



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Office of Water Management

Triennial Review of Water Quality Standards (TR #10)

Draft Proposed Rulemaking

Agricultural Advisory Board
December 8, 2022

Tom Wolf, Governor

Ramez Ziadeh, P.E., Acting Secretary

Water Quality Standards

Water Quality Standards

- Implement Sections 5 and 402 of The Clean Streams Law and Section 303 of the Federal Clean Water Act.
 - Protected water uses, water quality criteria and an antidegradation policy.
 - 25 Pa. Code Chapter 93
 - 25 Pa. Code Chapter 16

Triennial Review of WQS

Triennial Review

- Required by Section 303(c)(1) of the Federal Clean Water Act.
- Completed at least once every 3 years.
- Department's 10th triennial review (TR #10).

TR#10 Draft Proposed Rulemaking

Proposed Updates and Corrections

- 17 new or updated WQ Criteria
 - 14 Human Health (HH)
 - 3 Aquatic Life (AL)
- Exceptions for fishable/swimmable uses
 - Sections of the Lower Delaware River Basin and the Erie Harbor
- Minor edits/clarifications to Chapters 93 and 16

Human Health Criteria

Human Health Water Quality Criteria

- Established to protect human health from toxic substances.
- 304(a) criteria recommendations.
- *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (EPA 2000).
- Chapters 93 and 16

Human Health Criteria

$$AWQC = RfD * RSC \left(\frac{BW}{DWI + (FI * BAF)} \right)$$

AWQC = ambient water quality criteria

RfD = published reference dose

RSC = relative source contribution, default = 0.2

BW = body weight, default = 80 kg

DWI = drinking water intake, default = 2.4L

FI = fish intake, default = 0.022 kg/day

BAF = bioaccumulation factor, default = 1

Human Health Criteria

$$AWQC = RSD \left(\frac{BW}{DWI + (FI * BAF)} \right)$$

AWQC = ambient water quality criteria

RSD = risk specific dose

RSC = relative source contribution, default = 0.2

BW = body weight, default = 80 kg

DWI = drinking water intake, default = 2.4L

FI = fish intake, default = 0.022 kg/day

BAF = bioaccumulation factor, default = 1

Human Health Criteria

- **Department-derived HH criteria**
 - Recalculated based on new exposure inputs
 - 7 criteria more stringent; 4 criteria less stringent
 - 1,4 – Dioxane (carcinogen)
- **EPA 304(a) Recommendations**
 - 2,4-D (chlorophenoxy herbicide)
 - Chloroform

Human Health Criteria

Pollutant	DEP Current ($\mu\text{g/L}$)	DEP Recommended ($\mu\text{g/L}$)
Barium	2400	1000
Boron	3100	1000
Methyl ethyl ketone	21000	4000
1,2,3-trichloropropane	210	30
1,2,4-trimethylbenzene	72	10
1,3,5-trimethylbenzene	72	10
Xylene	70000	1000
Acetone	3500	6000
Formaldehyde	700	1000
Metolachlor	69	700
Resorcinol	2700	3000

Human Health Criteria

1,4-dioxane

- Previously evaluated in TR#8 (2013)
- Additional data collection and evaluation.
- Identified by EPA as a likely human carcinogen.

Human Health Criteria

$$AWQC_{1,4\text{-dioxane}} = RSD \left(\frac{BW}{DWI + (FI * BAF)} \right)$$

$$= 0.00001 \times (80 \div [2.4 + (0.022 \text{ kg/day} \times 1)])$$

$$= 0.0003 \text{ mg/L} \text{ (} 0.3 \text{ } \mu\text{g /L)}$$

where:

- RSD = 0.00001 mg/kg-day
- Body Weight (BW) = 80 kg
- Drinking Water Intake (DWI) = 2.4 L
- Fish Intake (FI) = 0.022 kg/day
- Bioaccumulation factor (BAF) = 1

Human Health Criteria

**TABLE 5
WATER QUALITY CRITERIA FOR TOXIC SUBSTANCES**

PP NO	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human Health Criteria (µg/L)	Foot Notes
			Criteria Continuous Concentrations (µg/L)	Criteria Maximum Concentration (µg/L)		
* * * * *						
D	CYCLOHEXYLAMINE	108918	N/A	N/A	1000	[H]2
E	DIAZINON	333415	0.17	0.17	N/A	-
D	1,4-DIOXANE	123911	N/A	N/A	0.3	1
D	FORMALDEHYDE	50000	440	2200	[700] <u>1000</u>	[H]2
D	2-HEXANONE	591786	4300	21000	N/A	-
* * * * *						

Human Health Criteria

- 2,4-D (chlorophenoxy herbicide)
 - 1,400 $\mu\text{g}/\text{L}$ adopted in TR#9 (2020)
 - EPA disapproved; not consistent with EPA recommendation of 1,300 $\mu\text{g}/\text{L}$.
 - Proposed criterion is 1,300 $\mu\text{g}/\text{L}$
- Chloroform
 - Removed from TR#9 by Department.
 - Proposed criterion is 60 $\mu\text{g}/\text{L}$; consistent with EPA recommendation.

Human Health Criteria

**TABLE 5
WATER QUALITY CRITERIA FOR TOXIC SUBSTANCES**

PP NO	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human	-
			Criteria Continuous Concentrations (µg/L)	Criteria Maximum Concentration (µg/L)	Health Criteria (µg/L)	<u>Foot</u> <u>Notes</u>
						-
			* * * * *			
10V	2-CHLOROETHYL VINYL ETHER	110758	3500	18000	N/A	-
11V	CHLOROFORM	67663	390	1900	[5.7] 60	[H]2
12V	DICHLOROBROMO- METHANE	75274	N/A	N/A	0.95	[CRL]1
			* * * * *			
6P	CHLORDANE	57749	0.0043	2.4	0.0003	[CRL]1
E	CHLOROPHENOXY HERBICIDE (2,4-D)	94757	N/A	N/A	[1400] 1300	[H]2
E	CHLOROPHENOXY HERBICIDE (2,4,5-TP)	93721	N/A	N/A	100	[H]2
			* * * * *			

Aquatic Life Criteria

Aquatic Life Water Quality Criteria

- Established to protect aquatic life from toxic substances.
- 304(a) criteria recommendations.
- *Guidelines for Deriving Numeric National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (EPA, 1985).
- Chapters 93 and 16

Aquatic Life Criteria

Aquatic Life Water Quality Criteria

- Components
 - Magnitudes
 - Criteria Maximum Concentration (CMC) – Acute
 - Criteria Continuous Concentration (CCC) – Chronic
 - Duration (1-hr. and 4-day avg.)
 - Frequency (once every 3 years)
- Data requirements

Aquatic Life Criteria

EPA 304(a) Recommendations

- Cadmium (updated)
- Carbaryl (new)
- Tributyltin (TBT) (new)

Aquatic Life Criteria

Cadmium Criteria

- Magnitude

- $CMC = \{1.136672 - [(\ln[H]) \times (0.041838)]\} \times \text{Exp}(0.9789 \times \ln[H] - 3.866)$
- $CCC = \{1.101672 - [(\ln[H]) \times (0.041838)]\} \times \text{Exp}(0.7977 \times \ln[H] - 3.909)$

- Duration

- CMC = 1-hour average
- CCC = 4-day average

- Frequency

- Not to be exceeded more than once every three years.

Aquatic Life Criteria

**TABLE 5
WATER QUALITY CRITERIA FOR TOXIC SUBSTANCES**

PP NO	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human	<u>Foot</u> <u>Notes</u>
			Criteria Continuous Concentrations (µg/L)	Criteria Maximum Concentration (µg/L)	Health Criteria (µg/L)	
1M	ANTIMONY	7440360	220	1100	5.6 [†]	[H]2,5
2M	ARSENIC	7440382	150 (As3+)	340 (As3+)	10	[H]2
3M	BERYLLIUM	7440417	N/A	N/A	N/A	-
4M	CADMIUM	7440439	*{1.101672- (ln[H]x0.041838)}x	*{1.136672-(ln[H]x0.041838)} x	N/A	-
			[Exp(0.7409xln[H]-4.719)] Exp(0.7977 x ln([H]) - 3.909)	[Exp(1.0166xln[H]-3.924)] Exp(0.9789 x ln([H]) - 3.866)		
			(ex: @H=100, CCC=[0.25]0.72)	(ex: @H=100, CMC=[2.0]1.8)		
			(ex: @ H=50, CCC= 0.43)	(ex: @ H=50, CMC= 0.94)		
			(ex: @ H=25, CCC= 0.25)	(ex: @ H=25, CMC= 0.49)		
5M	CHROMIUM III	16065831	*0.860xExp(0.819xln[H]+0.6 848)	*0.316xExp(0.819xln[H]+3.72 56)	N/A	-

Aquatic Life Criteria

Carbaryl Criteria

- Magnitude
 - CMC = 2.1 $\mu\text{g/L}$
 - CCC = 2.1 $\mu\text{g/L}$
- Duration
 - CMC = 1-hour average
 - CCC = 4-day average
- Frequency
 - Not to be exceeded more than once every three years.

Aquatic Life Criteria

TBT Criteria

- Magnitude
 - CMC = 0.46 $\mu\text{g/L}$
 - CCC = 0.072 $\mu\text{g/L}$
- Duration
 - CMC = 1-hour average
 - CCC = 4-day average
- Frequency
 - Not to be exceeded more than once every three years.

Aquatic Life Criteria

**TABLE 5
WATER QUALITY CRITERIA FOR TOXIC SUBSTANCES**

PP NO	Chemical Name	CAS Number	Fish and Aquatic Life Criteria		Human	<u>Foot</u> <u>Notes</u>
			Criteria Continuous Concentrations (µg/L)	Criteria Maximum Concentration (µg/L)	Health Criteria (µg/L)	
* * * * *						
5P E	delta-BHC CARBARYL	319868 63252	N/A 2.1	N/A 2.1	N/A N/A	- -
6P	CHLORDANE	57749	0.0043	2.4	0.0003	[CRL]1
* * * * *						
PP E	2,3,7,8-TCDD TRIBUTYLTIN	1746016 -	N/A 0.072	N/A 0.46	5.0 E-9 [+] N/A	[CRL]1,5 -
D	ACETONE	67641	86000	450000	[3500] 6000	[H]2

Non-Fishable/Non-Swimmable Waters

Need to reaffirm existing exclusions of the “fishable/swimmable” uses are still applicable

- Harbor Area and central channel to Outer Erie Harbor/ Presque Isle Bay (§ 93.9x)
- Zones 3 & 4 within a portion of the Delaware Estuary (§§ 93.9e & 93.9g)

Minor Edits/Clarifications to Chapter 93

- Deletion of reference to Appendix A, Table 1A from § 93.1. Definitions.
- Addition of language to §§ 93.7, 93.8c, 93.8e, and 93.9 that clarifies the duration of the aquatic life criteria contained within those sections.
- Updates to the notes for Tables 5 and 6, including:
 - Replacement “H”, “CRL”, “*”, and “†” with numerals
 - Addition of a new note for specific criteria durations.

Minor Edits/Clarifications to Chapter 93

§ 93.7. Specific water quality criteria.

(a) Table 3 displays specific water quality criteria and associated critical uses. The criteria associated with the Statewide water uses listed in § 93.4, Table 2 apply to all surface waters, unless a specific exception is indicated in §§ 93.9a— 93.9z. These exceptions will be indicated on a stream-by-stream or segment-by-segment basis by the words “Add” or “Delete” followed by the appropriate symbols described elsewhere in this chapter. Other specific water quality criteria apply to surface waters as specified in §§ 93.9a—93.9z. All applicable criteria shall be applied in accordance with this chapter, Chapter 96 (relating to water quality standards implementation) and other applicable State and Federal laws and regulations. **Unless otherwise specified in Table 3, the duration of aquatic life criteria with “minimum” or “maximum” values is a one-hour average. The duration of pH is a one-hour average.**

Minor Edits/Clarifications to Chapter 93

§ 93.8c. Human health and aquatic life criteria for toxic substances.

- (c) Unless a different duration is indicated by the Notes in Table 5, the aquatic life criteria in Table 5 have the following duration periods:
- (1) One-hour average for criteria maximum concentrations
 - (2) Four-day average for criteria continuous concentrations

§ 93.8e. Special Criteria for the Great Lakes System.

- (c) Unless a different duration is indicated by the Notes in Table 6, the aquatic life criteria in Table 6 have the following duration periods:
- (1) One-hour average for criteria maximum concentrations
 - (2) Four-day average for criteria continuous concentrations

Minor Edits/Clarifications to Chapter 93

§ 93.9. Designated water uses and water quality criteria.

(a) The tables in §§ 93.9a—93.9z display designated water uses and water quality criteria in addition to the water uses and criteria specified in Tables 2 and 3. Designated uses shall be protected in accordance with Chapters 95 and 96 (relating to wastewater treatment requirements; and water quality standards implementation) and any other applicable State and Federal laws and regulations. The tables also indicate specific exceptions to Tables 2 and 3 on a stream-by-stream or segment-by-segment basis by the words “add” or “delete” followed by the appropriate symbols described elsewhere in this chapter. **A one-hour average duration period applies to the Tur₁ and Tur₂ criteria in Drainage List E; the D.O. criterion in Drainage List O (Yellow Breeches); and the pH criterion in Drainage List X.** The county column in §§ 93.9a—93.9z indicates the county in which the mouth of the stream or the downstream limit of the zone described for that entry is located. Abbreviations used in the Stream and the “Zone” columns are as follows:

▶ Minor Edits/Clarifications to Chapter 16

- Update § 16.32(d)(1), so that DEP may include other EPA-approved data sources rather than being limited to IRIS to obtain risk assessment values
- Update § 16.41, delete reference to Appendix A, Table 1A



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