3745-1-32 **Ohio river standards.**

[Comment: For dates of non-regulatory government publications, publications of recognized organizations and associations, federal rules and federal statutory provisions referenced in this rule, see rule 3745-1-03 of the Administrative Code.]

The Ohio river is designated warmwater habitat, public water supply, agricultural water supply, industrial water supply and bathing waters, and will meet the criteria set forth in, or derived in accordance with, rules 3745-1-01 to 3745-1-07 of the Administrative Code and rules 3745-1-35 to 3745-1-43 of the Administrative Code. However, criteria set forth in this rule supercede the criteria for those designations where applicable.

(A) Water quality criteria for the protection of aquatic life.

Table 32-1. Ohio river water quality criteria for the protection of aquatic life.

Chemical	Form[1]	Units[2]	IMZM[3]	OMZM[3]	OMZA[3]
Ammonia	T	mg/l	--	Table 42-2[c]	Table 42-2[a,c]
Cadmium	TR	ug/l	Table 32-2	Table 32-2	Table 32-2
Cyanide	free	ug/l	44	22	5.2
Dissolved oxygen[4]	T	mg/l	--	4.0[b]	5.0
Lead	TR	ug/l	Table 32-2	Table 32-2	Table 32-2
Selenium	TR	ug/l	--	20	5.0
Temperature	--	--	--	Table 32-3	Table 32-3

[1] T = total; TR = total recoverable.

[2] mg/l = milligrams per liter (parts per million); ug/l = micrograms per liter (parts per billion).

[3] IMZM = inside mixing zone maximum; OMZM = outside mixing zone maximum; OMZA = outside mixing zone average.

[4] For dissolved oxygen, OMZM means outside mixing zone minimum at any time and OMZA means outside mixing zone minimum daily average.

[a] In addition, the four-day average within the thirty-day period shall not exceed 2.5 times the OMZA.

[b] During the April fifteen to June fifteen spawning season, a minimum

concentration of 5.0 mg/l shall be maintained at all times.

[c] Table 42-2 can be found in rule 3745-1-42 of the Administrative Code.

Table 32-2. Water quality criteria for the protection of aquatic life for water hardness dependent criteria.

A. The equations in this table can be used to calculate numeric criteria at any water hardness up to 400 mg/l $CaCO_3$. The criteria at a water hardness of 400 mg/l $CaCO_3$ are used for water hardnesses above 400 mg/l $CaCO_3$. "e" = the base e exponential function. "ln H" = the natural logarithm of the water hardness. Criteria at example values of water hardness are in table 32-2B of this rule.

Table 32-2A.

Chemical	Total Recoverable Criteria (ug/l[2])	Dissolved Criteria (ug/l[2])	Conservation Factor (CF)
Cadmium			
--IMZM[1]	$e^{(0.8368[\ln H] - 2.867)}$ / CF	$e^{(0.8368[\ln H] - 2.867)}$	1.136672 - [(ln H) x 0.041838]
--OMZM[1]	$e^{(0.8368[\ln H] - 3.560)}$ / CF	$e^{(0.8368[\ln H] - 3.560)}$	1.136672 - [(ln H) x 0.041838]
--OMZA[1]	$e^{(0.7409[\ln H] - 4.719)}$	$e^{(0.7409[\ln H] - 4.719)}$ x CF	1.101672 - [(ln H) x 0.041838]
Lead			
--IMZM[1]	$e^{(1.273[\ln H] - 0.7669)}$	$e^{(1.273[\ln H] - 0.7669)}$ x CF	1.46203 - [(ln H) x 0.145712]
--OMZM[1]	$e^{(1.273[\ln H] - 1.460)}$	$e^{(1.273[\ln H] - 1.460)}$ x CF	1.46203 - [(ln H) x 0.145712]
--OMZA[1]	$e^{(1.273[\ln H] - 4.705)}$	$e^{(1.273[\ln H] - 4.705)}$ x CF	1.46203 - [(ln H) x 0.145712]

[1] IMZM = inside mixing zone maximum; OMZM = outside mixing zone maximum; OMZA = outside mixing zone average.

[2] ug/l = micrograms per liter (parts per billion).

B. Water quality criteria for the protection of aquatic life for water hardness dependent criteria.

Table 32-2B.

Chemical	Form[1]	Units[2]	Criteria			
			100	200	300	400
Cadmium						
--IMZM[3]	D[4]	ug/l	2.7	4.8	6.7	8.6
--OMZM[3]	D[4]	ug/l	1.3	2.4	3.4	4.3
--OMZA[3]	D[4]	ug/l	0.25	0.40	0.53	0.64
Cadmium						
--IMZM[3]	TR[5]	ug/l	2.8	5.2	7.5	9.7
--OMZM[3]	TR[5]	ug/l	1.4	2.6	3.7	4.8
--OMZA[3]	TR[5]	ug/l	0.27	0.45	0.61	0.76
Lead						
--IMZM[3]	D[4]	ug/l	130	270	420	560
--OMZM[3]	D[4]	ug/l	65	140	210	280
--OMZA[3]	D[4]	ug/l	2.5	5.3	8.1	11
Lead						
--IMZM[3]	TR[5]	ug/l	160	390	660	950
--OMZM[3]	TR[5]	ug/l	82	200	330	480
--OMZA[3]	TR[5]	ug/l	3.2	7.7	13	19

[1] D = dissolved; TR = total recoverable.

[2] ug/l = micrograms per liter (parts per billion).

[3] IMZM = inside mixing zone maximum; OMZM = outside mixing zone maximum; OMZA = outside mixing zone average.

[4] These criteria are implemented by multiplying them by a translator approved by the director pursuant to rule 3745-2-04 of the Administrative Code.

[5] These criteria apply in the absence of a translator approved by the director pursuant to rule 3745-2-04 of the Administrative Code.

Table 32-3. Ohio river temperature criteria.

Month/date	Period average		Instantaneous maximum	
	°F	°C	°F	°C
January 1-31	45	7.2	50	10.0
February 1-29	45	7.2	50	10.0
March 1-15	51	10.6	56	13.3
March 16-31	54	12.2	59	15.0
April 1-15	58	14.4	64	17.8
April 16-30	64	17.8	69	20.6
May 1-15	68	20.0	73	22.8
May 16-31	75	23.9	80	26.7
June 1-15	80	26.7	85	29.4
June 16-30	83	28.3	87	30.6
July 1-31	84	28.9	89	31.7
August 1-31	84	28.9	89	31.7
September 1-15	84	28.9	87	30.6
September 16-30	82	27.8	86	30.0
October 1-15	77	25.0	82	27.8
October 16-31	72	22.2	77	25.0
November 1-30	67	19.4	72	22.2
December 1-31	52	11.1	57	13.9

(B) Water quality criteria for the protection of human health. These criteria apply everywhere in the Ohio river outside mixing zones, unless specified otherwise.

(1) Bacteria. For the protection of the public water supply use, at no time shall fecal coliform bacteria content exceed two thousand per one hundred milliliters as a monthly geometric mean based on not less than five samples per month year round.

(2) Total ammonia-nitrogen. Total ammonia-nitrogen shall not exceed one milligram per liter at any surface water intake for a public water system.

(3) Radionuclides. Gross total alpha activity (including radium-226, but excluding radon and uranium) shall not exceed fifteen picocuries per liter (pCi/l) and combined radium-226 and radium-228 shall not exceed four pCi/l. Concentration of total gross beta particle activity shall not exceed fifty pCi/l. Concentration of total gross beta particle activity shall not exceed fifty pCi/l; the concentration of total strontium-90 shall not exceed eight pCi/l.

(4) Total dissolved solids. Total dissolved solids shall not exceed five hundred milligrams per liter at river flows equal to or greater than the minimum seven day, ten year flow at drinking water intakes.

(5) In addition to the criteria in table 32-4 of this rule, the water quality criteria identified in table 40-2 of rule 3745-1-40 of the Administrative Code apply everywhere in the Ohio river outside mixing zones, except that the ambient water quality criteria based on maximum contaminant levels (MCLs) identified in table 40-1 of rule 3745-1-40 of the Administrative Code apply outside mixing zones only within five hundred yards of surface water intakes for public water systems.

Table 32-4. Ohio river water quality criteria for the protection of human health.

Chemical	Form[1]	Units[2]	OMZA[3]
Acenaphthene	T	ug/l	670
Acrolein	T	ug/l	190
Acrylonitrile[5]	T	ug/l	0.51
Aldrin[5]	T	ug/l	0.00049
Anthracene	T	ug/l	8,300
Antimony	TR	ug/l	5.6
Arsenic	T	ug/l	10

Asbestos	T	MF/l	7.0
Barium	T	ug/l	1,000
Benzene[5]	T	ug/l	12
Benzidine[5]	T	ug/l	0.00086
Benzo(a)anthracene[5]	T	ug/l	0.038
Benzo(a)pyrene[5]	T	ug/l	0.038
Benzo(b)fluoranthene[5]	T	ug/l	0.038
Benzo(k)fluoranthene[5]	T	ug/l	0.038
Beryllium	TR	ug/l	16
Bromoform[5]	T	ug/l	43
Butylbenzyl phthalate	T	ug/l	1,500
Carbon tetrachloride[5]	T	ug/l	2.3
Chlordane[5]	T	ug/l	0.008
Chlorides	T	ug/l	250,000
Chlorobenzene	T	ug/l	130
Chlorodibromomethane[5]	T	ug/l	4.0
bis(2-Chloroethyl)ether[5]	T	ug/l	0.30
2-Chloronaphthalene	T	ug/l	1,000
2-Chlorophenol	T	ug/l	81
Chrysene[5]	T	ug/l	0.038
Copper	TR	ug/l	1,300
Cyanide	Free	ug/l	140
2,4-D (Dichlorophenoxyacetic acid)	T	ug/l	100
4,4'-DDD[5]	T	ug/l	0.0031
4,4'-DDE[5]	T	ug/l	0.0022

4,4-DDT[5]	T	ug/l	0.0022
Dibenzo(a,h)anthracene[5]	T	ug/l	0.038
Di-n-butyl phthalate	T	ug/l	2,000
1,2-Dichlorobenzene	T	ug/l	420
1,3-Dichlorobenzene	T	ug/l	320
1,4-Dichlorobenzene	T	ug/l	63
3,3'-Dichlorobenzidine[5]	T	ug/l	0.21
Dichlorobromomethane[5]	T	ug/l	5.5
trans-1,2-Dichloroethylene	T	ug/l	140
2,4-Dichlorophenol	T	ug/l	77
1,2-Dichloropropane[5]	T	ug/l	5.0
1,3-Dichloropropene	T	ug/l	3.4
Dieldrin[5]	T	ug/l	0.00052
Diethyl phthalate	T	ug/l	17,000
2,4-Dimethylphenol	T	ug/l	380
Dimethyl phthalate	T	ug/l	270,000
Dinitrophenols[4]	T	ug/l	69
2,4-Dinitrotoluene	T	ug/l	1.1
1,2-Diphenylhydrazine	T	ug/l	0.36
alpha-Endosulfan[6]	T	ug/l	62
beta-Endosulfan[6]	T	ug/l	62
Endosulfan sulfate[6]	T	ug/l	62
Endrin[7]	T	ug/l	0.059
Endrin aldehyde[7]	T	ug/l	0.29
Ethylbenzene	T	ug/l	530

bis(2-Ethylhexyl)phthalate[5]	T	ug/l	12
Fluoranthene	T	ug/l	130
Fluorene	T	ug/l	1,100
Fluoride	T	ug/l	1,000
Heptachlor[5]	T	ug/l	0.00079
Heptachlor epoxide[5]	T	ug/l	0.00039
Hexachlorobenzene[5]	T	ug/l	0.0028
alpha-Hexachlorocyclohexane[5]	T	ug/l	0.026
beta-Hexachlorocyclohexane[5]	T	ug/l	0.091
Hexachlorocyclopentadiene	T	ug/l	40
Hexachloroethane[5]	T	ug/l	14
Indeno(1,2,3-c,d)pyrene[5]	T	ug/l	0.038
Isophorone[5]	T	ug/l	350
Methoxychlor	T	ug/l	100
Methyl bromide	T	ug/l	47
Methylene chloride[5]	T	ug/l	46
Nitrate-N + Nitrite-N	T	ug/l	10,000
Nitrite-N	T	ug/l	1,000
N-Nitrosodiphenylamine[5]	T	ug/l	33
Pentachlorophenol[5]	T	ug/l	2.7
Phenol	T	ug/l	21,000
Phenolics	T	ug/l	5.0
Polychlorinated biphenyls[5]	T	ug/l	0.00064
Pyrene	T	ug/l	830
Selenium	TR	ug/l	170

Sulfates	T	ug/l	250,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin[5]	T	ug/l	0.00000005
Tetrachloroethylene[5]	T	ug/l	6.9
Thallium	TR	ug/l	0.24
Toluene	T	ug/l	1,300
Toxaphene[5]	T	ug/l	0.0028
1,2,4-Trichlorobenzene	T	ug/l	35
1,1,2-Trichloroethane[5]	T	ug/l	5.9
Trichloroethylene[5]	T	ug/l	25
2,4,6-Trichlorophenol[5]	T	ug/l	14
Vinyl chloride[5]	T	ug/l	0.25
Zinc	T	ug/l	7,400

[1] T = total; TR = total recoverable.

[2] ug/l = micrograms per liter; Mf/l = million fibers per liter.

[3] OMZA = outside mixing zone average.

[4] The criteria for this chemical apply to the sum of all dinitrophenols.

[5] Criteria for this chemical are based on a carcinogenic endpoint.

[6] The criteria for this chemical apply to the sum of alpha-endosulfan, beta-endosulfan and endosulfan sulfate.

[7] The criteria for this chemical apply to the sum of endrin and endrin aldehyde.

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