# EPA Region 7 TMDL Review

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| **TMDL ID:** | KS-UR-01-W088-1C | **Waterbody ID:** | KS-UR-01-W088_1 |
| **Waterbody Name:** | ARIKAREE RIVER -- SULFATE | | |
| **Tributary:** | ARIKAREE RIVER | | |
| **Pollutant:** | SULFATE | | |
| **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. In Kansas, violations of the criteria occur more frequently during greater than average flow events during all three defined seasons, Winter: November-March, Spring: April-July, Summer-Fall: August-October (Table 1). The current Kansas criterion of 250 mg/L of sulfate was used to establish a load duration curve.

**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 KS water quality standard for sulfate: 250 mg/l for Domestic Water Supply (KAR 28-16-28e(c) (3)(A)) was used. This segment is designated for Special Aquatic Life Support, Primary Contact Recreation (C), Domestic Water Supply; Food Procurement; Ground Water Recharge; Industrial Water Supply Use; Irrigation Use; Livestock Watering Use.

**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 ultimate endpoint for this TMDL will be to achieve the Kansas Water Quality Standards fully supporting Domestic Water Supply. The current standard of 250 mg/L of sulfate was used to establish a load duration curve (Figure 4) for the monitoring site.

**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.*

If elevated sulfate levels in the Arikaree River occur in Kansas, they likely come from baseflow contributions after runoff events, or return flows from irrigated lands, and seasonally elevated alluvial aquifer and soil seepage during winter months, originating in Colorado.

**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.*

Field investigation by KDHE personnel during the winter of 2006 revealed that flows originating in the Haigler Ditch system contributed all flows at the KDHE monitoring site. The Arikaree River contained no flow in the Kansas segment, but had flow downstream of the Haigler Ditch return, located in Nebraska. While it is possible that the Arikaree River is impaired in Kansas, sampling at Haigler does not necessarily provide direct evidence of that impairment, given the multiple sources of water seen at Haigler that are not related to Kansas. The field investigation indicated that the channel of the Arikaree River in Kansas had not had flow for some time, based on the state of vegetation encroachment in the flow way. Therefore, to the extent that the impairment originates in Colorado and flows directly to Nebraska via the Haigler Ditch, the impairment is a concern for those states, and does not suggest action by Kansas.

**WLA Comment**

WLA is set at zero because there are no facilities in Kansas. The facility in Colorado, Genoa, CO. had a US Census figures 211 people in 2000.

**LA Comment**

The majority of the sulfate load in the Arikaree River appears to be irrigation related. At site 226 the Load Allocation based on the existing sulfate standard of 250 mg/L across all flow conditions and is 4995 pounds per day of sulfate at the median flow of 3.7 cfs.

**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 sulfate endpoints for the Arikaree River system. Since there are no point sources discharging to the Arikaree River 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 conservation 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 loads during winter low flow conditions.

**Public Participation**

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

Public meetings to discuss TMDLs in the Upper Republican Basin were 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. Public Hearings on the TMDLs of the Upper Republican Basin were held in Atwood on March 2, 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 sulfate samples, in each of the three defined seasons. Based on that sampling compliance with the 250 mg/l criterion will be evaluated in 2011 including sampling at the upstream Colorado state line during winter baseflow conditions.

**Reasonable assurance**

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

This is a non-point source only TMDL. The one facility in Colorado in not expected to be measurably contributing to the impairment.