Huntsville Water Utilities
P.O. Box 430
Huntsville, Arkansas 72740
501-738-6929

October 29, 2015

Mr. Doug Szenher
Arkansas Department of Environmental Quality
Public Outreach and Assistance Division
5301 Northshore Drive
North Little Rock, AR 72118.

Re: Proposed Rulemaking by the Cities of Harrison and Yellville for Crooked Creek

Dear Mr. Szenher:

In the Notice of Proposed Third-Party Rulemaking Public Hearing the Arkansas Pollution Control and Ecology Commission (APC&EC) invited the Public to comment on two specific questions. The first question regards rounding up of proposed new criteria to the nearest whole number for chloride and sulfate and to the nearest multiple of ten for total dissolved solids. The second question is whether proposed new criteria should correspond to the 99th percentile of relevant instream data.

Regarding the first question, the use of significant digits to the right of the decimal point suggests a higher degree of accuracy than typically exists in the analytical laboratory. Method 300.0, cited in this rulemaking as the method used to analyze chloride and sulfate, is not predictably accurate enough to produce results sufficient to derive criteria to the tenths of a milligram per liter. For example, Method 300.0 "Determination of Inorganic Anions by Ion Chromatography" lists single operator accuracy and bias for standard ions in various media including surface water and wastewater (EPA, 1993). For chloride in surface water the standard deviation (SD) for wastewater from 7 replicates of a known solution concentration is reported as 5.2 mg/L and for surface water the SD is 0.33 mg/L. For sulfates the wastewater SD reported is 6.4 mg/L and for surface water the SD is 1.7 mg/L. The City of Huntsville supports the rounding up convention.

With respect to the second question, whether the proposed new criteria should be revised to correspond to the 99th percentile of relevant instream data, the City of Huntsville supports the use of the 99th percentile. In some cases other statistical analysis, such as mean plus three

standard deviations may be useful when working with a normally distributed data set (this method matches the manner in which the ecoregion values in Regulation 2 were initially calculated). Our agreement with the use of a percentile basis higher than the 95th percentile, such as the 99th percentile, especially when working with limited measurements, is based on the analysis of data collected during a similar study.
In the Huntsville situation our conclusion was that the use of a 95th percentile of 12 instream samples would produce criteria that do not capture the full range of conditions that existed during the single yearlong study period. Because the full range of conditions was not reflected in the 12 instream samples, site specific criteria would be developed on lower variability than actually exists instream. Permit limits based upon these criteria would not be expected to be maintained all the time. Additionally, the possibility that the stream would return to the 303(d) List, even though the aquatic life communities are in excellent shape, is much enhanced.

In order to evaluate use of the 95th and 99th percentiles as a basis for criteria development we developed a linear regression relationship between discharge concentrations of dissolved minerals and those measured in the first downstream tributary. Statistical procedures are commonly employed with small data sets to improve the accuracy of the data. Procedures commonly used are correlation analysis and regression analysis. These statistical procedures can be used to predict water quality constituent concentrations in one waterbody, using data from a nearby similar waterbody or other source of water such as discharged effluent. The accuracy of the prediction depends upon the strength of the relationship between the two data sets. In our case, there are only 12 data points from Town Branch (TB-2), below the Huntsville NPDES outfall. There is a strong relationship (R^2=0.95) between outfall TDS concentration and the concentration of TDS measured below the outfall at station TB-2 (Figure 1). The strong relationship, which would be expected since the majority of the flow at TB-2 is usually from the outfall, can be used to predict instream concentrations based on effluent concentrations.

The R^2 value of 0.95 indicates that 95 percent of the time TDS at TB-2 can be predicted using the TDS from Outfall 001. Since there is much more TDS data for Outfall 001 (60 data points) that was collected during the study period (June 2011-June 2012) than there is for TB-2 (only 12 data points) the predicted data set is more powerful than the instream data and represents a more accurate range of water quality during the study period.

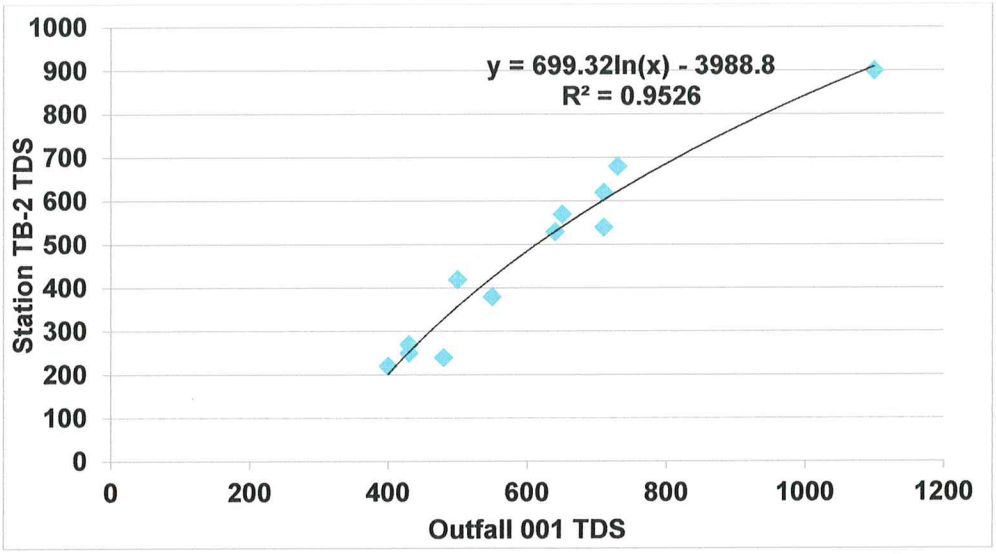

Figure 1. Plot of measured Outfall 001 TDS and measured Station TB-2 TDS.

The regression equation that was found to best fit (best predictive ability) for the outfall data and the TB-2 data was a logarithmic equation (Figure 1). When the Figure 1 equation is employed with the Outfall 001 TDS data to predict TDS at TB-2, a much larger data set is achieved, allowing variability to be more accurately assessed (Figure 2).

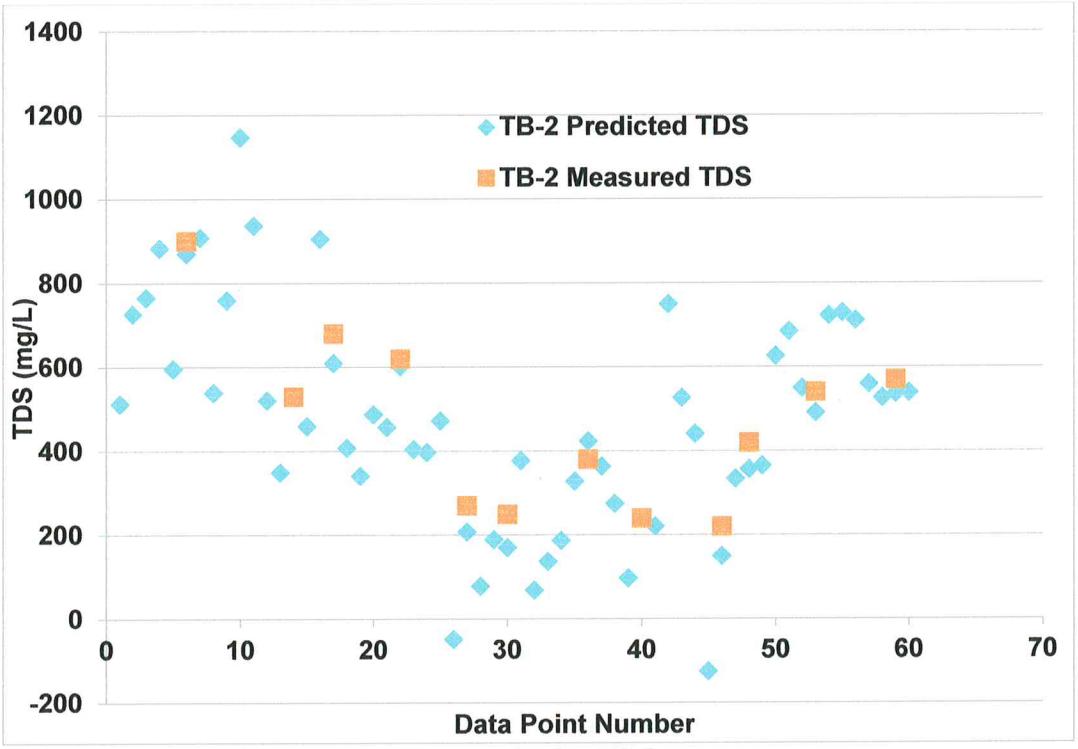

Figure 2. Measured and Predicted TDS at Station TB-2.

The 95th percentile of the predicted TDS data set is 906 mg/L and the 99th percentile for the predicted TDS data set is 1023 mg/L. As an example Table 1 compares the results of various percentiles based on measured values and predicted values for TDS.

Table 1. Comparison of Different Criteria Development Approaches.

Stream Reach	Total Dissolved Solids (mg/L) 12 Measurements		Total Dissolved Solids (mg/L) Predicted (regression)	
	99th Percentile	95th Percentile	99th Percentile	95th Percentile
Downstream from Huntsville Discharge	876	779	1023	906

The measured data 99th percentile based criteria are less than the values predicted by the correlation/regression analysis; (both 95th and 99th percentile value of the predicted data set) and thus can be considered conservative. The predictive values are likely much more representative of actual instream minerals levels than is the existing 12 data point data set.

Similar correlation and regression analysis procedures have been, and are being employed by EPA and other states in developing nutrient criteria, biological criteria, stressor response relationships and minerals criteria (using conductivity as a surrogate per EPA/600/R-10/023F).

The requirements for completing a minerals criteria modification study, pursuant to Reg. 2.306 have become much more expensive over time. Once these large criteria modification studies for minerals have been completed it makes no sense to place a permittee in jeopardy of having to repeat the study simply because the resulting criteria have been developed too conservatively. This could easily lead to re-listing the stream on the 303(d) list, or subjecting the permittee to permit compliance issues for discharging the same wastewater as existed during the study. It defeats the purpose of conducting such studies in the first place.

Thank you for the opportunity to provide this information.

Sincerely,

Larry D. Garrett

Larry Garrett
Executive Director, Huntsville Water Utilities