

Amendment to Exhibit F to Huntsville Petition

City of Huntsville, Arkansas Section 2.306 Site Specific Water Quality Study: Town Branch, Holman Creek, and War Eagle Creek ("the Study")

Revised pages 4,64,66,67 and 74 attached –revised language is underlined attached as well are letters received from the Arkansas Natural Resources Commission and from the Arkansas Department of Health, neither of which identify an existing domestic water supply use on the reaches of Town Branch or Holman Creek that are at issue in this Rulemaking

2.0 SIGNIFICANT FINDINGS AND RECOMMENDATIONS

2.1 Recommendations

The following recommendations are based on the information developed during this study of the Town Branch, Holman Creek and War Eagle Creek.

1. Criteria for the Town Branch, Holman Creek and War Eagle Creek should be amended as follows:

Town Branch from Point of Discharge of the City of Huntsville WWTP downstream to the confluence with Holman Creek			Holman Creek from the confluence with Town Branch downstream to the confluence with War Eagle Creek			War Eagle Creek from the confluence with Holman Creek		
Site Specific Criteria Proposed			Site Specific Criteria Proposed			Site Specific Criteria Proposed		
Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)
185	525	41	185	525	41	<u>130</u>	<u>407</u>	<u>30</u>

2. It should be specified that a critical background flow of 4.0 cfs be applied by listing Town Branch, and Holman Creek (with asterisks) in Reg. 2.511. The 4.0 cfs critical background flow was selected for each creek since they are both small watershed streams and un-gauged.
3. The critical background flow of 7.2 cfs (the 7Q10 for War Eagle at the Holman Creek confluence) was used in the development of the Site Specific Criteria (SSC) for War Eagle Creek. War Eagle Creek is a larger watershed stream and is gauged; therefore 7Q10 was selected as the critical background flow. At such time as Regulation 2 is amended to implement Act 954 of 2013, the proposed SSC could revert back to the present Ecoregion values.
4. Removal of the Domestic Water Supply use is requested for Town Branch beginning at Latitude 36.112330°, Longitude -93.732833° and extending downstream to its confluence with Holman Creek at Latitude 36.118158°, Longitude -93.736039°; and for Holman Creek beginning at its confluence with Town Branch at Latitude 36.118158°,

- Q_b = The background flow of the receiving stream (4.0 cfs or 7.2 cfs)
- C_b = The background concentration of chloride, sulfate or TDS in the receiving stream (ecoregion background values)
- Q_e = The discharge (design) flow of the City of Huntsville WWTF
- C_e = The effluent concentrations of chloride, sulfate or TDS from the City of Huntsville WWTF (estimated 95th percentile from data obtained during this study and from DMR data)

7.2.1 Methods

The procedure for evaluating instream concentrations and developing permit limits for dissolved minerals can be found in *ADEQ Discharge Permit, Toxic Control Implementation Procedure* in Arkansas' 1995 Continuing Planning Process (CPP). The values used for the background concentration are chloride (6 mg/L), sulfate (6 mg/L) and TDS (143 mg/L) in accordance with the CPP in Appendix D, *Mineral Implementation Policy*, for streams in the Ozark Highlands with a 7Q10 flow rate of less than 100 cfs. A background flow of 4 cfs was used ~~in each stream~~ for Town Branch and Holman Creek calculations, as allowed for determining instream mineral concentrations in the WQS. As stated in Appendix D of the referenced CPP, the critical flow of 4.0 cfs "provides for maintenance of the ecoregion mineral standard in all perennial fishery streams 50 percent of the time or more." The background flow for each calculation (for ~~all three streams~~ Town Branch and Holman Creek) was 4 cfs, i.e., the flows were not added together, so 4.0 cfs rather than ~~42.8~~ 8 cfs upstream flow was used for the Holman Creek calculations. Use of 4.0 cfs is also consistent with the Reg 2 definition of critical flow as used for minerals criteria implementation. For War Eagle Creek the 7Q10 flow was used; both to compare projected instream concentrations of minerals with the domestic water supply use criteria (see Section 7.3.2), and to derive recommended Site Specific Criteria. The City of Huntsville WWTF Outfall 001 effluent concentrations for chloride, TDS, and sulfate were derived from DMR data collected by City personnel during the study period and data collected during the monthly field sampling trips conducted during the period (7/6/2011 through 6/27/2012). The effluent data from the City of Huntsville WWTF were checked for normality, transformed if needed and 95th and 99th percentile values for chloride TDS, and sulfate calculated. Procedures used in the effluent data percentile calculation process are provided in Appendix C. The resulting percentile values are provided in Table 7.1.

7.2.3 Calculations for Holman Creek

The calculations used to determine the SSC for Holman Creek, below the confluence with Town Branch are as follows:

$$SSC_{\text{chloride}} = \frac{[(4 \text{ cfs} \times 6 \text{ mg/L}) + (3.1 \text{ cfs} \times 416 \text{ mg/L})]}{(4 \text{ cfs} + 3.1 \text{ cfs})} = 185 \text{ mg/L}$$

$$SSC_{\text{TDS}} = \frac{[(4 \text{ cfs} \times 143 \text{ mg/L}) + (3.1 \text{ cfs} \times 1019 \text{ mg/L})]}{(4 \text{ cfs} + 3.1 \text{ cfs})} = 525 \text{ mg/L}$$

$$SSC_{\text{sulfate}} = \frac{[(4 \text{ cfs} \times 6 \text{ mg/L}) + (3.1 \text{ cfs} \times 87 \text{ mg/L})]}{(4 \text{ cfs} + 3.1 \text{ cfs})} = 41 \text{ mg/L}$$

Values used in the calculation process for the determination of the site specific criteria for Holman Creek were as shown in Table 7.3.

Table 7.3. Calculation values, and the recommended site specific criteria for Holman Creek.

Parameters	Chloride	TDS	Sulfate
Qb, cfs	4.0	4.0	4.0
Cb, mg/L	6.0	143.0	6.0
Qe, cfs	3.1	3.1	3.1
Ce, mg/L	416	1019	87
Site Specific Criteria (mg/L)	185	525	41

7.2.4 Calculations for War Eagle Creek

The calculations used to determine the site specific criteria for War Eagle Creek are as follows:

$$SSC_{\text{chloride}} = \frac{[(4 \text{ cfs } \underline{7.2 \text{ cfs}} \times 6 \text{ mg/L}) + (3.1 \text{ cfs} \times 416 \text{ mg/L})]}{(4 \text{ cfs } \underline{7.2 \text{ cfs}} + 3.1 \text{ cfs})} = 185 \underline{130} \text{ mg/L}$$

$$SSC_{\text{TDS}} = \frac{[(4 \text{ cfs } \underline{7.2 \text{ cfs}} \times 143 \text{ mg/L}) + (3.1 \text{ cfs} \times 1019 \text{ mg/L})]}{(4 \text{ cfs } \underline{7.2 \text{ cfs}} + 3.1 \text{ cfs})} = 525 \underline{407} \text{ mg/L}$$

$$SSC_{\text{sulfate}} = \frac{[(4 \text{ cfs } \underline{7.2 \text{ cfs}} \times 6 \text{ mg/L}) + (3.1 \text{ cfs} \times 87 \text{ mg/L})]}{(4 \text{ cfs } \underline{7.2 \text{ cfs}} + 3.1 \text{ cfs})} = 41 \underline{30} \text{ mg/L}$$

Values used in the calculation process for the determination of the site specific criteria for War Eagle Creek were as shown in Table 7.4.

Table 7.4. Calculation values, and the recommended site specific criteria for War Eagle Creek.

Parameters	Chloride	TDS	Sulfate
Qb, cfs	4.0 <u>7.2</u>	4.0 <u>7.2</u>	4.0 <u>7.2</u>
Cb, mg/L	6.0	143.0	6.0
Qe, cfs	3.1	3.1	3.1
Ce, mg/L	416	1019	87
Site Specific Criteria (mg/L)	<u>185</u> <u>130</u>	<u>525</u> <u>407</u>	<u>41</u> <u>30</u>

The site specific criteria determined through the calculation process were then compared with the existing criteria. Table 7.5 provides this comparison.

Table 7.5. Comparison of proposed site specific criteria amendments and existing criteria for each stream.

Town Branch from Point of Discharge of Huntsville WWTP downstream to the confluence with Holman Creek			Holman Creek from the confluence with Town Branch downstream to the confluence with War Eagle Creek			War Eagle Creek from the confluence with Holman Creek downstream to Beaver Lake		
Site Specific Criteria Proposed			Site Specific Criteria Proposed			Site Specific Criteria Proposed		
Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)
185	525	41	185	525	41	<u>185</u> <u>130</u>	<u>525</u> <u>407</u>	<u>41</u> <u>30</u>
Calculated Ecoregion Reference Stream Values								
Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)
17.3	250	22.7	17.3	250	22.7	17.3	250	22.7

7.3 Drinking Water Use Water Quality Criteria

7.3.1 Drinking Water Use Removal

Fisheries uses are not the only use that drives minerals implementation (permitting) in Arkansas. In Arkansas the Domestic Water Supply use contains EPA's secondary drinking water recommendations for chloride, sulfate, and TDS. According to the Arkansas WQS (Reg. 2.511) and the Arkansas CPP (Appendix D) the Domestic Water Supply use applies at the critical flow (7Q10) with chloride, sulfate, and TDS, criteria of 250 mg/l, 250 mg/L and 500 mg/l, respectively.

Town Branch and Holman Creek are small (watershed sizes less than 30mi²) un-gauged streams and assumed to have a 7Q10 of 0 cfs. At this flow level the Domestic Water Supply use criteria become the permit limits at the end of pipe. Under this scenario the Domestic Water Supply

10.0 SELECTED ALTERNATIVE

Based on the facility biomonitoring record, the results of the aquatic life field study, the mass balance modeling, toxicity modeling, the USGS modeling effort, and the assessment of alternatives presented previously, the selected alternative is to modify the WQS using site specific criteria for chloride, TDS and sulfate as presented in the Table 10.1.

Table 10.1. Site Specific Criteria Recommendations.

Town Branch from Point of Discharge of Huntsville WWTP downstream to the confluence with Holman Creek			Holman Creek from the confluence with Town Branch downstream to the confluence with War Eagle Creek			War Eagle Creek from the confluence with Holman Creek downstream to Beaver Lake		
Site Specific Criteria Proposed			Site Specific Criteria Proposed			Site Specific Criteria Proposed*		
Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Sulfate (mg/L)
185	525	41	185	525	41	185 <u>130</u>	525 <u>407</u>	41 <u>30</u>

*It should be noted that at such time as Act 954 of 2013 has been implemented, using average flow, the proposed Site Specific Criteria for War Eagle Creek may revert back to the present Ecoregion values. The average flow of War Eagle Creek from the most current, uninterrupted data set (Oct 1998- current) is 310.7 cfs, or 1.181 cfs/mi². When adjusted for watershed size, the average flow of War Eagle Creek at the confluence with Holman Creek is 236.3 cfs. The discharge concentration of minerals will be below the Ecoregion values at average flow in War Eagle Creek as shown below:

Chloride =

$$[(236 \text{ cfs} \times 6 \text{ mg/L}) + (3.1 \text{ cfs} \times 416 \text{ mg/L}) / (236 \text{ cfs} + 3.1 \text{ cfs})] = 11.3 \text{ mg/L} (<17.3 \text{ mg/L})$$

TDS=

$$[(236 \text{ cfs} \times 143 \text{ mg/L}) + (3.1 \text{ cfs} \times 1019 \text{ mg/L}) / (236 \text{ cfs} + 3.1 \text{ cfs})] = 154.4 \text{ mg/L} (<250 \text{ mg/L})$$

Sulfate=

$$[(236 \text{ cfs} \times 6 \text{ mg/L}) + (3.1 \text{ cfs} \times 87 \text{ mg/L}) / (236 \text{ cfs} + 3.1 \text{ cfs})] = 7.1 \text{ mg/L} (<22.7 \text{ mg/L})$$



Arkansas Natural Resources Commission



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Mike Beebe
Governor

May 30, 2013

Mr. Shon Simpson
GBM^o & Associates
219 Brown Lane
Bryant, Arkansas 72022

RE: Domestic Water Supply Determination
GBM^o No. 4450-11-070

Dear Mr. Simpson:

In accordance with the State of Arkansas Continuing Planning Process and APCEC Regulation #2 requirements, Commission staff has reviewed the proposed removal of the Designated Domestic Water Supply Use from reaches of Town Branch and Holman Creek near Huntsville, Arkansas. It is noted that Holman Creek is a tributary to War Eagle Creek which is a tributary to Beaver Lake. There are no existing or planned public water supply uses documented for these reaches of Town Branch and Holman Creek. Therefore, the removal of the domestic water supply use designation does not conflict with the Arkansas Water Plan at this time.

If you have questions, don't hesitate to contact us at 501-3830.

Sincerely,

Kenneth W. Brazil, P.E.
Engineer Supervisor, Water Management

KWB/ddavis

cc. Vince Blubaugh, GBM^o & Associates



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April 9, 2013

Shon Simpson
GBMc & Associates
219 Brown In
Bryant, AR 72022

RE: Domestic Water Supply Determination
Town Branch & Holman Creek
GBMc No. 4450-11-075, Madison County, Arkansas

Dear Mr. Simpson,

The stream reaches of Town Branch and Holman Creek are tributaries of Beaver Lake and are considered domestic water supply source streams. Beaver Lake is the water source used by Beaver Water District, Benton-Washington Regional PWA, Carroll-Boone Water District, and Madison Co Regional Water which serve drinking water to approximately 390,00 people.

If you have any questions or comments, please coordinate them through Brad Jones at 501-661-2067.

Sincerely,

Lyle Godfrey, P.E.
Chief, Technical Support
Engineering Section

LG:DR:bj

CC: Beaver Water District, PO Box 400 Lowell, AR 72745
Benton-Washington Regional PWA 15531 Woods Lodge Rd., Rogers, AR 72756
Carroll-Boon Water District, 11510 Hwy 187, Eureka Springs, AR 72631
Madison Co Regional Water, 22701 Pinetop, Rogers, AR