

# EPA Region 7 TMDL Review

 TMDL ID:
 KS-LA-10\_536-1
 Waterbody ID:
 KS-LA-10-524\_3, KS-LA-10-536\_1, KS-LA-10-536\_8, KS-LA-10-536\_9011, KS-LA-10-536\_9035

 Waterbody Name:
 LOWER ARKANSAS RIVER - HUTCHINSON TO MAIZE -- CL

 Tributary:
 SEE (ENCLOSURE A) FOR TRIBUTARIES COVERED UNDER THIS TMDL

 Pollutant:
 CHLORIDE

 State:
 KS

 BASIN:
 HUC:

 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 7, 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.

Chlorides in the Hutchinson vicinity remain high across the hydrologic spectrum, except at the highest flows resulting from overland runoff. Winter tends to have higher chloride levels because the season is dominated by ground water, much of which is high in chloride because of the underlying Permian deposits in the area. Spring and Summer have episodes of runoff in the region and streamflow generated from upstream areas. Salt Creek is an outlet of the upwelling saltwater from the Permian deposits south of the Arkansas River. The high chloride levels seen on Salt Creek are consistent over the four years of sampling.

## 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 Kansas chloride criteria for domestic Water Supply is 250 mg/L at any point of domestic water supply diversion (K.A.R.28-16-28e(c)(3)(A)). For aquatic life support [acute criterion] is 860 mg/l for (KAR 28-16-28e(c)(2)(D)(ii)).

# 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 Drinking Water Use. Kansas Water Quality Standards and their Implementation Procedures for Surface Water allow for a numerical criterion based on natural background concentrations to be established, particularly from ambient samples taken at flows less than median flows. Stage II end points have been set at the background concentrations at Sites 522 and 536 by chloride TMDLs pertaining to those reaches of Cow Creek and the Arkansas River, respectively. These endpoints are 300 mg/l at Site 522 and 620 mg/l at Site 536.

## **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.

Hydraulic head differentials between the Permian formations and the overlying Great Bend Prairie Aquifer upwells high chloride water into the fresher waters of the unconsolidated deposits at the surface. The resulting saltwater discharges to streams, predominantly south of the Arkansas River from the confluence of Rattlesnake Creek to Wichita.

Mixing curves of chloride and bromide/chloride and sulfate/chloride ratios indicate the river water represents a mix of freshwater with the Permian ground water and its high chloride content. The exception to this is at Station 522 on Cow Creek where there is a signal of oil-field brines, attributed to historic upstream energy extraction activities on either side of Lyons.

Irrigation return flows are not likely to occur, nor contribute chloride to the streams. Depletion by irrigation consumptive use, however, may cause a general rise in chlorides because of the reduction of freshwater discharged to the streams.

There are three wastewater treatment facilities that discharge flow and chloride into the Arkansas River and two facilities principally discharging to Cow Creek below Hutchinson. There also are a number of small dischargers to the streams that are unlikely to cause any influence on stream water quality.

## 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.

Mass balance analysis and suggested background levels were used to allocate the chloride loading among the sources. Table 5 lists the Wasteload Allocations for the three principal dischargers to the Arkansas River, the Load Allocation within the river itself from ground water contributions and the estimated downstream concentration of chloride. The Wasteload Allocations hold the three dischargers to close to their current average chloride concentration in their effluent at design flow. Total Wasteload Allocation is 42.3 tons per day. Load Allocations are set by the anticipated low flow seen on the Arkansas River and the background concentration.

# WLA Comment

For the mainstem, WLA 6.3 T/d, 13 T/d, and 23 T/d are set for S. Hutch, Hutchinson, and Morton facilities, respectively, for phase 1 of the TMDL. Other limits may be necessary for phase 2 depending on site specific criteria adopted in the future. Specific WLAs for individual facilities are detailed in Tables 3 and 4 of the document.

For Cow Creek, 6.3 T/d and 3.6 T/d were set for Cargill and Textron, respectively, in Scenario 9 (the only scenario which meet the in-stream concentration of 300 mg/l of chloride for phase one.)

For Salt Creek, the WLA is set to zero because there are no permitted facilities.

# LA Comment

Load Allocations are set by the anticipated low flow seen on the Arkansas River and the background concentration. This is estimated at 650 mg/l and at 30 cfs flow and would correspond to a LA of 52 tons/day; other examples of flow are also given in the TMDL.

The Load Allocation is set at the ambient stream flow and the background concentration of 1300 mg/l. At one cfs, the Load Allocation is 3.5 tons per day, at median flow of 5 cfs, it is 17.6 tons per day and at mean flow of 20 cfs it is 70 tons per day.

## **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 is implicitly set because the geology and ground water are the main contributors for the chloride impairment and the endpoints are established from the Winter data when man-made influences are minimal. Furthermore, loadings from the point sources typically act as a dilution base for natural chloride contributions, particularly during periods when the ambient levels are above the recommended background concentrations from this TMDL.

## **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 seasonal patterns of elevated chloride levels, especially during periods of low flows, extended drought, and winter-time 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 Lower Arkansas Basin were held on June 6, 2006. An active Internet Web site was established at http://www.kdhe.state.ks.us/tmdl/ to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Lower Arkansas Basin. Public Hearings on the TMDLs of the Lower Arkansas Basin were held in June 6, 2006 in Hutchinson. The Lower Arkansas Advisory Committee met to discuss the TMDLs in the basin on June 6, 2006 in Hutchinson.

# 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 Stations 287, 522, 523, 524, and 536, including chloride samples, in each of the three defined seasons over 2006-2011. Based on that sampling, the priority status will be evaluated in 2012 including application of numeric criterion based on background concentrations. Should impaired status remain, the desired endpoints under this TMDL will be refined and more intensive sampling will be needed under specified seasonal flow conditions after 2012. Monitoring of chloride levels in effluent will be a condition of NPDES and state permits for facilities. This monitoring will continually assess the contributions of chloride in the wastewater effluent released to the stream. Monitoring of upstream and downstream reaches relative to the facility outfall will be required so more accurate assessment of the impact of effluent chloride on streams may be determined.

# **Reasonable assurance**

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

Even zeroing out the WLA would not lead to compliance with the existing water quality standards because of natural background concentrations of chloride. This is a phased TMDL that recognizes the need to establish site specific water quality standards based on the natural background concentrations of chloride and the need for an adaptive management approach. The TMDL has established WLAs for the permitted facilities. Remediation projects are proposed in the area and the ultimate implementation of the projects will affect the Phase 2 TMDL allocations.