KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: **Salt Creek Watershed**
Water Quality Impairment: Dissolved Oxygen

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Lower Republican **Counties:** Republic and Cloud

HUC 8: 10250017 **HUC 11:** 050

Drainage Area: 216.6 miles^2

Main Stem Segments: 19, 20, 22, & 23, starting at confluence of Republican River, headwaters in Republic County near Munden

Tributary Segments: Riley Creek (24)
Coal Creek (47)
West Salt Creek (25)
Turkey Creek (51)
East Creek (21)

Designated Uses: Expected Aquatic Life Support on Main Stem and Tributary Segments.

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

Impaired Use: Expected Aquatic Life Support on Main Stem and Tributary Segments.

Water Quality Standard: Dissolved Oxygen: 5 mg/l (KAR 28-16-28e(c)(2)(A))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Partially Supporting Aquatic Life Support

Monitoring Sites: Station 650 near Hollis

Period of Record Used: 1993 & 1997

Flow Record: Flow at Salt Creek is calculated from Mill Creek at Washington (USGS Station 06884200, Recorded daily data 1959 - 1997) by proportional drainage area.

Long Term Flow Conditions: 7Q10 = 1 cfs

Current Conditions: Excursion from the 5 mg/l criterion was seen once in the Summer-Fall (Jul.- Oct.) of 1997 under low flow conditions. DO concentrations were measured at 3.8 mg/l at an estimated flow of 2.5 cfs. The remaining 10 measurements taken over 1993 and 1997 were above the criterion, although June of 1997 saw a value at the 5 mg/l level. BOD concentrations at the time of excursion was 2.2 mg/l and ammonia concentrations were 0.3 mg/l. For the remainder of samples, the average BOD was 4.7 mg/l and average ammonia was 0.05 mg/l

Desired Endpoint Condition of Water Quality for Station 650 over 2004 - 2008

The desired endpoint will be reduced ammonia from artificial sources such that average ammonia concentrations average below 0.05 mg/l in the stream which results in no excursions below 5 mg/l of DO detected between 2004 - 2008, particularly at low flows in the summer and fall. Achievement of this endpoint will maintain full support of the aquatic life function of the creek and attain the dissolved oxygen water quality standard. Seasonal variation is accounted for by this TMDL, since the TMDL endpoint is sensitive to low flow conditions, generally occurring in late summer and fall.

This endpoint will be reached as a result of expected, though unspecified, reductions in loading from the various sources in the watershed resulting from implementation of corrective actions and Best Management Practices, as directed by this TMDL. Achievement of the endpoint indicates 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

NPDES: There is one NPDES permitted municipal wastewater discharger located within the watershed. Belleville uses a rotating biological contactor to treat its waste up to design flows of 0.46 MGD (0.71 cfs). The current permit expires in the year 2001.

Population projections through the year 2020 indicate a declining population for Belleville. Projections of future water use and resulting wastewater appear to be under design flows for the waste treatment system. Since the excursions from the water quality standards appear to occur under flow conditions of less than 65% duration and given the magnitude of the design flows of each of this system, the point source impact appears to be minimal to the watershed.

Livestock Waste Management Systems: Six operations are permitted within the watershed accounting for a potential of up to 2,540 animal units. Only one operation of the six is in the mainstem drainage area, a 35 animal unit dairy. All permitted livestock facilities have waste management systems designed to minimize runoff entering their operations or detaining runoff emanating from their areas. Such systems are designed for the 25 year, 24 hour rainfall/runoff event, which would be indicative of flow durations well under 10 percent of the time. The actual number of animal units on site is variable, but typically less than permitted numbers.

Land Use: Most of the watershed is either cropland or grassland (95% combined), with 60% of the watershed as cropland. Low dissolved oxygen concentrations are associated with condition of limited stream flow. The elimination of shade, primarily through the removal of woody riparian canopies exacerbates the problem by exposing surface water to direct sunlight and increasing water temperatures. Land use within 1,320 feet of the listed segments in the Salt Creek watershed shows that cropland still comprises 56% of the area, grassland 32%, while woodland is only 12%.

Actual permitted water use along Salt Creek and its tributaries tends to be from surface water sources. The chief surface water use is associated with irrigation (1996 water use reports) along the mainstem of Salt Creek and West Salt Creek. Most of the ground or surface water use relative to listed stream segments occurs along the mainstem and West Salt Creek. Since low flows are impacted by irrigation withdrawals, leaving little water for dilution or reaeration, it is imperative that loadings of material which would exert an oxygen demand be kept to a minimum.

Grazing density of livestock for the watershed is about 34 animal units/square mile. In 1997, inventories of cattle and swine in Republic and Cloud counties were 64,800 and 34,000 and 9,900 and 8,700, respectively. Twenty-four percent of Republic County and 6 percent of Cloud County lie within the watershed. Assuming an even distribution, up to 17,600 cattle should be in the watershed as well as 2,900 swine. However, given the lower grazing density in the watershed, actual numbers should be smaller, on the order of 7,400 animal units. Presuming the swine estimate is accurate, that would leave approximately 6,200 cattle (7,400 animals- 2,900 swine) in the watershed.

Since there are no permitted swine operations in the watershed, all the estimated 2,900 swine should be associated with small family farms.

The single permitted dairy has an allowance of about 35 animal units, which translates to roughly 25 dairy cows. The other remaining permitted cattle and beef operations would have about 2,500 head of cattle. The remaining cattle (estimated 3700 head) are likely dispersed throughout the watershed in smaller family operations (unpermitted) and on open range/grassland.

On-Site Water Systems: A number of residents within Cloud and Republic counties are in rural settings without sewer service, relying instead on septic systems. Failing septic systems contribute organic loadings. The infrequent excursions from the water quality standards seem to indicate a lack of persistent loadings from such systems on any grand scale. It is likely that the contribution of high nutrient and organic loads from septic systems is restricted to local areas. Furthermore, population projections for the two counties covering the watershed indicate a decrease in rural population to the year 2020, suggesting that proliferation of septic systems will not be occurring in the watershed. The number of inspections or investigations of on-site wastewater systems in the two counties number 4 for Republic and 32 for Cloud County over the last two years.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Point Sources: The single municipal wastewater system is currently designed to accommodate growth. All point sources are responsible to maintain their systems in proper working condition and appropriately handle anticipated wasteloads of their respective populations. Ongoing inspections and monitoring of the lagoons will be made to ensure that minimal contributions have been made by these sources.

The Wasteload Allocation is defined at the flow condition where the sum of the design flows represent more than 10% of the flow or the 7Q10, whichever is greater, thereby exerting influence on the water quality of the stream. For Salt Creek at this location, that flow condition would be flows of 0-7 cfs. Such flows have been exceeded 71 and 87% of the time during the Winter and Spring respectively. The critical period will be the Summer-Fall season, when 7 cfs has been exceeded only 58% of the time. Future NPDES and state permits will be conditioned such that BOD and ammonia limits are sufficient to prevent dissolved oxygen violations during July and August.

Non-Point Sources: The previous assessment suggests that livestock activities close to the stream under low flow conditions may contribute waste materials to the stream which would exert an oxygen demand. Given the limited runoff characteristics of the watershed, activities would need to be in proximity to the stream for waste material to influence the stream quality. Activities should be directed toward the smaller, unpermitted livestock operations utilizing the stream-riparian areas in the watershed. All six of the livestock facilities in the watershed rely on some system for wastewater detention and long holding times to minimize the release of waste and nutrients to receiving streams.

The Load Allocation assigns responsibility for maintaining water quality below the TMDL curve over flow conditions which are exceeded 1-87% of the time during the Spring, 1-58% of the time over the Summer and Fall and 1-71% of the time during the Winter. Best Management Practices will be directed toward those activities such that there will be minimal violation of the applicable dissolved oxygen criteria at lower flows. The Load Allocation will be to maintain ammonia concentrations below 0.04 mg/l thereby keeping dissolved oxygen above 5 mg/l particularly at flow conditions below 2.5 cfs in the watershed.

Defined Margin of Safety: Because of the uncertainty between loads exerting oxygen demand, the interaction of available streamflow and the resulting dissolved oxygen concentrations, the defined margin of safety will be additional reduction of at least 0.01 mg/l of instream ammonia below the desired endpoint, so that measured ammonia is below 0.04 mg/l in the stream under low flow conditions.

State Water Plan Implementation Priority: Because this watershed has had some problem with dissolved oxygen which has short term and immediate consequences for aquatic life and because this watershed has a number of impairments cited under TMDL development and because of the need to comprehensive package implementation measures to handle multiple pollutants in the agricultural setting, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Republican Subbasin (HUC 8: 10250017) with a ranking of 11 (Highest Priority for restoration work).

Priority HUC 11s and Stream Segments: Because of the presence of water rights on these streams which would be active under low flow conditions, focus should be made on Stream Segments 19, 20 and 22 and the lower reaches of Segments 25 and 21.

5. IMPLEMENTATION

Desired Implementation Activities

1. Renew necessary state and federal permits and inspect permitted facilities for permit compliance
2. Install necessary grass buffer strips along streams.
3. Remove feeding sites in proximity to streams
4. Reduce livestock use of riparian areas
5. Insure proper on-site waste system operations in proximity to main streams.

Implementation Programs Guidance

NPDES and State Permits - KDHE

a. Municipal permits for Belleville in the watershed will be renewed after 2001 with adequate limits on BOD from system.

b. Registered livestock facilities with less than 300 animal units will apply pollution prevention technologies.

Non-Point Source Pollution Technical Assistance - KDHE

a. Provide technical assistance on practices geared to small livestock operations which minimize impact to stream resources.

Water Resource Cost Share Program - SCC

a. Provide alternative water supplies to small livestock operations

Riparian Protection Program - SCC

a. Design feeding areas away from streams

b. Develop riparian restoration projects

Buffer Initiative Program - SCC

a. Install grass buffer strips near streams.

b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

a. Educate livestock producers on riparian techniques.
b. Continue Section 319 demonstration projects on livestock management.

Local Environmental Protection Program - KDHE

a. Inspect on-site waste systems within one mile of main tributary streams.

Time Frame for Implementation: Pollution reduction practices should be installed within the priority segments over the years 2000-2004, with minor follow up implementation, including other segments over 2004-2008.

Targeted Participants: Primary participants for implementation will be small scale livestock producers operating without need of permits within the priority segments. Implemented activities 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. Number of facilities without water quality controls
2. Number of unpermitted permanent feeding/holding areas
3. Sites where livestock have full access to stream and stream is primary water supply
4. Poor riparian sites
5. Failing on-site waste systems

Based on the local assessment, implementation activities should focus participation within those areas with greatest potential for impact on stream resources.

Milestone for 2004: The year 2004 marks the midpoint of the ten year implementation window for the watershed. At that point in time, milestones should be reached which will have at least two-thirds of the landowners responsible for the facilities and sites cited in the local assessment participating in the implementation programs provided by the state. Additionally, sampled data from Station 650 should indicate evidence of sustained oxygen levels over 5 mg/l at low flow conditions relative to the conditions seen over 1990-1998.

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension and agricultural interest groups such as Kansas Farm Bureau or Kansas Livestock Association. On-site waste system inspections will be performed by Local Environmental Protection Program personnel for Cloud and Republic counties.

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.A.R. 28-16-69 to -71 implements water quality protection by KDHE through the establishment and administration of critical water quality management areas on a watershed basis.

4. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.

5. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control non-point source pollution.

6. 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.

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

8. The *Kansas Water Plan* and the Kansas-Lower Republican 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 watershed and its TMDL is a High Priority consideration.

In State Fiscal Year 1999, the state provided to Cloud and Republic counties, $55,976 in State Water Plan Funds for non-point source pollution reduction. The Commission will decide State Fiscal Year 2000 allocations in May 1999 and is expected to direct similar amounts of funding to the two counties for the next fiscal year

Effectiveness: Isolation of activities from the stream is most effective in limiting the water quality impairments caused by those activities. Under low flow conditions, increased travel distance of waste will directly impact the introduction of that waste into the stream.

Should participation significantly lag below expectations over the next five years or monitoring indicates lack of progress in improving water quality conditions from those seen over 1990-1998, the state may employ more stringent conditions on agricultural producers in the watershed in order to meet the desired endpoints expressed in this TMDL. The state has the authority to impose conditions on activities with a significant potential to pollute the waters of the state under K.S.A. 65-171. If overall water quality conditions in the watershed deteriorate, a Critical Water Quality Management Area may be proposed for the watershed, in response.

6. MONITORING

KDHE should collect bimonthly samples at Station 650 in 2003, 2005 and 2007 in order to assess progress and success in implementing this TMDL. Samples should be taken primarily in Summer and Fall and at flows generally below 10 cfs.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the KLR Basin were held March 10, 1999 in Topeka, April 27 in Lawrence and April 29 in Manhattan. 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 Kansas-Lower Republican Basin.

Public Hearing: A Public Hearing on the TMDLs of the Kansas-Lower Republican Basin was held in Topeka on June 3, 1999.

Basin Advisory Committee: The Kansas-Lower Republican Basin Advisory Committee met to discuss the TMDLs in the basin on December 3, 1998; January 14, 1999; February 18, 1999; March 10, 1999; May 20, 1999 and June 3, 1999.

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

Agriculture: November 10, 1998; December 18, 1998; February 10, 1999; April 10, 1999, May 4, 1999, June 8, 1999 and June 18, 1999.

Municipal: November 12, 1998, January 25, 1999; March 1, 1999; May 10, 1999 and June 16, 1999.

Environmental: November 3, 1998; December 16, 1998; February 13, 1999; March 15, 1999, April 7, 1999 and May 3, 1999.

Conservation Districts: March 16-18, 24-25, 1999

Milestone Evaluation: In 2004, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Salt Creek. Subsequent decisions will be made regarding implementation approach, follow up of additional implementation and implementation in the nonpriority reaches.

Consideration for 303d Delisting: The streams in this watershed will be evaluated for delisting under Section 303d, based on the monitoring data over the period 2004-2008. Therefore, the decision for delisting will come about in the preparation of the 2008 303d list. Should modifications be made to the applicable water quality criteria 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 for Fiscal Years 2000-2004.

Approved January 26, 2000.