



EPA Region 7 TMDL Review

TMDL ID: KS-UR-01-W088_1A
Waterbody ID: KS-UR-01-W088_1
Waterbody Name: ARIKAREE RIVER - PH
Tributary: ARIKAREE RIVER
Pollutant: PH
State: KS
HUC: 10250001
BASIN:
Submittal Date: 6/30/2006
Approved: Yes

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

Letter, dated June 30, 2006, and received by EPA on June 30, 2006, formally submitted this TMDL for approval under Section 303(d). A revised version was submitted by email on August 29, 2006.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

Most of the watershed is located in Colorado, cutting a corner in Kansas. Violations of the aquatic life criteria have occurred during the winter and spring months, during generally clear conditions, and more frequently when samples were taken later in the day.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The specific stream criteria for pH is not to exceed 8.5 for Special Aquatic Life Support (KAR 28-16-2Wc) (3) (A)).

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The current standard of pH not greater than 8.5 will be maintained for the monitoring site. The lack of clear causal relationships between elevated pH levels and other potentially influencing factors requires this TMDL to be updated when more information becomes available. In the interim, increases in riparian cover to reduce incident solar radiation will be implemented to reduce photosynthetic activity in the river.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Because pH is a function of complex interactions between organic and inorganic acids, bases, buffers, and living organisms, pH may vary substantially throughout the day in aquatic systems. The most likely source is a result of biological process perhaps related to nutrient enrichment. Nutrient enrichment has been associated with elevated pH levels in aquatic systems, as photosynthesis generates hydroxyls resulting from cleaved water molecules and concurrent use of the hydrogen ions by the photosynthetic community. Additionally, photosynthesis results in the uptake of CO₂, which reduces the concentration of its chemical equilibrium partner, carbonic acid (H₂CO₃), a potential buffer against excessively basic conditions. When CO₂ supply is limiting some algae use bicarbonate as a source of carbon for photosynthesis. The uptake of bicarbonate generates additional hydroxyl ions, which generates higher pH within the stream.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

Additional assessment will be necessary to ascertain the anthropogenic contributions to elevated pH conditions.

WLA Comment

A current Wasteload Allocation of zero for inorganic nitrogen and phosphorus is established by this TMDL because of the lack of point sources located within the state upstream of the sampling site.

LA Comment

Current conditions will be maintained, reflective of the lack of significant excursions since 1992.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The Margin of Safety provides some hedge against the uncertainty of loading and the pH endpoints for the Arikaree River system. Since there are no point sources discharging to the Arikaree River and it appears much of the water monitored at Site 227 arises from Colorado and Nebraska, the Margin of Safety will be implicit based on the conservative assumption that implementation of control practices on activities in Kansas will reduce non-point source contributions sufficiently to restore water quality and designated uses on the Kansas portion of the Arikaree River.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Seasonal variation has been incorporated in this TMDL through the documentation of seasonally elevated pH during winter and spring months.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

A Public Meeting to discuss TMDLs in the Upper Republican Basin was held March 2, 2006 in Atwood. An active Internet Web site was established at <http://www.kdheks.gov/tmdl/index.htm> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Upper Republican Basin. A Public Hearing on the TMDLs of the Upper Republican Basin was held in Atwood on March 2, 2006. The public comment period remained open until April 1, 2006.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

KDHE will continue to collect bimonthly samples at Station 226, including pH samples, in each of the three defined seasons. Based on that sampling, the TMDL will be evaluated in 2009. Should conditions over 8.5 pH arise over 2006-2008, this TMDL will be refined to investigate causal factors.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

Reasonable assurance not applicable because no point sources contributing to the impairment were identified.