LOWER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: **Peace Creek**
Water Quality Impairment: Chloride

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Gar-Peace **Counties:** Reno, Stafford and Rice

HUC 8: 11030010

HUC 11 (HUC 14s)**:** **010** (020, 030, 040)

Drainage Area: 122.1 square miles

Main Stem Segments: WQLS: 6; starting at the confluence with the Arkansas River and traveling upstream to Stafford.

Designated Uses: Special Aquatic Life Support; Primary Contact Recreation; Food Procurement for Main Stem Segment

1998 303(d) Listing: Table 1 - Predominant Point Source and Non-point Source Impacts

Impaired Use: Special Aquatic Life Support

Water Quality Standard: 352 mg/l for Special Aquatic Life (KAR 28-16-28e(c)(2)(F)(ii))

In stream segments where background concentrations of naturally occurring substances, including chlorides and sulfates, exceed the water quality criteria listed in Table 1a of KAR 28-16-28e(d), at ambient flow, the existing water quality shall be maintained, and the newly established numeric criteria shall be the background concentration, as defined in KAR 28-16-28b(e). Background concentrations shall be established using the methods outlined in the "Kansas implementation procedures: surface water," dated June 1, 1999... (KAR 28-16-28e(b)(9)).

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 1998 303(d): Not Supporting Special Aquatic Life

Monitoring Sites: Station 658 near Sterling

Period of Record Used: 1992, 1996 and 1999 (Kansas Biological Survey samples for 1999)

Flow Record: Calculated flows based on USGS gaging sites 07142650 and 07142670

Long Term Flow Conditions: Median Flow = 2 cfs, 7Q10 = 1 cfs

Current Conditions: Since loading capacity varies as a function of the flow present in the stream, this TMDL represents a continuum of desired loads over all flow conditions, rather than fixed at a single value. The calculated flow duration data were examined from the Peace Creek Gaging Sites. The seasonal component of the duration data could not be examined because of lack of a permanent gage on Peace Creek. High flows and runoff equate to lower flow durations, baseflow and point source influences generally occur in the 75-99% range. A load curve was established for the chloride 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 tons of chloride per day. This load curve represents the TMDL since any point along the curve represents water quality at the standard at that flow. Historic excursions from WQS are seen as plotted points above the load curves. Water quality standards are met for those points plotting below the applicable load duration curves.

Excursions were seen at all times of the year. All of the samples from water quality site 658 were over the criteria. This would represent a baseline condition of non-support of the impaired designated use for the site.

NUMBER OF SAMPLES OVER CHLORIDE STANDARD OF 352 mg/L BY FLOW

Station	Season	0 to 10%	10 to 25%	25 to 50%	50 to 75%	75 to 90%	90 to 100%	Cum Freq.
Sterling (658)	Annual	0	2	1	5	4	2	13/13 = 100%

Desired Endpoints of Water Quality (Implied Load Capacity) at Site 658 over 2005 - 2010:

The ultimate endpoint for this TMDL will be to achieve the Kansas Water Quality Standards fully supporting Special Aquatic Life. This TMDL will, however, be phased. Kansas adopted a Chronic Aquatic Life standard of 352 mg/L of chloride, but EPA subsequently disapproved that standard. This standard was used to establish a load duration curved on the TMDL curve. It is recognized, however, that the Chronic Aquatic Life Standard will be revised in the future . A revised Chronic Aquatic Life TMDL curve will be established in Phase Two of this TMDL to reflect changes in this Standard.

Kansas Implementation Procedures for Surface Water allow for a numerical criterion based on natural background to be established using the mean concentration of in stream measurements gathered when stream flow was less than the median flow on the creek. The specific stream

criteria to supplant the general standard will be developed concurrent with Phase One of this TMDL following the appropriate administrative and technical Water Quality Standards processes. Meanwhile, a Phase Two endpoint has been developed for the creek based on currently available information and is 1,800 mg/L from data collected over 1992-1999 at flows equal to or less than 2 cfs. The Phase Two TMDL will be based on the future standard.

Seasonal variation has been incorporated in this TMDL through the documentation of the seasonal consistency of elevated chloride levels. Achievement of the endpoints indicate loads are within the loading capacity of the stream, water quality standards are attained and full support of the designated uses of the stream has been restored.

3. SOURCE INVENTORY AND ASSESSMENT

Groundwater from the Permian geologic formations underlying the Peace Creek watershed have a naturally high level of chloride. As the baseflow component in the watershed increases or becomes a more dominant factor in stream flow, so does the chloride concentration. The source of the chloride in the surface water can be attributed to this natural contribution from baseflow.

Although groundwater development in the watershed is minimal, saltwater movement to the stream may be induced by groundwater withdrawals causing upwelling of the fresh/salt water interface.

Some additional loading might be associated with brine from oil fields in the area. Additional monitoring will be required to determine the relative contribution of these sources.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Additional assessment will be necessary to ascertain the amount of natural chloride loading within the watershed. The following can be anticipated:

Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources in the watershed. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current wasteload allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers.

Non-Point Sources: The vast majority of chloride load is background in nature. The Load Allocation based on the existing standard will be 1,711 pounds per day at one cfs This allocation increases to 4.4 tons per day at one cfs if the elevated background concentration becomes the applicable criteria. These allocations also increase as a function of flow, doubling in value at the median flow of 2 cfs.

Defined Margin of Safety: The Margin of Safety will be ten percent of the applicable chloride load, or 190 pounds tons per day at one cfs. Again, the Margin of Safety increases to 970 pounds per day at one cfs if the elevated background concentration becomes the applicable criterion.

State Water Plan Implementation Priority: Because this watershed's chloride load is predominately natural in source this TMDL will be a Low Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Gar-Peace Subbasin (HUC 8: 11030010) with a priority ranking of 16 (High Priority for restoration work).

Priority HUC 11s and Stream Segments: Pending additional monitoring and assessment, no priority subwatersheds or stream segments should be identified until after 2005.

5. IMPLEMENTATION

Desired Implementation Activities

1. Establish appropriate background concentrations
2. Remediate brine discharges to streams

Implementation Programs Guidance

Water Quality Standards and Assessment - KDHE

a. Establish background levels of chloride for Peace Creek.

Conservation Program - Kansas Corporation Commission

a. Inventory, inspect and maintain any brine transport lines crossing streams within the watershed.

b. Ensure oil and gas extraction activities have spill prevention and appropriate brine storage practices in place.

c. Remediate by extraction and deep injection any brine disposal areas found to be contributing to elevated chloride conditions within the watershed.

Timeframe for Implementation: Continued monitoring over the years 2000 and 2004. Development of a background level- based water quality standard should be accomplished with the 2002 water quality standards.

Targeted Participants: Primary participants for implementation will be oil and gas operators within the watershed. Implementation should be targeted at those areas with greatest potential to impact the stream. Nominally, this would be activities located within one mile of the streams including:

1. Brine Disposal Areas
2. Active leases for oil and gas extraction
3. Historic oil and gas lease areas no longer in production

Milestone for 2006: The year 2006 marks the mid-point of the ten year implementation window for the watershed. At that point in time, additional monitoring data from Stations 658 will be re-examined to confirm the impaired status of the river and the suggested background concentration. Should the case of impairment remain, source assessment, allocation and implementation activities will ensue

Delivery Agents: The primary delivery agents for program participation will be the Kansas Department of Health and Environment and the Kansas Corporation Commission.

Reasonable Assurances

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollution.

1. K.S.A. 65-164 and 165 empowers the Secretary of KDHE to regulate the discharge of sewage into the waters of the state.

2. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.

3. K.S.A. 2-1915 empowers the Kansas Corporation Commission to develop programs to permit oil and gas activities, including the remediation of sites impacted by past operations.

4. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.

5. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.

6. The *Kansas Water Plan* and the Lower Arkansas River Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund, annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This TMDL is a Low Priority consideration and should not receive funding.

Effectiveness: Minimal control can be exerted on natural contributions to loading.

6. MONITORING

KDHE will continue to collect bimonthly samples in 2000 and 2004 at the rotational Station 658, including chloride samples. Based on that sampling, the status of 303(d) listing will be evaluated in 2006 including application of a numeric criteria based on background concentrations. Should impaired status remain, the desired endpoints under this TMDL will be refined and direct more intensive sampling will need to be conducted under specified seasonal flow conditions over the period 2005-2009.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Lower Arkansas River Basin were held March 9, 2000 and April 26-27, in Hutchinson, Wichita, Arkansas City and Medicine Lodge. 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 River Basin. A draft of this TMDL has been maintained on the website since June 1, 2000 and modifications to the original draft have been available to the public for viewing and review up to the date of submitting this TMDL to EPA.

Public Hearing: A Public Hearing on the original draft of these TMDLs of the Lower Arkansas River Basin was held in Wichita on June 1, 2000.

Basin Advisory Committee: The Lower Arkansas River Basin Advisory Committee met to discuss the TMDLs in the basin on September 27, and November 8, 1999; January 13 and March 9, 2000. The Committee recommended approval of the Basin Plan which set high priority TMDLs in the basin, thereby, delegating medium and low priority status to this and subsequent TMDLs for the basin. The Kansas Water Authority approved the Basin Plan on July 11, 2000.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:

Sedgwick County Technical Advisory Group: August 8, October 14, November 15, 1999 and January 20, 2000.
Agriculture: January 12, February 2 and 19, 2000.
Environmental: March 9, 2000.

Conservation Districts: November 22, 1999.
Industry: December 15, 1999, January 13, February 9 and 22, 2000.
Local Environmental Protection Groups: September 30, November 2, December 16, 1999.

Milestone Evaluation: In 2006, evaluation will be made as to the degree of impairment which has occurred within the watershed and current condition of Peace Creek. Subsequent decisions will be made regarding implementation approach and follow up on additional implementation in subwatersheds.

Consideration for 303(d) Delisting: Peace Creek will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2000-2005. Therefore, the decision for delisting will come about in the preparation of the 2006 303(d) list. Should modifications be made to applicable criterion during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process after Fiscal Year 2005.

Approved July 27, 2001.