



EPA Region 7 TMDL Review

TMDL ID: KS-UR-01-W088-1B **Waterbody ID:** KS-UR-01-W088_1
Waterbody Name: ARIKAREE RIVER-SELENIUM
Tributary: ARIKAREE RIVER
Pollutant: SELENIUM
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.

5 ug/L for Chronic Aquatic Life (KAR 28-16-28e(c)(2)(F)(ii)).

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.

Most of the watershed is located in Colorado, cutting a corner in Kansas. In Kansas, violations of the criteria occur more frequently during less than average flow events during all three defined seasons, Winter: November-March, Spring: April-July, Summer-Fall: August-October. exceedences occurred primarily during winter low flow conditions. Nebraska currently does not assess this river for selenium. Colorado has not included the Arikaree River on their 303(d) list, suggesting that Colorado also may not monitor this river for selenium. The current Kansas criterion of 5 ug/l for Chronic Aquatic Life was used to establish a load duration curve.

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.

Load Curves were established for the Aquatic Life criterion by multiplying the flow values along the curve by the applicable water quality criterion and converting the units to derive a load duration curve of pounds of selenium per day. These load curves represent the TMDL since any point along the curve denotes water quality for the standard at that flow. Historic excursions from the water quality standard are seen as plotted points above the load curve.

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.

Significant irrigation activity associated with corn production occurs in the Arikaree basin. Irrigation water is drawn from deepwater wells that tap the High Plains Aquifer and near surface withdrawals from alluvial sources. The likely source of the selenium in the Arikaree River is percolation through soils with moderate selenium levels discharged to the river either from elevated groundwater levels, baseflow contributions after runoff events, or return flows from irrigated lands. Selenium is widely distributed geologically, and occurs naturally at low levels in many soils. The presence of shale along the channel may also be a source of selenium. The extensive use and reuse of irrigation water can result in buildup of selenium over time, and that selenium may be mobilized when reduced evapo-transpiration demand and reduced irrigation withdrawals allow percolation through the soil and shale with subsequent transport to the river and its tributaries.

During periods of greater runoff, the predominant source of river water is likely surface runoff, which should be low in selenium. Elevated selenium levels have been noted in rivers draining irrigated agricultural catchments in other parts of Colorado, and have been attributed to increasing soil concentration resulting from buildup of chemical salts over time. Generally, violations of the water quality criteria have occurred during low-flow events during periods of low flow and during the off-season for irrigation.

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 selenium load in the Arikaree River appears to be background in nature. At site 226 the Load Allocation based on the existing selenium standard of 0.005 mg/L across all flow conditions is shown in a TMDL curve, and is 0.0999 pounds per day of selenium at the median flow of 3.7 cfs. The LA at station 226 will increase if the elevated background concentration (0.009 mg/L) becomes the applicable criteria (0.17982 lbs/day at 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 selenium 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. Incidentally, the Stage One criterion will remain in place until irrigation return flows can be discounted as a cause of the winter elevated selenium levels.

Seasonal Variation and Critical Conditions

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

Selenium concentrations at SC226 as a function of flow during the irrigation season. Samples were assigned Julian dates, and sorted. The irrigation season was defined as starting on Julian date 151 (the beginning of June) and ending on Julian date 280 (the end of September).

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 selenium samples, in each of the three defined seasons. Based on that sampling, application of numeric criterion based on background concentrations will be considered if irrigation return flows are eliminated as a source and conditions at SC226 reflect conditions within Kansas. If both situations are noted in the Arikaree River, the desired endpoint under this TMDL will be refined using the background concentration established by this TMDL.

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 is not expected to be measurably contributing to the impairment.