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SECONDARY VALUES FOR TRIFLURALIN (CAS No. 1582-09-8)

A search was conducted for information on the chemical properties and toxicity of trifluralin 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), BIODEG (degradation), HSDB (Hazardous Substances Data Bank), CCRIS (Chemical Carcinogenesis Research Info System), ATSDR ToxFAQs (Agency for Toxic Substances and Disease Registry chemical fact sheets), and EXTOXNET (Extension Toxicology Network's pesticide information project). This search yielded some useful information on trifluralin's properties and toxicity.

Fish and Aquatic Life Secondary Values

To derive an acute toxicity criterion for fish and 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 trifluralin to fish and other aquatic life, it was determined that data are available to meet seven out of the eight requirements. Because data are available for a Daphnid species, it was possible to calculate a secondary acute value for trifluralin.

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 seven out of eight requirements met = 4.3
Lowest GMAV = 37 µg/L (*Palaemonetes kadiakensis*)

SAV = GMAV/SAF
= 37 µg/L / 4.3
= 8.60 µg/L

There are currently no chronic data available for trifluralin that meet acceptability requirements. Therefore, a secondary chronic value (SCV) may be calculated using default acute-chronic ratios only.

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

SMACR 1 = 18 (default)
SMACR 2 = 18 (default)

SMACR 3 = 18 (default)

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

SCV = SAV/SACR
= 8.60 µg/L / 18
= 0.48 µg/L

So for cold water-designated waters, the secondary acute value is 9 µg/L and the secondary chronic value is 0.5 µg/L for trifluralin.

<u>Warm Water Sportfish, Warm Water Forage Fish, Limited Forage Fish, and Limited Aquatic Life</u>

Because the lowest GMAV in the cold water database is for *Palaemonetes kadiakensis*, an invertebrate species that will not drop out of the database for any of the remaining water body use designations, secondary values calculated for cold water designated waters will apply for warm water sportfish, warm water forage fish, limited forage fish and limited aquatic life-designated waters as well.

Table 1. Requirements for calculation of an acute toxicity criterion for protection of aquatic life for trifluralin, 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**	**210**	**13**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**152**	**13**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**42**	**13**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**10**	**14**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**86**	**14**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**41**	**9**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**330**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**120**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**92**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**14**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**10**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**76**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**98**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**28**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**50**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**41**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**43**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**42**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**33**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**25**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**100**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**60**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**22**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**51**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**86**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**83**	**2**	**AQUIRE**

Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**140**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**170**	**2**	**AQUIRE**
Oncorhynchus mykiss	**rainbow trout**	**96-h/LC50**	**160**	**2**	**AQUIRE**
# *Oncorhynchus mykiss*	**rainbow trout**	**96-h/LC50**	**1,600**	**2**	**AQUIRE**

# - Result was excluded since it was so far above the remaining values.
SMAV = 59.44

2. At least one non-salmonid fish from another family in the class Osteichthyes, preferably a commercially or recreationally important warmwater species.

Ictalurus punctatus	**channel catfish**	**96-h/LC50**	**417**	**12**	**AQUIRE**
Ictalurus punctatus	**channel catfish**	**96-h/LC50**	**2,200**	**9**	**AQUIRE**
Ictalurus punctatus	**channel catfish**	**96-h/LC50**	**440**	**2**	**AQUIRE**
Ictalurus punctatus	**channel catfish**	**96-h/LC50**	**210**	**2**	**AQUIRE**
Ictalurus punctatus	**channel catfish**	**96-h/LC50**	**330**	**2**	**AQUIRE**
Ictalurus punctatus	**channel catfish**	**96-h/LC50**	**660**	**2**	**AQUIRE**

SMAV = 514.10

Lepomis macrochirus	**bluegill**	**96-h/LC50**	**190**	**13**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**120**	**13**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**47**	**13**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**18**	**14**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**68**	**14**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**58**	**9**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**18.5**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**280**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**210**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**135**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**47**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**8.4**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**60**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**58**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**400**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**240**	**2**	**AQUIRE**

Lepomis macrochirus	**bluegill**	**96-h/LC50**	**190**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**100**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**260**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**120**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**140**	**2**	**AQUIRE**
Lepomis macrochirus	**bluegill**	**96-h/LC50**	**70**	**2**	**AQUIRE**
SMAV = 89.43					
Micropterus salmoides	**largemouth bass**	**96-h/LC50**	**75**	**2**	**AQUIRE**
SMAV = 75					

3. At least one planktonic crustacean (e.g., cladoceran, copepod).

Daphnia magna	**water flea**	**48-h/LC50**	**193**	**6**	**AQUIRE**
Daphnia magna	**water flea**	**48-h/EC50**	**560**	**7**	**AQUIRE**
SMAV = 328.76					
Daphnia pulex	**water flea**	**48-h/EC50**	**240**	**8**	**AQUIRE**
Daphnia pulex	**water flea**	**48-h/EC50**	**625**	**9**	**AQUIRE**
SMAV = 387.30					

Genus Mean Acute Value (GMAV; *Daphnia* sp.) = 356.83

Simocephalus serrulatus	**water flea**	**48-h/EC50**	**450**	**8**	**AQUIRE**
Simocephalus serrulatus	**water flea**	**48-h/EC50**	**900**	**2**	**AQUIRE**
SMAV = 636.40					

4. At least one benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish).

Gammarus fasciatus	**scud**	**96-h/LC50**	**1,000**	**7**	**AQUIRE**
Gammarus fasciatus	**scud**	**96-h/LC50**	**2,200**	**9**	**AQUIRE**
SMAV = 1,483.24					
Gammarus lacustris	**scud**	**96-h/LC50**	**2,200**	**11**	**AQUIRE**
SMAV = 2,200					

GMAV (*Gammarus* sp.) = 1,806.41

Palaemonetes kadiakensis	**freshwater prawn**	**96-h/LC50**	**37**	**2**	**AQUIRE**
SMAV = 37					
Procambarus clarkii	**red swamp crayfish**	**96-h/LC50**	**12,000**	**10**	**AQUIRE**
Procambarus clarkii	**red swamp crayfish**	**96-h/LC50**	**13,000**	**16**	**AQUIRE**
Procambarus clarkii	**red swamp crayfish**	**96-h/LC50**	**26,000**	**16**	**AQUIRE**
SMAV = 15,947.75					

5. At least one insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge).

Chironomus thummi	**midge**	**48-h/EC50**	**1,000**	**3**	**AQUIRE**
SMAV = 1,000					
Pteronarcys californicus	**stonefly**	**96-h/EC50**	**3,000**	**14**	**AQUIRE**
Pteronarcys californicus	**stonefly**	**96-h/EC50**	**2,800**	**2**	**AQUIRE**
SMAV = 2,898.28					

6. At least one fish or amphibian from a family in the phylum Chordata not already represented in one of the other subdivisions.

Bufo woodhousei flowleri	**Fowler's toad**	**96-h/LC50**	**100**	**1**	**AQUIRE**
Bufo woodhousei flowleri	**Fowler's toad**	**96-h/LC50**	**115**	**2**	**AQUIRE**
Bufo woodhousei flowleri	**Fowler's toad**	**96-h/LC50**	**110**	**2**	**AQUIRE**
SMAV = 108.15					
Carassius auratus	**goldfish**	**96-h/LC50**	**145**	**2**	**AQUIRE**
SMAV = 145					
Cyprinus carpio	**common carp**	**96-h/LC50**	**660**	**4**	**AQUIRE**
Cyprinus carpio	**common carp**	**96-h/LC50**	**45**	**5**	**AQUIRE**
SMAV = 172.34					
Gambusia affinis	**Western mosquitofish**	**96-h/LC50**	**12,000**	**10**	**AQUIRE**
SMAV = 12,000					

Pimephales promelas	**fathead minnow**	**96-h/LC50**	**105**	**2**	**AQUIRE**
Pimephales promelas	**fathead minnow**	**96-h/LC50**	**160**	**2**	**AQUIRE**
Pimephales promelas	**fathead minnow**	**96-h/LC50**	**124**	**2**	**AQUIRE**

SMAV = 127.72

7. At least one organism from a family in a phylum other than Arthropoda or Chordata (e.g., Rotifera, Annelida, Mollusca).

Lumbriculus variegatus	**oligochaete worm**	**96-h/LC50**	**>300**	**15**	**AQUIRE**

SMAV = 300

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.

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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). The U.S. EPA has classified trifluralin as a Class C carcinogen (possible human carcinogen; U.S. EPA's IRIS database). Because an oral slope factor for carcinogenicity and a log octanol water partition coefficient are available, it is possible to calculate a secondary cancer value for trifluralin. However, because trifluralin is classified as a possible human carcinogen, rather than as a probable human carcinogen, human threshold secondary values will also be calculated.

HUMAN CANCER SECONDARY VALUES

There are several steps to calculating a secondary cancer value: 1) calculation of the risk associated dose (RAD); 2) calculation of the fraction of freely dissolved chemical; 3) calculation of the "baseline BAF"; 4) calculation of the "human health BAF"; and 5) calculation of the human cancer secondary value.

1) Calculation of the risk-associated dose (RAD)

$RAD = (1/q_1*)(0.00001)$

Where

RAD = risk-associated dose in milligrams toxicant per kilograms body weight per day (mg/Kg/d)

q_1* = upper 95% confidence limit (one-sided) of the carcinogenic potency factor in milligrams toxicant per kilograms body weight per day (mg/Kg/d) = oral cancer slope factor = 0.0077 mg/Kg/d for trifluralin (IRIS database, 2003).

RAD = (1/0.0077 mg/Kg/day) (0.00001)

= (129.8701) (0.00001)

= **0.001299 mg/Kg/d**

2) Calculation of the freely-dissolved fraction = f_{fd}

Given a standard dissolved organic carbon (DOC) concentration of 0.000002 Kg/L and a particulate organic carbon (POC) concentration of 0.00000004 Kg/L in water, the equation

$$f_{fd} = 1/\{1 + [(DOC)(K_{ow})/10] + [(POC)(K_{ow})]\}$$

can be reduced to:

$= 1/\{1 + [(0.00000024 \text{ Kg/L})(K_{ow})]\}$

A log K_{ow} of 5.34 (K_{ow} of 218,776.1624) has been published for trifluralin (National Institutes of Health, Hazardous Substance Database).

$f_{fd} = 1/\{1 + [(0.00000024 \text{ Kg/L})(218{,}776.1624)]\}$

$= 1/1.0525$

= 0.9501

3) Calculation of the baseline BAF

The baseline BAF is calculated according to the equations contained in 40 CFR part 132 (Final Water Quality Guidance for the Great Lakes System), Appendix B, using BAF data that was collected in one of four ways (listed in order of most preferred to least preferred):

a) a measured BAF from a field study
b) a predicted BAF based on field-measured BSAFs
c) a predicted BAF using a laboratory-measured bioconcentration factor (BCF) and a food chain multiplier (FCM)
d) a predicted BAF using a K_{ow} and a FCM

The baseline BAF was calculated using the K_{ow} and a food chain multiplier (method d above).

Given trifluralin's log K_{ow} of 5.34 (K_{ow} of 218,776.1624), the FCMs (taken from table B-1 in GLI) are 4.803 for trophic level 3 (warm waters) and 4.742 for trophic level 4 (cold waters).

a) Cold Water

Baseline BAF = (FCM)(Kow)

= (4.742)(218,776.1624)

= 1,037,436.5621

b) Warm Waters

Baseline BAF = (FCM)(Kow)

= (4.803)(218,776.1624)

= 1,050,781.9080

4) Calculation of the human health BAF

a) Cold Water

BAF^{HH}_{TL4} = {[(baseline BAF)(0.044)] + 1} (f_{fd})

where

BAF^{HH}_{TL4} = Human health BAF for trophic level 4 (cold water)

baseline BAF = the baseline BAF (for cold waters) calculated in 3)

0.044 = fraction lipid value for cold water fish and aquatic life communities

f_{fd} = fraction freely dissolved

BAF^{HH}_{TL4} = {[(**1,037,436.5621)**(0.044)] + 1} (0.9501)

= **43,370.3631**

b) Warm Waters

BAF^{HH}_{TL3} = {[(baseline BAF)(0.013)] + 1} (f_{fd})

where

BAF^{HH}_{TL3} = Human health BAF for trophic level 3 (warm waters)

baseline BAF = the baseline BAF (for warm waters) calculated in 3)

0.013 = fraction lipid value for warm water fish and aquatic life communities

f_{fd} = fraction freely dissolved

BAF^{HH}_{TL3} = {[(**1,050,781.9080**)(0.013)] + 1} (0.9501)

= **12,979.4727**

5) Calculation of the human cancer secondary value

Human Cancer Secondary Value = RAD x 70 kg/[W_H + (F_H)(BAF)]

Where

RAD = Risk associated dose in milligrams toxicant per kilograms body weight per day (mg/Kg/d) that is associated with a lifetime incremental cancer risk equal to one in 100,000, as derived in step 1).

70 Kg = average weight of an adult male in kilograms

W_H = average per capita daily water consumption (= 2 L/d for public water supplies, and 0.01 L/d for non-public water supplies)

F_H = average consumption of sport-caught fish in Wisconsin (= 0.02 Kg/d)

BAF = appropriate (cold or warm) human health BAF calculated in 4).

a) Public Water Supply/Cold Water

Human Cancer Secondary Value = RAD x 70/[W_H + (F_H)(BAF)]

= (0.001299)(70 Kg)/[**2** L/d + (0.02 Kg/d)(43,370.3631 L/Kg)]

= 0.000105 mg/L

= 0.105 µg/L

b) Public Water Supply/Warm Water Sportfish

Human Cancer Secondary Value = RAD x 70/[W_H + (F_H)(BAF)]

= (0.001299)(70)/[**2** L/d + (0.02 Kg/d)(12,979.4727 L/Kg)]

= 0.000347 mg/L

= 0.347 µg/L

c) Non-Public Water Supply/Cold Water

Human Cancer Secondary Value = RAD x 70/[W_H + (F_H)(BAF)]

= (0.001299)(70)/[**0.01** L/d + (0.02 Kg/d)(43,370.3631 L/Kg)]

= 0.000105 mg/L

= 0.105 µg/L

d) Non-Public Water Supply/Warm Waters (Warm Water Sportfish, Warm Water Forage Fish, and Limited Forage Fish designated waters)

Human Cancer Secondary Value = RAD x 70/[W_H + (F_H)(BAF)]

= (0.001299)(70)/[**0.01** L/d + (0.02 Kg/d)(12,979.4727 L/Kg)]

= 0.000350 mg/L

= 0.350 µg/L

e) Non-Public Water Supply/Limited Aquatic Life

Note: The Limited Aquatic Life classification applies to water bodies with no (or very few) fish present. Therefore, calculation of a human health cancer value for water bodies with this classification does not include a human health BAF since it is assumed that humans will not be exposed to trifluralin through consumption of fish in these areas.

Human Cancer Secondary Value = RAD x 70/[W_H + (F_H)(BAF)]

= (0.001299)(70 Kg)/[**0.01** L/d + (0)]

= 9.0930 mg/L

= 9,093 µg/L

HUMAN THRESHOLD SECONDARY VALUES

There are several steps to calculating a human threshold secondary value: 1) calculation of the fraction of freely dissolved chemical; 2) calculation of the "baseline BAF"; 3) calculation of the "human health BAF"; and 4) calculation of the human threshold secondary value. The fraction of freely dissolved chemical, baseline BAFs, and human health BAFs remain the same as calculated in deriving the human cancer secondary values above.

1) Freely-dissolved fraction = f_{fd} = 0.9501

2) Baseline BAFs

a) Cold Water = **1,037,436.5621**
b) Warm Waters **= 1,050,781.9080**

3) Human health BAFs

a) Cold Water = **43,370.3631**
b) Warm Waters = **12,979.4727**

4) Human Threshold Secondary Values

Human Threshold Secondary Value = [(ADE)(70 Kg)(RSC)]/[W_H + (F_H)(BAF)]

where

ADE = acceptable daily exposure (= oral reference dose, or RfD; = 0.0075 mg/Kg/day for trifluralin (IRIS 2003))

70 Kg = average weight of an adult

RSC = relative source contribution to account for other routes of exposure (= 0.8 in the absence of other data)

W_H = average per capita daily water consumption (= 2 L/d for public water supplies, and 0.01 L/d for non-public water supplies)

F_H = average consumption of sport-caught fish in Wisconsin (= 0.02 Kg/d)

BAF = appropriate (cold or warm) human health BAF calculated in 3).

a) Public Water Supply/Cold Water

Human Threshold Secondary Value = [(ADE)(70 Kg)(RSC)]/[W_H + (F_H)(BAF)]

= [(0.0075 mg/Kg/d)(70 Kg)(0.8)]/[**2** L/d + (0.02 Kg/d)(43,370.3631 L/Kg)]

= 0.000483 mg/L

= 0.483 µg/L

b) Public Water Supply/Warm Water Sportfish

Human Threshold Secondary Value = [(ADE)(70 Kg)(RSC)]/[W_H + (F_H)(BAF)]

= [(0.0075 mg/Kg/d)(70 Kg)(0.8)]/[**2** L/d + (0.02 Kg/d)(12,979.4727 L/Kg)]

= 0.001606 mg/L

= 1.61 µg/L

c) Non-Public Water Supply/Cold Water

Human Threshold Secondary Value = [(ADE)(70 Kg)(RSC)]/[W_H + (F_H)(BAF)]

= [(0.0075 mg/Kg/d)(70 Kg)(0.8)]/[**0.01** L/d + (0.02 Kg/d)(43,370.3631 L/Kg)]

= 0.000484 mg/L

= 0.484 µg/L

d) Non-Public Water Supply/Warm Waters (Warm Water Sportfish, Warm Water Forage Fish, and Limited Forage Fish designated waters)

Human Threshold Secondary Value = [(ADE)(70 Kg)(RSC)]/[W_H + (F_H)(BAF)]

= [(0.0075 mg/Kg/d)(70 Kg)(0.8)]/[**0.01** L/d + (0.02 Kg/d)(12,979.4727 L/Kg)]

= 0.001618 mg/L

= 1.62 µg/L

e) Non-Public Water Supply/Limited Aquatic Life

Note: The Limited Aquatic Life classification applies to water bodies with no (or very few) fish present. Therefore, calculation of a human health threshold value for water bodies with this classification does not include a human health BAF since it is assumed that humans will not be exposed to trifluralin through consumption of fish in these areas.

Human Threshold Secondary Value = [(ADE)(70 Kg)(RSC)]/[W_H + (F_H)(BAF)]

= [(0.0075 mg/Kg/d)(70 Kg)(0.8)]/[**0.01** L/d + (0)]

= 42 mg/L

= 42,000 µg/L

Chemical	CAS #	Category	Type of Secondary Value	Water Body Classification	Value (µg/L)
Trifluralin	1582-09-8	Fish and Aquatic	Acute	Cold/WWSF/WWFF/ LFF/LAL	9
Trifluralin	1582-09-8	Fish and Aquatic	Chronic	Cold/WWSF/WWFF/ LFF/LAL	0.5
Trifluralin	1582-09-8	Human Health	Human Cancer	Public Water Supply/Cold	0.105
Trifluralin	1582-09-8	Human Health	Human Cancer	Public Water Supply/WWSF	0.347
Trifluralin	1582-09-8	Human Health	Human Cancer	Non-Public Water Supply/Cold	0.105
Trifluralin	1582-09-8	Human Health	Human Cancer	Non-Public Water Supply/WWSF, WWFF, LFF	0.350
Trifluralin	1582-09-8	Human Health	Human Cancer	Non-Public Water Supply/LAL	9,093
Trifluralin	1582-09-8	Human Health	Human Threshold	Public Water Supply/Cold	0.483
Trifluralin	1582-09-8	Human Health	Human Threshold	Public Water Supply/WWSF	1.61
Trifluralin	1582-09-8	Human Health	Human Threshold	Non-Public Water Supply/Cold	0.484
Trifluralin	1582-09-8	Human Health	Human Threshold	Non-Public Water Supply/WWSF, WWFF, LFF	1.62
Trifluralin	1582-09-8	Human Health	Human Threshold	Non-Public Water Supply/LAL	42,000

Note: Both human cancer and human threshold secondary values were calculated because trifluralin has been classified as a possible human carcinogen (Class C substance).

Cold = cold water designated water bodies
WWSF = warm water sportfish designated water bodies

WWFF = warm water forage fish designated water bodies
LFF = limited forage fish designated water bodies
LAL = limited aquatic life designated water bodies (includes wetlands)