JUSTIFICATION FOR REVISIONS
TO OKLAHOMA'S WATER QUALITY STANDARDS
OAC 785:45

Rationale for Promulgation of an 0.037 mg/l Total Phosphorus Criteria
for Scenic River Protection
(For consideration in the 2001/2002 WQS Revision Process)

Oklahoma's Water Quality Standards (OAC 785:45) provide for protection of all Oklahoma waters through the assignment of beneficial uses, criteria to protect those beneficial uses, an antidegradation policy and the application of certain limitations for additional protection to special waters called implementation of the antidegradation policy. These limitations for additional protection are found at OAC 785:45-5-25 and are designed (among other things) to protect the Scenic River status of Oklahoma's Scenic Rivers. Both empirical and anecdotal evidence over the last two decades indicates that, although the beneficial uses of the Illinois River may not be impaired, its status as a Scenic River pursuant to Title 82 Chapter 21 of Oklahoma Statute is seriously threatened by excess nutrients. These nutrients - primarily phosphorus - are causing accelerated primary productivity in the Illinois, resulting in significant growths of both attached algae (periphyton) and suspended algae (phytoplankton). As a consequence, historical river clarity and substrate quality are being adversely affected to such an extent that, without intervention, the Illinois River's exceptional ecological and recreational significance is in jeopardy.

Unfortunately, the problems with ecological and recreational integrity on the Illinois River are also reflected in the other five Scenic Rivers. Although less pronounced and obvious to the public, the Baron Fork River, Flint Creek, Lee Creek, Little Lee Creek and the Upper Mountain Fork River above Broken Bow reservoir are all showing signs of adverse impacts from excess nutrients. As a result, it is recommended that any nutrient control strategy put into place be applied to all six Scenic Rivers.

To holistically address these problems and protect our Scenic Rivers, it is proposed that a numerical criterion be incorporated into the WQS applicable to total phosphorus for all six Scenic Rivers. While water quality management programs are already in place to protect designated beneficial uses, this numerical value should assure that water quality better than that necessary to support beneficial uses is achieved. Based upon input received through personal communications and at informal water quality standards meetings in late 2001, the general consensus is that Oklahoma's six Scenic Rivers should be "better than average" The numerical criterion should be promulgated for the Scenic Rivers in addition to the existing narrative limitations for additional protection of those streams. Consequently Scenic River water quality still will not be allowed to degrade even if the concentrations are below the proposed criterion.

OWRB staff initially recommended at the December 7, 2001 informal Water Quality Standards Development Informal Meeting that a numerical criterion be promulgated in

the Water Quality Standards Antidegradation Policy. This number was to protect our Scenic Rivers from excess total phosphorus such that they are among the top quarter of all similar rivers in Oklahoma and nearby states. The lower 25th percent threshold of all historical data from the nutrient ecoregion containing these 6 waters would be the basis for this criterion. This area generally includes eastern Oklahoma, southern Missouri, northern Arkansas, and western Tennessee and Kentucky. All data should be aggregated such that only those waters of roughly equivalent stream order are considered. Once established and implemented, this criterion would maintain the total phosphorus concentration within the six Scenic Rivers such that it represents the lowest/best 25% of all similar waters within the given area. Unfortunately, acquisition and manipulation of data necessary to determine such a value became problematic, prohibiting the promulgation of a total phosphorus criteria using this methodology in the 2001/2002 WQS Revision.

OWRB staff, however, investigated other statistical techniques appropriate for historical data. Note that EPA's July *2000 Nutrient Criteria Technical Guidance Manual for Rivers and Streams* (EPA-822-B-00-002) bases a substantial portion of their recommended nutrient criteria on the premise that the 25th percentile for nutrient on all streams in a given region is roughly equivalent to the 75th percentile of least impacted or reference quality streams. An analysis of nutrient values in relatively un-impacted basins is found in *Nutrient Concentrations and Yield in Undeveloped Stream Basins of the United States* (*Gregory M Clark, David K. Mueller and M. Alisa Mast; Journal of the American Water Resources Association Volume 36, No. 4 August 2000*). This research may thus be used as the basis for this comparison as it evaluates total phosphorus data on least impacted/reference sites. This report determined that 75 % of the streams assessed in these least impacted areas had a flow weighted total phosphorus concentration of 0.037 mg/L or less. This value is similar to the median total phosphorus concentration seen in the Baron Fork River and the relatively un-impacted Mountain Fork River from Oklahoma's Beneficial Use Monitoring Program (0.045 mg/L and 0.028 mg/L respectively. It is also consistent with USGS monitoring of the Baron Fork which results in a median concentration of 0.03 mg/L. OWRB staff therefore recommend that 0.037 mg/L of total phosphorus be promulgated as a numerical criterion to protect our Scenic Rivers.

It is further understood that nutrient concentration varies considerably across the hydrograph, being generally higher at high flow conditions than base flow conditions. It is not always known at what flow stage the various historical concentration data was collected. As a result, it would be very difficult to advance an instantaneous criteria translatable to a yearly loading value. We therefore believe that a long-term average value most accurately represents the averaging period appropriate for any statistically derived criteria.

The following underlined language is proposed for OAC 785:45-5-25(c) Implementation Policies for the Antidegradation Policy Statement:

(c) The following limitations for additional protection apply to various waters of the state:

(1) **Outstanding Resource Waters (ORW).**

(A) Outstanding Resource Waters (ORW) are those waters of the state which constitute outstanding resources or are of exceptional recreational and/or ecological significance as described in 785:45-3-2(a), Anti-Degradation Policy Statement.

(B) The following waterbodies are prohibited from having any new point source discharge(s) of
any pollutant or increased load of any pollutant from existing point source discharge(s):

(i) Waterbodies designated "ORW" and/or "Scenic River" in Appendix A of this Chapter;

(ii) Waterbodies located within the watersheds of waterbodies designated "Scenic River" in Appendix A of this Chapter ; and

(iii) Waterbodies located within the boundaries of Appendix B areas which are specifically designated "ORW" in Appendix A of this Chapter.

(C) In addition to other limitations applicable to waterbodies designated "Scenic River" in Appendix A of this Chapter, the thirty (30) day average total phosphorus concentration in such waters shall not exceed 0.037 mg/L.