

# Sulfate and Chloride Criteria

- Several years ago, EPA approved Iowa's sulfate and chloride criteria.
- Last year, the Commission adopted revised criteria for chloride and sulfate based on Iowa's criteria.
- EPA has not yet approved Missouri's criteria.

# Iowa's Current Chloride Criteria

- Use Designations
- Parameter
 

	B(CW1)	B(CW2)	B(WW-1)	B(WW-2)	B(WW-3)
B(LW) C HH					
Chloride Chronic	389(m)*	389(m)*	389(m)*	389(m)*	389(m)*
389(m)* — —					
Acute	629(m)*	629(m)*	629(m)*	629(m)*	629(m)*
— —					
MCL	—	—	—	—	—
250*					
- (m) **Acute and chronic criteria listed in main table are based on a hardness of 200 mg/l (as CaCO3 (mg/l)) and a sulfate concentration of 63 mg/l.** Numerical criteria (µg/l) for chloride are a function of hardness (CaCO3 (mg/l)) and sulfate (mg/l) using the equation for each use according to the following table:
- B(CW1) B(CW2) B(WW-1) B(WW-2) B(WW-3) B(LW)
- Acute  $287.8(\text{Hardness})^{0.205797}(\text{Sulfate})^{-0.07452}$
- Chronic  $177.87(\text{Hardness})^{0.205797}(\text{Sulfate})^{-0.07452}$

# Missouri's Current Chloride Criteria

**Table A**

<b>Pollutant (mg/L)</b>	<b>AQL</b>	<b>DWS</b>
Chloride chronic—	(+)	250
acute—	(+)	
Sulfate	(+)	250

+ See Non-Metals (Hardness Dependent).

Chloride (mg/L)

Acute:  $287.8 * (\text{Hardness})^{0.205797} * (\text{Sulfate})^{-0.07452}$

Chronic:  $177.87 * (\text{Hardness})^{0.205797} * (\text{Sulfate})^{-0.07452}$

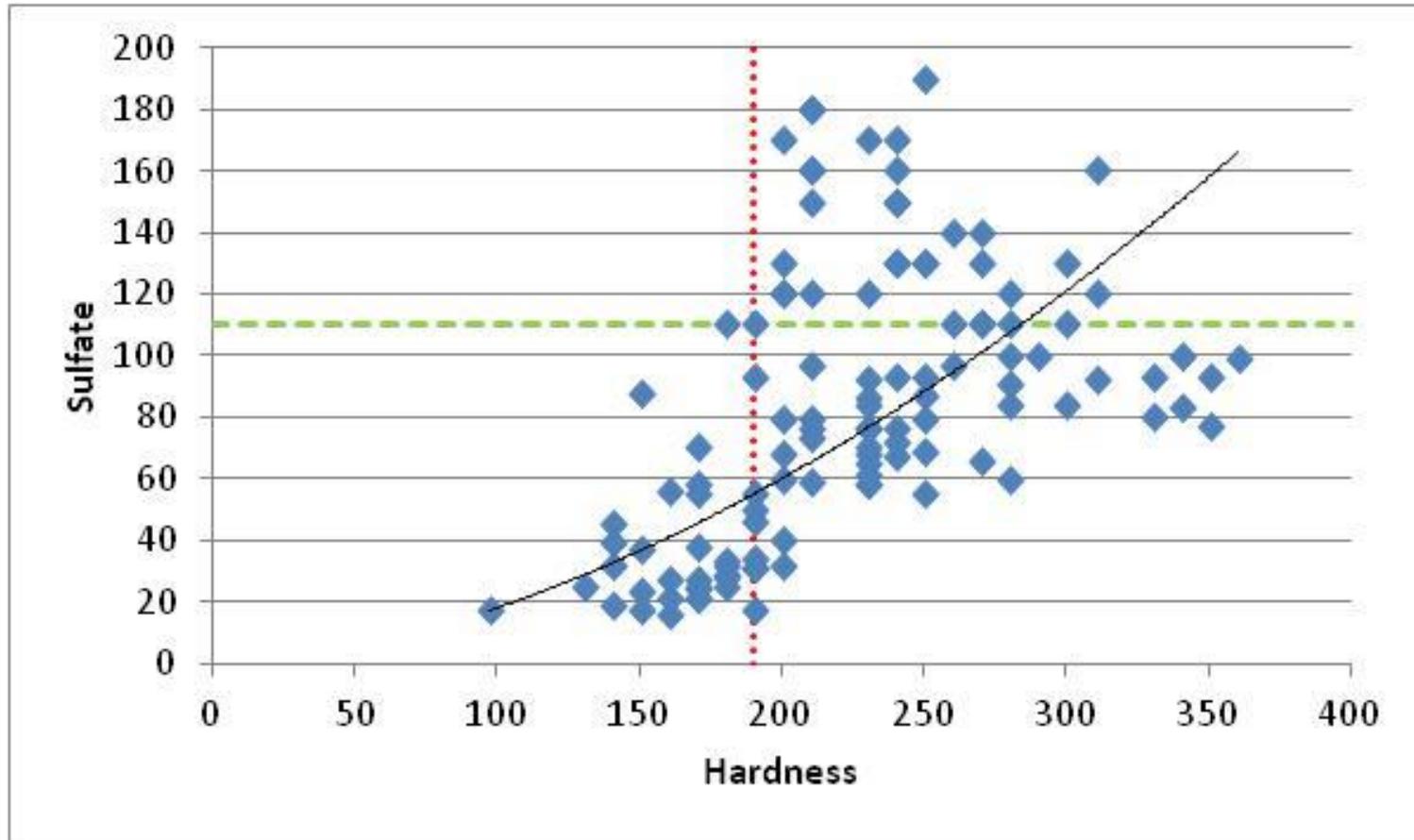
# Chloride Criteria

- EPA noted that Missouri's revised chloride criteria do not include default values for hardness or sulfate.
- Therefore, the revised criteria may not be approvable for that reason.

# MDNR's Proposed Rulemaking Order

- (L) Sulfate and Chloride Limit for Protection of Aquatic Life. Water contaminants shall not cause sulfate or chloride criteria to exceed the levels described in Table A. ~~Values for sulfate and chloride . . . shall be based on upper quartile (seventy-fifth percentile) values for the water body in question . . . . Upper quartile values shall be based on twelve or more surface water samples collected at least one (1) month apart under a representative range of flow conditions.~~

# Hardness and Sulfate Positive Correlation



# Proposed Revision to Missouri's Chloride Criteria

– Use of 162 mg/L hardness and 63 mg/L sulfate for acute and chronic default criteria (standard Missouri default values):

**Table A**

Pollutant (mg/L)	AQL	DWS
Chloride chronic—	<u>372</u> (+)	250
acute—	<u>602</u> (+)	
Sulfate	(+)	250

+ See Non-Metals (Hardness Dependent), below, for calculation of criteria based on site-specific values. In the absence of representative hardness and sulfate data from a given watershed or nearby watersheds, default chloride criteria presented above are based on default values of hardness and sulfate of 162 mg/L and 63 mg/L, respectively.

Non-Metals (Hardness Dependent)

Chloride (mg/L)      Acute:       $287.8 * (\text{Hardness})^{0.205797} * (\text{Sulfate})^{-0.07452}$   
                                  Chronic:       $177.87 * (\text{Hardness})^{0.205797} * (\text{Sulfate})^{-0.07452}$

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	B(CW1)	B(CW2)	B(WW-1)	B(WW-2)	B(WW-3)
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Chloride Chronic	389(m)*	389(m)*	389(m)*	389(m)*	389(m)*
389(m)* — —					
Acute	629(m)*	629(m)*	629(m)*	629(m)*	629(m)*
— —					
MCL	—	—	—	—	—
250*					
- (m) **Acute and chronic criteria listed in main table are based on a hardness of 200 mg/l (as CaCO3 (mg/l)) and a sulfate concentration of 63 mg/l.** Numerical criteria (µg/l) for chloride are a function of hardness (CaCO3 (mg/l)) and sulfate (mg/l) using the equation for each use according to the following table:
- B(CW1) B(CW2) B(WW-1) B(WW-2) B(WW-3) B(LW)
- Acute  $287.8(\text{Hardness})^{0.205797}(\text{Sulfate})^{-0.07452}$
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- The department agrees that it would not be appropriate to use the lower quartile (25<sup>th</sup> percentile) of hardness data and the upper quartile (75<sup>th</sup> percentile) of sulfate data to calculate criteria for chloride and sulfate. Sulfate and hardness are positively correlated. Therefore, the use of the 25<sup>th</sup> percentile hardness and 75<sup>th</sup> percentile sulfate values would result in overly protective criteria. In light of the significant and substantial changes proposed by commenters to this part of the rule, as well as a general lack of agreement among commenters on how the department should proceed. Consequently, the department recommends that the proposed language for Sulfate and Chloride Limit for Protection of Aquatic Life at 10 CSR 20-7.031(5)(L) be removed at this time. As EPA has pointed out, Missouri's rule does not include default values like the Iowa sulfate and chloride rules that were approved by EPA. To rectify this omission, the department recommends incorporating default value for hardness and sulfate of 162 and 63 mg/L respectively. This hardness value corresponds with the default the department uses in metal calculations. The sulfate number is the same number adopted by Iowa. These changes should put EPA in a position to provide conditional approval of the sulfate and chloride criteria. The department still recognizes the need for clarification on how to implement these criteria, and will continue to work with stakeholders to develop such procedures in a future rulemaking. Any action taken by EPA on this part of the previous rule will be taken into consideration at that time.