1.56	S M	Siefert et al. 1984
SMAV = 1.38		(2 results)

Rainbow trout (*Onchorhynchus mykiss*)

VALUE (ug/L)	METHOD	REFERENCE
7.1	S U	Macek et al. 1969
8.0	FT M	Holcombe et al. 1982
9.0	FT M	Phipps & Holcombe 1980
SMAV = 8.485		(2 FT results)

Fathead minnow (*Pimephales promelas*)

VALUE (ug/L)	METHOD	REFERENCE
170	S U	Jarvinen & Tanner 1982
203	FT M	Holcombe et al. 1982
542	FT M	Phipps & Holcombe 1985
SMAV = 331.7		(2 FT results)

Bluegill (*Lepomis macrochirus*)

VALUE (ug/L)	METHOD	REFERENCE
2.4	S U	Johnson & Finley 1980
10	FT M	Phipps & Holcombe 1985
SMAV = 10		(1 FT result)

Species with single test results (in units of ug/L):

SPECIES	METHOD	RESULT	REFERENCE
Snail (<i>Aplexa hypnorum</i>)	FT M	> 806	Phipps & Holcombe 1985
Amphipod (<i>Gammarus fasciatus</i>)	S U	0.32	Sanders 1972
Amphipod (<i>Gammarus lacustris</i>)	S U	0.11	Sanders 1969
Amphipod (<i>Gammarus pseudolimnaeus</i>)	S U	0.18	Siefert et al. 1984
Crayfish (<i>Orconectes immunis</i>)	FT M	6	Phipps & Holcombe 1985
Stonefly (<i>Pteronarcella badia</i>)	S U	0.38	Sanders & Cope 1968
Stonefly (<i>Pteronarcys californica</i>)	S U	10	Sanders & Cope 1968
Stonefly (<i>Claassenia sabulosa</i>)	S U	0.57	Sanders & Cope 1968
Trichopteran (<i>Leptoceridae</i> sp.)	S M	0.77	Siefert et al. 1984
Cr. water beetle (<i>Peitodytes</i> sp.)	S U	0.80	Federle & Collins 1976
Cutthroat trout (<i>Salmo clarkii</i>)	S U	18	Johnson & Finley 1980
Lake trout (<i>Salvelinus namaycush</i>)	S U	98	Johnson & Finley 1980
Goldfish (<i>Carassius auratus</i>)	FT M	> 806	Phipps & Holcombe 1985

Channel catfish (<i>Ictalurus</i> sp.)	FT M	> 806	Phipps & Holcombe 1985
Cladoceran (<i>Ceriodaphnia dubia</i>)	S M	0.08	Bailey et al. 1997
Cladoceran (<i>Daphnia magna</i>)		0.25	

MINIMUM DATABASE REQUIREMENT EVALUATION

According to s. NR 105.05(1)(a), acute toxicity criteria can be calculated if data are available on one or more species of freshwater animal in at least 8 different families, provided that of the 8 species:

1. At least one is a salmonid fish in the family Salmonidae in the class Osteichthyes,
2. At least one is a non-salmonid fish from another family in the class Osteichthyes, preferably a commercially or recreationally important species,
3. At least one is a planktonic crustacean (e.g., cladoceran, copepod),
4. At least one is a benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish),
5. At least one is an insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge),
6. At least one is a fish or amphibian from a family in the phylum Chordata not already represented in one of the other subdivisions,
7. At least one is an organism from a family in a phylum other than Arthropoda or Chordata (e.g., Rotifera, Annelida, Mollusca), and
8. At least one is an organism from a family in any order of insect or any other phylum not already represented in subs. 1. to 7.

Using the above numbering scheme, the following species are represented in the minimum database requirements for criteria calculation. If any of the 8 categories are not represented in the database, a criterion cannot be calculated under ch. NR 105. Instead, a secondary value must be calculated.

1. Rainbow trout
2. Bluegill
3. Cladoceran (*D. magna*)
4. Amphipod (*G. fasciatus*)
5. Stonefly (*P. badia*)
6. Fathead minnow, family Cyprinidae
7. Crawling water beetle
8. Pygmy backswimmer

CONCLUSION: An acute toxicity criterion can be calculated for chlorpyrifos according to ch. NR 105.

<u>GENUS NAME (w/ component species)</u>	<u>GMAV (ug/L)</u>	<u>CLASSIFICATIONS *</u>			
		<u>CW</u>	<u>WW</u>	<u>LFF</u>	<u>LAL</u>
Aplexa	806	x	x	x	x
Carassius	806	x	x	x	
Ictalurus	806	x	x		
Pimephales	331.70	x	x	x	
Salvelinus	98	x			
Salmo	18	x			
Pteronarcys	10	x	x	x	x
Lepomis	10	x	x		
Onchorhynchus	8.49	x			
Orconectes	6	x	x	x	x
Neoplea	1.38	x	x	x	x
Peltodytes	0.80	x	x	x	x
Leptoceridae	0.77	x	x	x	x
Claassenia	0.57	x	x	x	x
Pteronarcella	0.38	x	x	x	x
Daphnia	0.25	x	x	x	x
Gammarus	0.19	x	x	x	x
G. lacustris	0.11				
G. pseudolimnaeus	0.18				
G. fasciatus	0.32				
Ceriodaphnia	0.08	x	x	x	x
TOTAL NUMBER OF GENERA REPRESENTED:		18	15	13	11

* - KEY TO CLASSIFICATIONS (an X is listed for species considered in each):

CW = Coldwater community, all genera are considered here.

WW = Warmwater sportfish community, only the coldwater fish are excluded from this database (also includes warmwater forage).

LFF = Limited forage fish community, all sport fish are excluded from this database.

LAL = Limited aquatic life, all fish are excluded from this database.

The four most sensitive genera in each classification are used to calculate the criteria under each classification, pursuant to s. NR 105.05 (2). From this point, the results of the calculation are shown using the variables listed in sub. (2).

CRITERION CALCULATION:

	CW	WW	LFF	LAL
GMAV RANKS				
4	0.38	0.38	0.38	0.38
3	0.25	0.25	0.25	0.25
2	0.185	0.185	0.185	0.185
1	0.08	0.08	0.08	0.08
N	18	15	13	11
In GMAV				
4	-0.967584			
3	-1.386294			
2	-1.687169			
1	-2.525729			
In GMAV^2				
4	0.9362188			
3	1.9218121			
2	2.8465399			
1	6.3793052			
P				
4	0.2105263			
3	0.1578947			
2	0.1052632			
1	0.0526316			
sq rt P				
4	0.4588315			
3	0.3973597			
2	0.3244428			
1	0.2294157			
EV	-6.566776			
EW	12.083876			
EP	0.5263158			
EPR	1.4100498			
J	0.05			
S	6.6743134			
L	-3.994473			
A	-2.502051			
FAV	0.0819168			
ATC	0.0409584			

CRITERIA:

	CW
calc. ATC	0.041

Since the most sensitive four genera in each classification are the same, the calculated criteria for WW, LFF, and LAL will be less than that for CW due to the smaller databases. Essentially, this means that there is no relief available for the criteria in these other classifications. It was deemed appropriate to set the criteria equal to those for the coldwater databases rather than having more restrictive criteria applied to these "subset" classifications.

**Acute toxicity criteria for chlorpyrifos:
ATC = 0.041 ug/L (all classifications)**

EPA SPECIES MEAN CHRONIC VALUES

Since no freshwater chronic data are available, a chronic criterion cannot be calculated.