

**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER**

**RATIONALE FOR THE DEVELOPMENT OF
AMBIENT WATER QUALITY CRITERIA**

FOR HUMAN HEALTH PROTECTION

**February 2017
(Updated - July 2019)**

This rationale document includes revisions in response to comments received during the public comment period. The Environmental Quality Board (Board) adopted the proposed rulemaking at its April 18, 2017 meeting. The proposed rulemaking was published in the *Pennsylvania Bulletin* on October 21, 2017 (47 Pa.B. 6609) with provision for a 70-day public comment period scheduled to end December 29, 2017. The Board originally scheduled three public hearings during the initial 70-day comment period. The hearings were held in Harrisburg, Pittsburgh, and Wilkes-Barre, Pennsylvania. In response to a request received during the initial comment period, the Board extended the public comment period to February 16, 2018 and added another public hearing in Norristown, Pennsylvania. Notice of this public comment period extension and additional public hearing was published in the *Pennsylvania Bulletin* on December 30, 2017 (47 Pa.B. 7852). Additional details on the public participation, comments, and the Department's responses can be found in the Department's Report to the Board Comments and Responses Document (July 2019). Further description and explanation how the final rule has changed from proposed to final can be found Section E in the Order, in the Annex, and in this updated rationale.

The United States Environmental Protection Agency (EPA) provided comments to the Department during the public comment period of this triennial review of water quality standards, noting several differences in significant figures between EPA's recommended criteria and the Department's proposed criteria. In response to the comments, the Department recommended to slightly modify several pollutants, including: 1,2-diphenylhydrazine; cyanide; 2 methyl-4,6-dinitrophenol; acrolein; 1,3-dichlorobenzene; hexachlorocyclopentadiene; and endrin aldehyde. EPA further noted a significant discrepancy between EPA's recommended value and the Department's proposed value for the chloroform criterion. Since this discrepancy was not consistent with this rationale document and was significant enough to warrant an opportunity for public review and comment, the Department recommended to retain the current human health criterion for chloroform and reevaluate it in the next triennial review.

Introduction

Ambient water quality criteria (AWQC) are numeric values limiting the amount of chemicals present in our nation's waters. A water quality criterion is the concentration of a pollutant in water that is not expected to pose a significant risk to, or adversely impact, in this case, human

health protection. Water quality criteria are based solely on the best available scientific data and scientific judgments on pollutant concentrations and environmental or human health effects. These water quality criteria are developed under Section 304(a) of the Federal Clean Water Act of 1972. Section 304(a)(1) of the Clean Water Act requires that the EPA Administrator develop criteria for water quality that accurately reflect the latest scientific knowledge.

On June 29, 2015, EPA announced the final updates recommended for the AWQC for the protection of human health (EPA 2015a). Ninety-four priority pollutants were updated to reflect the latest scientific information and implementation of existing EPA policies found in the *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* 2000. EPA issued the draft updated human health criteria on May 13, 2014 and accepted written views from the public until August 13, 2014. These updated recommendations reflect the latest scientific information and EPA policies, including updated body weight, drinking water consumption rate, fish consumption rate, bioaccumulation factors, health toxicity values, and relative source contributions. The final 2015 update supersedes EPA's previous recommendations to the section 304(a) human health criteria recommendations.

EPA's recommended AWQC for the protection of human health provide technical information for states to establish water quality standards (i.e., criteria) and to protect human health under the Federal Clean Water Act. Under the Federal Clean Water Act and its implementing regulations, states are required to adopt water quality criteria to protect designated uses (e.g., public water supply, aquatic life, recreational use, industrial use) that are based on sound scientific rationale. Sections 5(b)(1) and 402 of The Clean Streams Law (35 P. S. § § 691.5(b)(1) and 691.402) authorize the Board to develop and adopt rules and regulations to implement The Clean Streams Law. Section 1920-A of The Administrative Code of 1929 (71 P.S. § 510-20) grants the Board the power and duty to formulate, adopt, and promulgate rules and regulations for the proper performance of the work of the Department.

The Department's staff use the AWQC found in 25 Pa. Code Chapter 93, Tables 3, 5, or 6 (relating to specific water quality criteria; to water quality criteria for toxic substances; or to Great Lakes aquatic life and human health criteria, respectively) as a tool in determining the appropriate effluent limitations and loading requirements designed to protect water quality and uses. These criteria are implemented, in part, through Pennsylvania's regulations supporting the National Pollution Discharge Elimination System (NPDES), and through other approvals issued by the Department. The NPDES regulations are found in 25 Pa. Code Chapter 92a (relating to national pollutant discharge elimination system permitting, monitoring and compliance), and in other implementation provisions found in 25 Pa. Code Chapter 96 (relating to water quality standards implementation).

Updated Exposure Inputs

EPA's 2015 human health criteria updates (EPA 2015a) incorporate the latest exposure factors for body weight, drinking water intake, and fish consumption. There is also an update to the methodology used to determine the bioaccumulation in fish, in addition to other toxicity factors (reference dose and cancer slope factors). Below are the updated inputs used to calculate the human health AWQC (also see EPA 2015b).

Body Weight – The default body weight has been increased to **80 kilograms** (176 pounds). This is the mean body weight for adults ages 21 and older. The new weight is based on data from the Centers for Disease Control and Prevention's National Health and Nutrition Examination Survey (NHANES), from 1999 to 2006. The previous default body weight was 70 kilograms (154 pounds) and was based on NHANES data from 1988 to 1994.

Drinking Water – The default drinking water intake assumption is increased to **2.4 liters per day**. This is based on NHANES data collected from 2003 to 2006 for the 90th percentile of water consumption in adults ages 21 and older. The water intake rate is based on consumer-only estimates of direct and indirect water ingestion. The previous recommended default drinking water intake rate was 2 liters per day. The data used was from adults surveyed in the United States Department of Agriculture, 1994-1996 Continuing Survey of Food Intake by Individuals (CSFII) and the National Cancer Institute study of the 1977-1978 Nationwide Food Consumption Survey.

Fish Consumption – The recommended default fish consumption rate has been increased to **22 grams per day**. This rate represents the consumption of freshwater and shellfish from inland and near shore waters for adults 21 years of age and older, based on NHANES data from 2003 to 2010. The previous fish consumption rate was 17.5 grams per day based on the consumption rate of freshwater and estuarine fish for the adult population from 1994-1996 CSFII data.

Bioaccumulation Factors – The criteria have been updated using bioaccumulation factors (BAFs) as recommended in the EPA human health criteria methodology (EPA 2000). BAFs will account for the uptake and retention of a chemical by an aquatic organism from all surrounding media (e.g. water, food, sediment). Criteria were previously calculated with bioconcentration factors that only accounted for direct water contact. In order to account for the variation in bioaccumulation due to the aquatic trophic position of an organism, EPA is recommending that BAFs be determined and applied to three trophic levels of fish. EPA used field-measured BAF's and laboratory-measured bioconcentration factors, along with octanol-water partition coefficients available from peer-reviewed databases to develop the national BAFs. EPA verified the calculated BAFs using a peer-reviewed model called Estimation Program Interface Suite (EPI Suite).

Health Risk Factors – EPA has updated the health risk factors using the most current toxicity information. The toxicity values for both non-carcinogenic and carcinogenic effects were used. EPA's Integrated Risk Information System (IRIS) is the primary source for reference dose and cancer slope values. For some pollutants, EPA has used other sources

provided by EPA's Office of Water, Office of Pesticide Programs, and international and state agencies.

Relative Source Contribution – EPA has updated the Relative Source Contribution (RSC) to reflect chemical-specific exposure. The RSC, which is only applied to threshold non-carcinogens, will range from 20 to 80 percent as recommended in EPA's human health methodology (EPA 2000). The RSC protects against particular pollutant exposures from other foods, marine fish consumption, dermal exposure, and respiratory exposures. The use of the RSC is to ensure that an individual's total exposure from all sources of a pollutant does not exceed the criteria.

Criteria Development

Human health AWQC for toxic pollutants are necessary to protect any designated uses related to ingestion of water and ingestion of aquatic organisms. These uses can include, but are not limited to: recreation in and on the water; consumption of fish or shellfish (including consumption associated with fishing or shellfish harvesting); and protection of drinking water supplies. The derivation of human health AWQC requires information about both the toxicological endpoints of concern for water pollutants and the pathways of human exposure to those pollutants. EPA considers the following two primary pathways of human exposure to pollutants present in a particular water body when deriving human health 304(a) AWQC: (1) direct ingestion of drinking water obtained from the water body and (2) consumption of fish or shellfish obtained from the water body (EPA 2015a).

Below is the equation used for deriving human health AWQC for non-carcinogenic and carcinogenic effects, based on the consumption of both water and aquatic organisms. EPA recommends including the drinking water exposure pathway for ambient surface waters where drinking water is a designated use for the following reasons: (1) drinking water is a designated use for surface waters under the Federal Clean Water Act, and therefore criteria are needed to ensure that this designated use can be protected and maintained; (2) although they are rare, some public water supplies provide drinking water from surface water sources without treatment; (3) even among the majority of water supplies that do treat surface waters, existing treatments might not be effective for reducing levels of particular contaminants; and (4) in consideration of the goals of pollution prevention, ambient waters should not be contaminated to a level where the burden of achieving health objectives is shifted away from those responsible for pollutant discharges and placed on downstream users that must bear the costs of upgraded or supplemental water treatment (EPA 2000; EPA 2015b).

The equations for deriving the criteria values are as follows (EPA 2000):
For consumption of water and organisms:

$$\text{AWQC } (\mu\text{g/L}) = \frac{\text{Toxicity value (mg/kg-d)} \times \text{BW (kg)} \times 1,000 (\mu\text{g/mg}) / \text{DI (L/d)} + \sum(\text{FCR}_i) \text{ } 4 \text{ } i=2 \text{ (kg/d)} \times \text{BAFi (L/kg)}}{}$$

Where:

AWQC = ambient water quality criteria

Toxicity value = RfD x RSC (mg/kg-d) for non-carcinogenic effects or 10⁻⁶/CSF (kg-d/mg) for carcinogenic effects

RSC = relative source contribution (applicable to only non-carcinogenic and nonlinear low-dose extrapolation for carcinogenic effects)

BW = body weight, default (80 Kg)

DI = drinking water intake, default (2.4 L/day)

Σ_{i=2} = summation of values for aquatic trophic levels (TLs), where the letter *i* stands for the TLs to be considered, starting with TL2 and proceeding to TL4

FCR_i = fish consumption rate for aquatic TLs 2, 3, and 4 – default (22.0 g/day)

BAF_i = bioaccumulation factor for aquatic TLs 2, 3, and 4

(EPA rounds AWQC to the number of significant figures in the least precise parameter as described in the 2000 Methodology (USEPA 2000, Section 2.7.3). The Department has rounded the AWQC in Table 5 to two significant figures.)

Comparisons of EPA 2015 Final Recommended Criteria and DEP Current Criteria

Of the 94 pollutants recalculated by EPA, 55 will have a **more stringent** criterion than previously listed in 25 Pa. Code Chapter 93, Table 5. These criteria have been recalculated to include chemical-specific BAFs, which account for how long each pollutant will be available in the environment and in increased average body weight and fish consumption amounts. These pollutant-specific inputs may be the driving factors for the change in the newly developed criteria. These AWQC are intended to be protective of the general adult population from non-carcinogenic or carcinogenic effects due to chronic (up to a lifetime) exposure.

Table 1 – More Stringent Criteria

	Pollutant	CAS No.	DEP Current Water + Organism (µg/L)	DEP Proposed Water + Organism (µg/L)	EPA 2015 Water + Organism (µg/L)
1	1,2,4-Trichlorobenzene	120-82-1	35	.07	0.071
2	1,3-Dichlorobenzene	541-73-1	420	7	7
3	1,3-Dichloropropene	542-75-6	0.34	0.27	0.27
4	1,4-Dichlorobenzene	106-46-7	420	300	300
5	2,4-Dichlorophenol	120-83-2	77	10	10
6	2,4-Dimethylphenol	105-67-9	380	100	100
7	2,4-Dinitrophenol	51-28-5	69	10	10
8	2-Chloronaphthalene	91-58-7	1,000	800	800
9	2-Chlorophenol	95-57-8	81	30	30
10	2-Methyl-4,6-Dinitrophenol	534-52-1	13	2	2
11	Acenaphthene	83-32-9	670	70	70
12	Acrolein	107-02-8	6	3	3
13	Aldrin	309-00-2	0.000049	0.0000008	0.00000077
14	alpha-Hexachlorocyclohexane (HCH)	319-84-6	0.0026	0.0004	0.00036
15	alpha-Endosulfan	959-98-8	62	20	20

16	Anthracene	120-12-7	8,300	300	300
17	Benzene	71-43-2	1.2	0.58	0.58
18	Benzo(a)anthracene	56-55-3	0.0038	0.001	0.0012
19	Benzo(a)pyrene	50-32-8	0.0038	0.0001	0.00012
20	Benzo(b)fluoranthene	205-99-2	0.0038	0.001	0.0012
21	beta-Hexachlorocyclohexane (HCH)	319-85-7	0.0091	0.008	0.0080
22	beta-Endosulfan	33213-65-9	62	20	20
23	Bis(2-Chloro-1-Methylethyl) Ether	108-60-1	1,400	200	200
24	Bis(2-Ethylhexyl) Phthalate	117-81-7	1.2	0.32	0.32
25	Butylbenzyl Phthalate	85-68-7	1,500	0.1	0.10
26	Chlordane	57-74-9	0.0008	0.0003	0.00031
27	Chlorobenzene	108-90-7	130	100	100
28	Cyanide	57-12-5	140	4	4
29	Dibenzo(a,h)anthracene	53-70-3	0.0038	0.0001	0.00012
30	Dieldrin	60-57-1	0.000052	0.000001	0.0000012
31	Diethyl Phthalate	84-66-2	17,000	600	600
32	Dimethyl Phthalate	131-11-3	270,000	2000	2,000
33	Di-n-Butyl Phthalate	84-74-2	2,000	20	20
34	Endosulfan Sulfate	1031-07-8	62	20	20
35	Endrin	72-20-8	0.059	0.03	0.03
36	Ethylbenzene	100-41-4	530	68	68
37	Fluoranthene	206-44-0	130	20	20
38	Fluorene	86-73-7	1,100	50	50
39	Heptachlor	76-44-8	0.000079	0.000006	0.0000059
40	Hexachlorobenzene	118-74-1	0.00028	0.00008	0.000079
41	Hexachlorobutadiene	87-68-3	0.44	0.01	0.01
42	Hexachlorocyclopentadiene	77-47-4	40	4	4
43	Hexachloroethane	67-72-1	1.4	0.1	0.1
44	Indeno(1,2,3-cd)pyrene	193-39-5	0.0038	0.001	0.0012
45	Isophorone	78-59-1	35	34	34
46	Nitrobenzene	98-95-3	17	10	10
47	Pentachlorophenol	87-86-5	0.27	0.03	0.03
48	Phenol	108-95-2	10,000	4000	4,000
49	p,p'-Dichlorodiphenyldichloroethane (DDD)	72-54-8	0.00031	0.0001	0.00012
50	p,p'-Dichlorodiphenyldichloroethylene (DDE)	72-55-9	0.00022	0.00002	0.000018
51	p,p'-Dichlorodiphenyltrichloroethane (DDT)	50-29-3	0.00022	0.00003	0.000030
52	Pyrene	129-00-0	830	20	20
53	Toluene	108-88-3	1,300	57	57
54	trans-1,2-Dichloroethylene (DCE)	156-60-5	140	100	100
55	Trichloroethylene (TCE)	79-01-6	2.5	0.6	0.6

Per EPA recommendation, the following toxic pollutants **will be added** to the water quality criteria for toxic substances in 25 Pa. Code Chapter 93, Table 5.

1,1,1-Trichloroethane (TCE) – The Department currently has acute (3000 ug/L) and chronic (800 ug/L) aquatic life criteria for 1,1,1-TCE. Chapter 93, Table 5 does not have a human health criterion for TCE. The EPA-recommended human health criterion is 10000 ug/L. Ingestion of drinking water is a potentially significant source of exposure to 1,1,1-TCE. Inputs used to derive the 2015 updated human health AWQC are protective of exposure to 1,1,1-TCE from consuming drinking water and eating fish and shellfish (organisms) from inland and near shore waters.

1,2-Dichloropropane – Under the 1986 EPA *Guidelines for Carcinogen Risk Assessment* (USEPA 1986a), 1,2-dichloropropane is classified as Group B2, “probable human carcinogen”. The major source of 1,2-dichloropropane in drinking water is discharge from industrial chemical factories. It may be released into the atmosphere or in wastewater during its production or use as an intermediate in chemical manufacture. There were also significant releases during its former use as a soil fumigant. It may also leach from municipal landfills. There are currently acute (11000 ug/L) and chronic (2200 ug/L) aquatic life criteria in Chapter 93, Table 5. The EPA-recommended cancer risk level (CRL) is 0.9 ug/L.

1,2,4,5-Tetrachlorobenzene – 1,2,4,5-tetrachlorobenzene was historically used as an insecticide, an intermediate in the production of herbicides and defoliants, and a component of dielectric fluids (USDHHS 2019). Currently, 1,2,4,5-tetrachlorobenzene is not registered for use as a pesticide (USEPA 2019). The general population could be exposed to 1,2,4,5-tetrachlorobenzene via inhalation of ambient air and drinking water (USDHHS 2019). EPA is recommending a human health criterion of 0.03 ug/L.

2,4,5-Trichlorophenol – 2,4,5-trichlorophenol was once registered as an antimicrobial by EPA but is not currently a registered pesticide (USEPA 2019). Chlorophenols can be formed when water containing humic substances is treated with chlorine and has a pH ranging from 7 to 8 (Krijghsheld and van der Gen 1986). The general population could be exposed to chlorophenols through ingestion of water and food contaminated with the compounds as well as inhalation of contaminated air (ATSDR 1999). 2,4,5-trichlorophenol has been detected in ocean fish (ATSDR 1999). The EPA-recommended human health criterion is 300 ug/L.

3-Methyl-4-chlorophenol – 3-methyl-4-chlorophenol is used as a disinfectant and a preservative in the United States (USDHHS 2019). It also is registered in the United States as an antimicrobial pesticide and is currently in the re-registration process by EPA (USEPA 2019). Exposure of the general United States population to the chemical might occur through inhalation and dermal contact (USDHHS 2019). EPA is recommending a human health criterion of 500 ug/L.

Bis(chloromethyl)ether – EPA has revised the human health criteria for bis(chloromethyl) ether to reflect the latest scientific information. Under the 1986 EPA *Guidelines for Carcinogen Risk Assessment* (USEPA 1986a), bis(chloromethyl) ether is classified as Group A, “human carcinogen” (USEPA 1986a). The EPA-recommended CRL is 0.00015 ug/L.

Chlorophenoxy Herbicide (2,4-D) – 2,4-D is an herbicide used to control broad-leaved weeds in cereals, grain crops, road sides, and farm buildings (USDHHS 2019). 2,4-D is currently registered as a pesticide by EPA (USEPA 2019). Human exposure to 2,4-D might occur through inhalation and ingestion of food and water (USDHHS 2019). The primary exposure routes for the general public are through food residues and water ingestion (USDHHS 2019).

Based on its low potential for bioaccumulation, exposure to this chemical from ingestion of fish and shellfish is not considered likely. Because of the lack of data in fish and shellfish, EPA has not established BAFs according to trophic levels. 2,4-D is calculated with a total BAF of 13 L/kg. EPA’s recommended criterion is rounded from 1371 ug/L down to 1300 ug/L. The Department disagrees with this rounding and the criterion will be rounded up to 1400 ug/L.

Chlorophenoxy Herbicide (2,4,5-TP) – 2,4,5-TP is an herbicide that is no longer used in the United States. This herbicide was formerly used to control woody plants, broadleaf herbaceous weeds, and aquatic weeds (USDHHS 2019). Cancellation of all registered uses in the United States was put into effect on January 2, 1985 (USDHHS 2019). Prior to cancellation of 2,4,5-TP, research surveys detected the chemical in large fruit samples and dairy products (USDHHS 2019). Recent monitoring information on 2,4,5-TP in imported foods could not be identified.

Based on the available exposure information for 2,4,5-TP, and given that the chemical is no longer produced or used in the United States, EPA does not anticipate that there will be significant sources and routes of exposure of 2,4,5-TP other than fish and shellfish from inland and nearshore waters and water ingestion. EPA is recommending a human health criterion of 100 ug/L.

Dinitrophenols – After reviewing data presented in EPA’s AWQC updates, the dinitrophenols criterion will be adopted by the Department. The inputs used to calculate the criterion for dinitrophenols are identical to the inputs used to calculate the Department’s existing 2,4-dinitrophenol criterion. EPA’s recommended dinitrophenols criterion will also protect against other forms of dinitrophenols (e.g., 2,5-dinitrophenol and 2,6-dinitrophenol). The EPA-recommended criterion for dinitrophenols is 10 ug/L.

Hexachlorocyclohexane (HCH)-technical – HCH-technical is classified as Group B2, “probable human carcinogen” (USEPA 1986b). EPA is recommending a cancer risk level of 0.007 ug/L.

Methoxychlor – Methoxychlor is an insecticide that is no longer produced or used in the United States. Prior to its cancellation as an approved pesticide, the chemical was detected in fish from the Great Lakes at levels ranging from 10 to 120 µg/kg wet weight (ATSDR 2002). It also was detected in several species of migratory fish in Great Lakes tributaries at concentrations up to 1.4 µg/kg (ATSDR 2002). In EPA’s National Lake Fish Tissue Study (USEPA 2009), the chemical was detected in 1 to 5 percent (i.e., 9 of 468) of the predator filets (at a maximum concentration of 370 ppb) and 5.8 percent (i.e., 23 of 395) of the bottom-dweller whole body fish samples (at a maximum concentration of 107 ppb) (USEPA 2009). Thus, based on available exposure information and its high potential to bioaccumulate, ingestion of fish and shellfish is a potentially

significant source of exposure to methoxychlor. The EPA-recommended human health criterion is 0.02 ug/L.

Pentachlorobenzene – Pentachlorobenzene is generated as a byproduct in a variety of industrial processes, such as solid waste incineration and combustion of coal (USDHHS 2019). Air is likely the primary source by which the general population is exposed to pentachlorobenzene; however, water and food ingestion might also be significant exposure pathways (USDHHS 2019). Based on the physical properties and available exposure information for pentachlorobenzene, air, fish, and shellfish are potentially significant sources. EPA is recommending a human health criterion of 0.1 ug/L.

Table 2 – New Pollutants to be added to Chapter 93, Table 5

	Pollutant	CAS No.	DEP Current Water + Organism (µg/L)	DEP Proposed Water + Organism (µg /L)	EPA 2015 Water + Organism (µg/L)
1	1,1,1-Trichloroethane	71-55-6	None	10000	10,000
2	1,2-Dichloropropane	78-87-5	None	0.9	0.90
3	1,2,4,5-Tetrachlorobenzene	95-94-3	None	0.03	0.03
4	2,4,5-Trichlorophenol	95-95-4	None	300	300
5	3-Methyl-4-Chlorophenol	59-50-7	None	500	500
6	Bis(Chloromethyl)Ether	542-88-1	None	0.0002	0.00015
7	Chlorophenoxy Herbicide (2,4-D)	94-75-7	None	1400	1300
8	Chlorophenoxy Herbicide (2,4,5-TP) [Silvex]	93-72-1	None	100	100
9	Dinitrophenols	25550-58-7	None	10	10
10	Hexachlorocyclohexane (HCH)-Technical	608-73-1	None	0.007	0.0066
11	Methoxychlor	72-43-5	None	0.02	0.02
12	Pentachlorobenzene	608-93-5	None	0.1	0.1

EPA has recalculated the toxicity of the following 18 pollutants which will result in a reduced criterion. These criteria have been recalculated to include chemical-specific BAFs, which account for how long each pollutant will be available in the environment and in increased average body weight and fish consumption amounts. These pollutant-specific inputs are the driving factors for the change in the newly developed criteria.

Table 3 – Recalculated less stringent criteria

	Pollutant	CAS No.	DEP Current Water + Organism (µg/L)	DEP Proposed Water + Organism (µg /L)	EPA 2015 Water + Organism (µg/L)
1	1,2-Dichlorobenzene	95-50-1	420	1000	1,000

2	1,2-Dichloroethane	107-06-2	0.38	9.9	9.9
3	3,3'-Dichlorobenzidine	91-94-1	0.021	.05	0.049
4	Acrylonitrile	107-13-1	0.051	0.06	0.061
5	Benzidine	92-87-5	0.000086	0.0001	0.00014
6	Benzo(k)fluoranthene	207-08-9	0.0038	0.01	0.012
7	Bromoform	75-25-2	4.3	7.0	7.0
8	Carbon Tetrachloride	56-23-5	0.223	0.4	0.4
9	Chlorodibromomethane	124-48-1	0.4	0.8	0.80
10	Chloroform	67-66-3	5.7	60 ²	60
11	Chrysene	218-01-9	0.0038	0.12	0.12
12	Dichlorobromomethane	75-27-4	0.55	0.95	0.95
13	Endrin Aldehyde	7421-93-4	0.29	1.0	1
14	gamma-Hexachlorocyclohexane (HCH)	58-89-9	0.98	4.2	4.2
15	Methyl Bromide	74-83-9	47	100	100
16	Methylene Chloride	75-09-2	4.6	20	20
17	Tetrachloroethylene (Perchloroethylene)	127-18-4	0.69	10	10
18	Toxaphene	8001-35-2	0.00028	0.0007	0.00070

There are 10 pollutants that have an **insignificant** change in toxicity and will not require any change to the current criteria.

1,1-Dichloroethylene – Under the 1986 EPA *Guidelines for Carcinogen Risk Assessment* (USEPA 1986a), 1,1-dichloroethylene is classified as Group C, “possible human carcinogen” (USEPA 1986a). EPA has not identified a cancer slope factor for this compound. Therefore, a factor of 10 has been applied to the current human health criterion for 1,1-dichloroethylene to protect from carcinogenic effects. The Department’s current 1,1-dichloroethylene criterion is 33 ug/L. The recalculated criterion is 30 ug/L. This is an insignificant change, and therefore the human health criterion of 33 ug/L will remain in Chapter 93, Table 5.

Table 4 – Criteria that will not change

	Pollutant	CAS No.	2015 Water + Organism (µg/L)	DEP Current Water + Organism (µg/L)
1	1,1-Dichloroethylene	75-35-4	300	33
2	1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.17
3	1,1,2-Trichloroethane	79-00-5	0.55	0.59
4	1,2-Diphenylhydrazine	122-66-7	0.03	0.03
5	2,4,6-Trichlorophenol	88-06-2	1.5	1.4
6	2,4-Dinitrotoluene	121-14-2	0.05	0.05
7	Bis(2-Chloroethyl) Ether	111-44-4	0.03	0.03
8	Heptachlor Epoxide	1024-57-3	0.00003	0.000039
9	Vinyl Chloride	75-01-4	0.02	0.025

Recommendation

EPA's recommended AWQC for the protection of human health provide technical information for states to establish water quality standards (i.e., criteria) and to protect human health under the Federal Clean Water Act. Under the Federal Clean Water Act and its implementing regulations, states are required to adopt water quality criteria to protect designated uses (e.g., public water supply, aquatic life, recreational use, industrial use) that are based on sound scientific rationale.

After a thorough review of the 94 individual recommended criteria updates, the Department recommends adopting updated criteria for 73 compounds and adding 12 new human health compounds to 25 Pa. Code Chapter 93, Table 5. There are nine EPA-recommended criteria that will remain the same as currently in 25 Pa. Code Chapter 93, Table 5.

The Department recommends the Board adopt the 85 EPA-recommended human health criteria as stated above.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. *Toxicological profile for Chlorophenols*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. *Toxicological profile for Methoxychlor*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Krijgsheld, K.R. and van der Gen, Arne. 1986. *Assessment of the Impact of the Emission of Certain Organochlorine Compounds in the Aquatic Environment*. *Chemosphere* 15(7):861-880.

United States Environmental Protection Agency (USEPA). 1986a. *Guidelines for Carcinogen Risk Assessment*. EPA/630/R-00/004.
https://archive.epa.gov/raf/web/pdf/ca_guidelines_1986.pdf.

United States Environmental Protection Agency (USEPA). 1986b. *Integrated Risk Information System (IRIS) Chemical Assessment Summary: technical Hexachlorocyclohexane (t-HCH); CASRN 608-73-1*. Accessed on 7/17/2019 at
https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0165_summary.pdf.

United States Environmental Protection Agency (USEPA). 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. EPA-822-B-00-004.
<https://www.epa.gov/sites/production/files/2018-10/documents/methodology-wqc-protection-hh-2000.pdf>.

U.S. Environmental Protection Agency (USEPA). 2009. *The National Study of Chemical Residues in Lake Fish Tissue*. EPA-823-R-09-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

United States Environmental Protection Agency (USEPA). 2015a. *Final Updated Ambient Water Quality Criteria for the Protection of Human Health*. <https://www.epa.gov/wqc/human-health-water-quality-criteria-and-methods-toxics>.

United States Environmental Protection Agency (USEPA). 2015b. *Human Health Ambient Water Quality Criteria: 2015 Update*. EPA 820-F-15-001.
<https://www.epa.gov/sites/production/files/2015-10/documents/human-health-2015-update-factsheet.pdf>.

United States Environmental Protection Agency (USEPA). 2019. *Pesticide Chemical Search. Conventional, Antimicrobial and Biopesticide Active Ingredients*. Office of Pesticide Programs. Site last updated on 7/17/2019. Accessed on 7/17/2019 at
<https://iaspub.epa.gov/apex/pesticides/f?p=chemicalsearch:1>.

United States Department of Health & Human Services (USDHHS). 2019. *Toxnet Toxicology Data Network*. United States National Library of Medicine, Bethesda, MD. Site last updated on 11/26/2018. Accessed on 7/17/2019 at <https://toxnet.nlm.nih.gov/index.html>.