Water Quality Standards Quarterly Meeting

September 12, 2017
Morgantown, WV

LAURA COOPER

ASSISTANT DIRECTOR DWWM, WATER QUALITY STANDARDS

LAURA.K.COOPER@WV.GOV

west virginia department of environmental protection

Agenda

Introductions – WQS Staff & Attendees

Overview of Water Quality Standards

EPA Recommended Human Health Criteria

Upcoming Triennial Review

Water Quality Standards Update

Since our last meeting on June 14th

- **June 15 - WV DEP Special Reclamation variance for Muddy Creek APPROVED by EPA**
- **June 28 – Observed Cacapon River filamentous algae with ICPRB staff**
- **July 11 – Submitted revisions of §22-11-7(b) to EPA**
- **July 28 – EPA released 2017 DRAFT Aquatic Life Ambient WQC for Aluminum**
- **May-September – Sampled Greenbrier nutrients & assessed for filamentous algae**

Agenda

Introductions – WQS Staff & Attendees

Overview of Water Quality Standards

EPA Recommended Human Health Criteria

Upcoming Triennial Review

Water Quality Standards: an Overview

Purpose of Water Quality Standards (40 CFR Part 131.2)

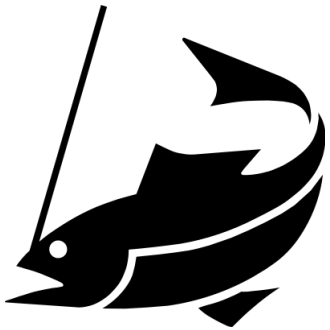
A water quality standard **defines** the **water quality goals** of a water body, or portion thereof, **by designating** the use or **uses** to be made of the water **and by setting criteria** that protect the designated uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (40 CFR Part 131.2)

Water Quality Standards: an Overview

Clean Water Act of 1972

Objective: “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters” (Section 101)

Goal of CWA: “water quality which provides for the protection and propogation of fish, shellfish, and wildlife, and provides for recreation in and on the water” (Section 101(a)(2))



In other words, all waters should be “Fishable and Swimmable”

Why we have standards for water quality

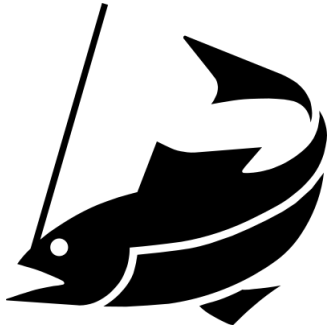
So we can enjoy places like these

What are Water Quality Standards?

- **Limits set for pollutant levels allowed in WV waters**
- **Can be numeric, narrative, site-specific, time-limited**
- **WQS determine the**

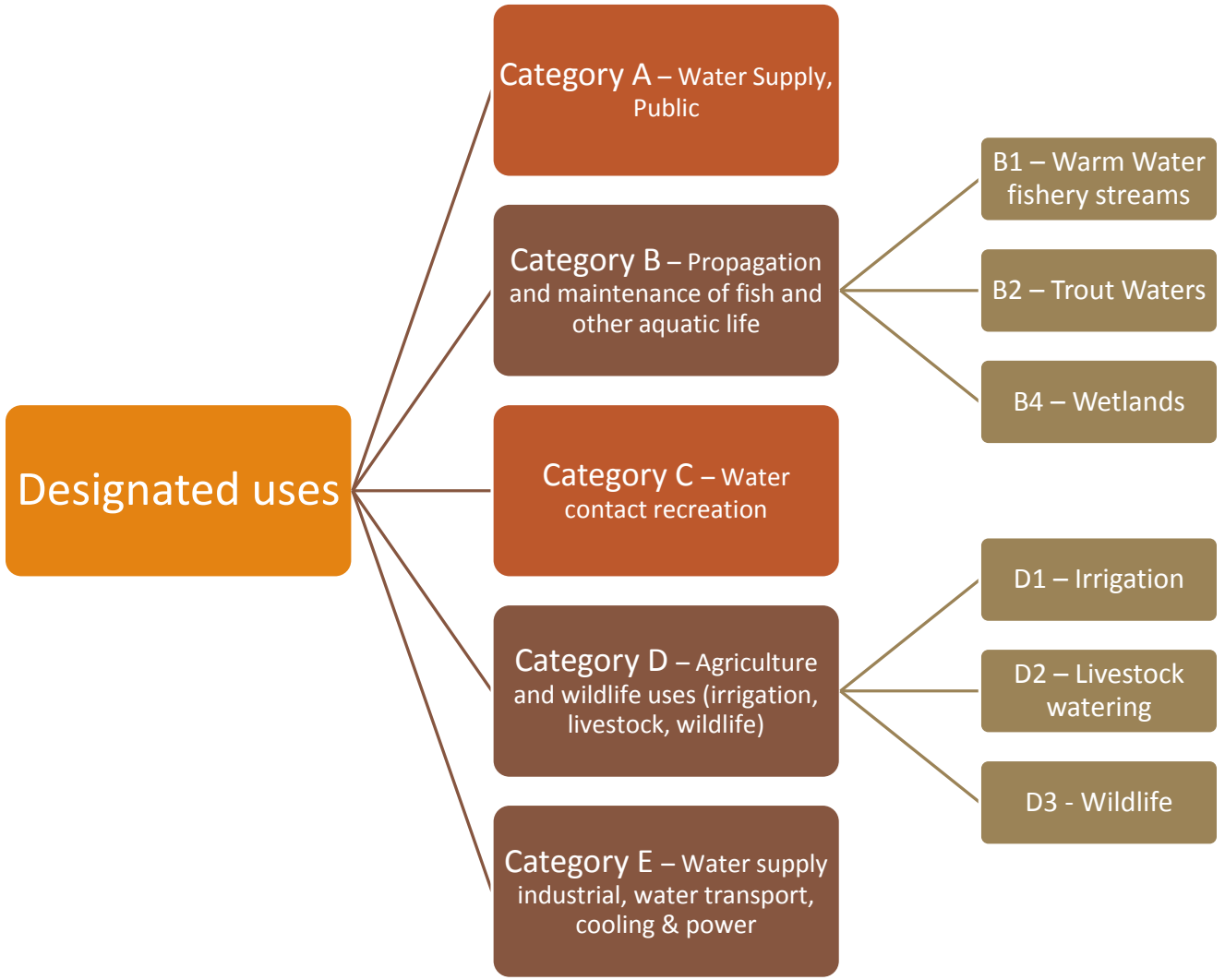
  magnitude, frequency, and duration below which

  chemical, physical, and biological parameters should not cause harm

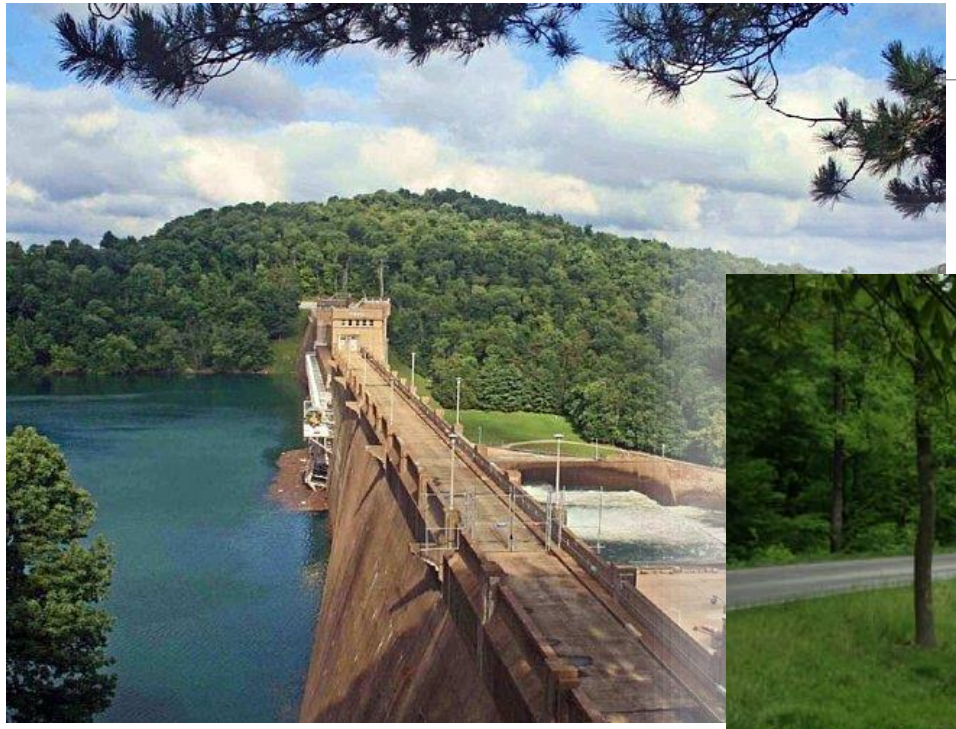


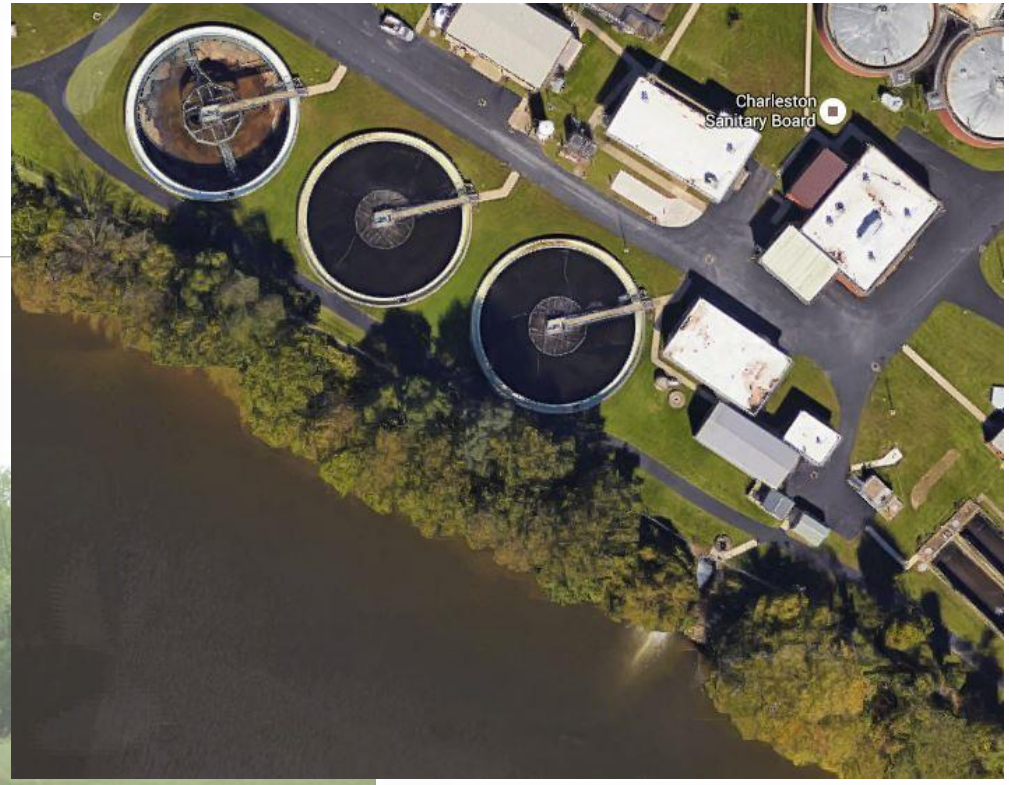
Water Quality Standards in WV

"Requirements Governing Water Quality Standards" rule – 47 CSR 2



For example…





Agenda

Introductions – WQS Staff & Attendees

Overview of Water Quality Standards

EPA Recommended Human Health Criteria

Upcoming Triennial Review

Human Health Criteria

What are human health criteria?

Human health ambient water quality criteria represent specific levels of chemicals or conditions in a water body that are not expected to cause adverse effects to human health. (EPA)

How are human health uses defined?

EPA Recommended Human Health Criteria	West Virginia WQS (47 CSR 2)	Designed to protect
Water + Organism	Category A – Water Supply, Public	Human health through drinking water and consuming fish
Organism Only	Category C – Water contact recreation	Human Health through consuming fish only

EPA 2002 Human Health Criteria Equation

For consumption of water and organisms:

$$AWQC\ [\mu g/L] = \frac{(10^{-6}/ql^{*}) \bullet 70\ kg \bullet 1000\ \mu g/mg}{(2\ L/d + (0.0175\ kg/d \bullet BCF\ [L/kg]))}$$

AWQC = Ambient water quality criteria (national recommended water quality criteria)
ql = Cancer potency factor kg-d/mg or per mg/kg-day
BCF = Bioconcentration factor L/kg

70 kg = human body weight
2 L/d = human water consumption
0.0175 kg/d = human fish consumption

BCFs

Historically, EPA recommended human health criteria have been based on Bioconcentration Factors (BCFs)

BCFs only take into account exposure of the fish to contaminants in the water column

BAFs

EPA's new recommendation uses Bioaccumulation Factors (BAFs) instead of BCFs

BAFs also take into account exposure of fish to contaminants through the food chain and the propensity of the contaminants to accumulate in the body tissue of the fish over time

Goal: greater accuracy

Since fish are exposed to contaminants assimilated from the water through the food they eat, the use of BAFs provides a more accurate assessment of human exposure to the fish we eat.

2015 Changes – Accumulation Factors

2015 Changes – Human Factors

Additional changes made to the calculation

- Body weight from 70 kg (154.3 lbs) to 80 kg (176.4 lbs) to reflect an avg. increase
- Drinking water intake increase from 2 L/day to 2.4 L/day
- Fish consumption increase from 17.5 grams/day to 22 grams/day

Fish Consumption & the 2015 Criteria

EPA suggests a four preference hierarchy for states and authorized tribes that encourages use of the best local, state, or regional data available to derive fish consumption rates.

The preferred hierarchy is:

(1) use of local data;

(2) use of data reflecting similar geography/ population groups;

(3) use of data from national surveys; and

(4) use of EPA's default consumption rates

EPA 2015 Human Health Criteria Equation

$$AWQC = RSD \cdot \left(\frac{BW}{DI + \sum_{i=2}^{4} (FI_i \cdot BAF_{3i})} \right)$$

AWQC = Ambient Water Quality Criterion

RSD = Risk-specific Dose

BW = Human body weight (80 kg)

DI = Drinking water intake (2.4 L/day)

FIi = Fish intake (0.022 kg/day)

BAFi = Bioaccumualtion factor

Equation Inputs

Chemical-specific Inputs for EPA's 2015 Final Updated Human Health Ambient Water Quality Criteria

Chemical Name	CAS	Cancer Slope Factor, CSF (per mg/kg-d)	Reference Dose, RfD (mg/kg-d)	Relative Source Contribution, RSC (-)	Bioaccumulation Factor			Bioconcentration Factor (L/kg tissue)
					Trophic Level 2 (L/kg tissue)	Trophic Level 3 (L/kg tissue)	Trophic Level 4 (L/kg tissue)	
Aldrin	309-00-2	17	0.00003	0.20	18,000	310,000	650,000	
alpha-Hexachlorocyclohexane (HCH)	319-84-6	6.3	0.008	0.20	1,700	1,400	1,500	
alpha-Endosulfan	959-98-8	ND	0.006	0.20	130	180	200	
Anthracene	120-12-7	ND	0.3	0.20	610*	610*	610*	
Benzene	71-43-2	0.015 – 0.055	0.0005	0.20	3.6	4.5	5.0	

https://www.epa.gov/wqc/2015-epa-updated-ambient-water-quality-criteria-protection-human-health

How the New Calculation Affects Criteria

Comparison of EPA's 2015 Final Updated Human Health AWQC and Previous AWQC
June 2015

Pollutant	CAS No.	2015 EPA Human Health AWQC for the Consumption of		Previous EPA Human Health AWQC for the Consumption of	
		Water + Organism (µg/L)	Organism Only (µg/L)	Water + Organism (µg/L)	Organism Only (µg/L)
Acrylonitrile	107-13-1	0.061	7.0	0.051	0.25
Aldrin	309-00-2	0.00000077	0.00000077	0.000049	0.00005
alpha-Hexachlorocyclohexane (HCH)	319-84-6	0.00036	0.00039	0.0026	0.0049
alpha-Endosulfan	959-98-8	20	30	62	89
Anthracene	120-12-7	300	400	8,300	40,000
Benzene	71-43-2	0.58 - 2.1	16 - 58	0.61 - 2.2	14 - 51
Benzidine	92-87-5	0.00014	0.011	0.000086	0.0002
Benzo(a)anthracene	56-55-3	0.0012	0.0013	0.0038	0.018
Benzo(a)pyrene	50-32-8	0.00012	0.00013	0.0038	0.018
Benzo(b)fluoranthene	205-99-2	0.0012	0.0013	0.0038	0.018
Benzo(k)fluoranthene	207-08-9	0.012	0.013	0.0038	0.018
beta-Hexachlorocyclohexane (HCH)	319-85-7	0.0080	0.014	0.0091	0.017
beta-Endosulfan	33213-65-9	20	40	62	89

Example: Some of WV's Human Health WQS

	Category A	Category C
Acrylonitrile[b] (ug/l)	0.059	0.66
Aldrin[b] (ng/l)	0.071	0.071
alpa-BHC (alpha- Hexachloro-cyclohexane)[b] (ug/l)	0.0039	0.013
Anthracene (ug/l)	8,300	40,000
Benzene[b] (ug/l)	0.66	51
Benzo(a) Anthracene[b] (ug/l)	0.0038	0.018
Benzo(a) Pyrene[b] (ug/l)	0.0038	0.018
Benzo(b) Fluoranthene[b] (ug/l)	0.0038	0.018
Benzo(k) Fluoranthene[b] (ug/l)	0.0038	0.018
beta-BHC(beta- Hexachloro-cyclohexane)[b] (ug/l)	0.014	0.046

Discussion

What comments and questions do you have regarding Human Health Criteria?

Agenda

Introductions – WQS Staff & Attendees

Overview of Water Quality Standards

EPA Recommended Human Health Criteria

Upcoming Triennial Review

Status & Timeline: 2019 Triennial Review

Review Criteria: 2017

September 2017 – Accept comments on potential revisions

October 2017 – Review comments

November 2017 – WQS Public Meeting: discuss comments received

Propose Rule: 2018

March 2018 – WQS Public Meeting: discuss potential revisions

Spring 2018 – Advisory Council review

Summer 2018 – Propose rule for public review, hearing & comment

Fall 2018 – Submit rule to LRMRC, may make changes

Legislative Review: 2019

Legislative Session 2019 – review of proposed rule, may make changes

What questions do you have?

Next WQS Meeting in November

- **Discuss comments received**
- **Discuss potential criteria revisions**

Reach me at:

Laura Cooper

Office: 304-926-0499 x1110

Email: Laura.K.Cooper@wv.gov