

Agenda for Rule 2 Stakeholder Workgroup

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May 19, 2022

- I. Introduction
- II. Revision of two aquatic life toxic criteria
- III. Addition of five human health toxics criteria
- IV. Site specific dissolved oxygen for three assessment units
- V. Status of ecoregion studies
- VI. Status of minerals criteria development

May 19, 2022

All proposed toxics criteria were chosen based on EPA Region 6 Toxic Release Inventory (TRI) discharge amounts and the EPA Integrated Risk Information System (IRIS) confidence of medium to high in background studies.

**Cadmium** – Aquatic Life Criteria Update

EPA Criteria	Freshwater CMC (Acute)(µg/L)	Freshwater CCC (Chronic)(µg/L)
<b>Existing 1986*</b>	3.7	1.03
<b>Proposed 2016*</b>	1.8	0.72
*These numbers are hardness-dependent based on a hardness of 100mg/L as CaCO <sub>3</sub>		

- 16 facilities with 17 total outfalls having active limits
  - These facilities were evaluated using their own site specific data
  - 12 outfalls are capable of meeting the more stringent criteria at this time
- 2 NPDES permitted facilities have shown limit failures within the past 2 years under the existing criteria
  - Both would have a few additional failures under the new criteria
- Monitoring data showed 12,718 total data points from 509 monitoring stations in the past 5 years
  - 55 total water quality criteria exceedances of the new criteria (both acute and chronic)
  - 15 chronic only exceedances of the new criteria
  - Exceedances of new criteria divided by ecoregion:
    - Gulf Coastal Plains
      - 7 total exceedances from 6 monitoring stations
      - 1 chronic exceedance from 1 monitoring station
    - Ouachita Mountains\*
      - 45 total exceedances from 19 monitoring stations
      - 14 chronic exceedances from 3 monitoring stations
      - \* Exceedances in this ecoregion appear to be due to prior geological disturbances and the type of geology within the ecoregion.
    - Boston Mountains
      - 1 total exceedance from 1 monitoring station
    - Ozark Highlands
      - 1 total exceedance from 1 monitoring station
    - Arkansas River Valley
      - 1 total exceedance from 1 monitoring station
- Toxic Release Inventory (TRI) data

2018	2019	2020
21.3 lb/yr	58.84 lb/yr	9.08 lb/yr

May 19, 2022

**Aquatic Life**

**Ammonia** – Aquatic Life Criteria Update

	1999 Criteria Existing	2013 Criteria Proposed
<b>Acute (1hr avg) (mg/L)</b>	24	17
<b>Chronic (30 day rolling avg)(mg/L)</b>	4.5*	1.9*
*Not to exceed 2.5 times criterion continuous concentrations as a 4-day avg within a 30 day period		
**Based upon a temperature of 20°C and a pH of 7.		

- The new EPA 2013 criteria takes into account the sensitivity of freshwater mussels

	Federally Endangered	Federally Threatened	State Critically Imperiled	State Imperiled	State Vulnerable
<b># Mussel Species</b>	10	3	9	12	17
<b>Species Names</b>	Curtis Pearlymussel, Fat Pocketbook, Neosho Mucket, Ouachita Rock-Pocketbook, Pink Mucket, Scaleshell, Snuffbox, Speckled Pocketbook, Spectaclecase, Winged Mapleleaf	Arkansas Fatmucket, Louisiana Pearlyshel, Rabbitsfoot	Neosho Mucket, Ouachita Rock-Pocketbook, Snuffbox, Speckled Pocketbook, Winged Mapleleaf, Slippershell, Louisiana Pigtoe, Pink Heelsplitter Salamander	Fat Pocketbook, Pink Mucket, Scaleshell, Spectaclecase, Arkansas Fatmucket, Southern Pocketbook, "Red River" Fatmucket, Pyramid Pigtoe, Tapered Pondhorn, Pondhorn, Ellipse, Little Spectaclecase, Elktoe	Rabbitsfoot, Elktoe, Ozark Fanshell, Ozark Pigtoe, "Arkoma" Fatmucket, Hickorynut, Ohio Pigtoe, Round Pigtoe, Ouachita Kidneysshell, Southern Mapleleaf, Gulf Mapleleaf, Purple Lilliput, Lilliput, Texas Lilliput, Fawnsfoot, Bleedingtooth, Rainbow

- 585 facilities with active limits
  - 51 out of 585 did not have any limit changes
  - 428 saw a minimum of 1 limit value change
    - Limit changes ranged from none to 20.13 mg/L increases

Information for Rule 2 Stakeholder Workgroup

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May 19, 2022

- 357 facilities have been found to have failures with current limits
- 376 out of 585 fully reviewed facilities would have at least 1 failure with new criteria
- TRI data

2018	2019	2020
91,579.61 lb/yr	103,028.8 lb/yr	78,898.09 lb/yr

May 19, 2022

Temperature and pH-Dependent Values of the CMC (Acute Criterion Magnitude)

pH	Temperature (°C)																													
	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30									
6.5	51	48	44	41	37	34	32	29	27	25	23	21	19	18	16	15	14	13	12	11	10	9.9								
6.6	49	46	42	39	36	33	30	28	26	24	22	20	18	17	16	15	14	13	12	11	10	9.5								
6.7	46	44	40	37	34	31	29	27	24	22	21	19	18	16	15	14	13	12	11	10	9.8	9.0								
6.8	44	41	38	35	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5									
6.9	41	38	35	32	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9	7.3								
7.0	38	35	33	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7								
7.1	34	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7	6.0								
7.2	31	29	27	25	23	21	19	18	16	15	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.0	5.3								
7.3	27	26	24	22	20	18	17	16	14	13	12	11	10	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.1	4.7								
7.4	24	22	21	19	18	16	15	14	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.4	4.0								
7.5	21	19	18	17	15	14	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	3.8	3.5								
7.6	18	17	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.2	2.9								
7.7	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	2.9	2.5								
7.8	13	12	11	10	9.3	8.5	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5	2.1								
7.9	11	9.9	9.1	8.4	7.7	7.1	6.6	6.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1	1.7								
8.0	8.8	8.2	7.6	7.0	6.4	5.9	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.4								
8.1	7.2	6.8	6.3	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.1								
8.2	6.0	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.2								
8.3	4.9	4.6	4.3	3.9	3.6	3.3	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96	0.96								
8.4	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.98	0.90	0.83	0.79								
8.5	3.3	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.98	0.90	0.83	0.77	0.71	0.65								
8.6	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.58	0.54	0.54								
8.7	2.3	2.2	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45	0.45								
8.8	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.37								
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32	0.32								
9.0	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27	0.27								

May 19, 2022

Temperature and pH-Dependent Values of the CCC (Chronic Criterion Magnitude)

pH	Temperature (°C)																																		
	0-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30											
6.5	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7			
6.6	4.8	4.5	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6		
6.7	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6		
6.8	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6		
6.9	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	
7.0	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	
7.1	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4
7.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	
7.3	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3
7.4	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3
7.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3
7.6	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2
7.7	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2
7.8	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
7.9	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.1	1.5	1.5	1.4	1.3	1.2	1.1	1.1	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.2	1.3	1.2	1.2	1.1	1.0	0.9	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.3	1.1	1.1	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.4	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.5	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.7	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.8	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8.9	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
9.0	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

May 19, 2022

**Human Health**

EPA Human Health Exposure Inputs		
	1994	2015
<b>Body Weight</b>	70 kg	80 kg
<b>Fish Consumption</b>	17.5 g	22 g
<b>Drinking Water Intake</b>	2.0 L	2.4 L

The seven Human Health Criteria currently in Rule 2 were adopted per EPA’s request on February 15, 1990 and are for Organism + Water. These criteria were created using 7.5 g/d for fish consumption.

**Benzene** – New Human Health Criteria

- Carcinogen
- Exposure can cause anemia, decrease in blood platelets, and increased risk of cancer.

EPA 2015 Criteria
<b>Water + Organism (ug/L)</b>
0.58
*Values based on cancer risk factor of 10 <sup>-6</sup> and a cancer slope factor of either 0.015 or 0.055.

- 4 permitted facilities
  - All are capable of meeting the more stringent criteria at this time.
- DEQ does not have routine ambient water monitoring data for benzene.
- TRI data

2018	2019	2020
33.40 lb/yr	65.34 lb/yr	6.14 lb/yr

**Toluene** – New Human Health Criteria

- Non-carcinogenic
- Exposure can cause nervous system, kidney, or liver problems.
- More dangerous to children and pregnant women.

EPA 2015 Criteria
<b>Water + Organism (ug/L)</b>
57

- 3 permitted facilities with limits
- All are capable of meeting the more stringent criteria at this time.
- DEQ does not have routine monitoring data for toluene.
- TRI data

2018	2019	2020
49.02 lb/yr	116.17 lb/yr	24.69 lb/yr

May 19, 2022

**Ethylbenzene** – New Human Health Criteria

- Group D – inadequate data for human carcinogen determination
- Exposure can cause eye and throat irritation, vertigo and dizziness. May cause blood, liver, and kidney damage.

EPA 2015 Criteria
<b>Water + Organism (ug/L)</b>
68

- 4 permitted facilities with limits
  - All are capable of meeting the more stringent criteria at this time
- DEQ does not have routine ambient monitoring data for ethylbenzene.
- TRI data

2018	2019	2020
3.68 lb/yr	11.64 lb/yr	9.20 lb/yr

**Xylene** – New Human Health Criteria

- Exposure can cause irritation of the skin, eyes, nose, and throat; difficulty breathing; impaired lung function; impaired memory; stomach discomfort; headaches; lack of muscle coordination; changes in sense of balance; and possible changes in the liver and kidneys.

EPA 1992 Criteria
<b>MCL</b>
10 mg/L

- 1 permitted facility with report
- DEQ does not have routine monitoring data for xylene.
- TRI data

2018	2019	2020
19.31 lb/yr	63.50 lb/yr	39.01 lb/yr



May 19, 2022

**Phenol** – New Human Health Criteria

- Group D – inadequate data for human carcinogen determination
- Readily absorbed throughout the body.
  - o Highly irritating to the skin, eyes, and mucous membranes.
  - o Can cause anorexia, progressive weight loss, diarrhea, vertigo, salivation, dark coloration of the urine, and blood and liver effects.

EPA 2015 Criteria
<b>Water + Organism (mg/L)</b>
4

- 5 permitted facilities with 9 outfalls
  - o All are capable of meeting the proposed criteria at this time
- No monitoring data of ambient water quality for phenol.
- TRI data

2018	2019	2020
3 lb/yr	8 lb/yr	7 lb/yr

May 19, 2022

**Site specific dissolved oxygen (DO) for three assessment units**

This proposal is for the revision of current DO criteria to site specific DO criteria for three waterbody assessment units (AUs) located in West Central and Southwest Arkansas. The rationale behind the proposed criteria revision is based on existing and available water quality data from the Arkansas Department of Energy and Environment, Division of Environmental Quality (DEQ) Water Quality Monitoring Station (WQS) as well as biological data available for these AUs.

Site Name	Assessment Unit	Monitoring Station	Monitored Period	Current Critical Season Criterion	Proposed Critical Season Criterion
Saline River (Red River Basin)	AR_11140109_014	RED0032	9/4/1990-9/15/2020	6 mg/L	5 mg/L
Alum Fork Saline River	AR_08040203_014	OUA0216	6/1/2016-6/27/2018		
South Fork Ouachita River	AR_08040101_043	UWSFO01	6/21/1994-6/11/2018		

