

**KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD**

**Waterbody: White Rock Creek  
Water Quality Impairment: Selenium**

**1. INTRODUCTION AND PROBLEM IDENTIFICATION**

**Subbasin:** Middle Republican

**County:** Jewell and Smith

**HUC 8:** 10250016

**HUC 11:** 130

**Drainage Area:** 341.7 sq. mi.

**Main Stem Segments:** 45, 47 and 49; starting at the inlet to Lovewell Reservoir and traveling upstream to eastern Smith County west of Highway 281 bridge.

**Tributary Segments:** Burr Oak Creek (48) - Predominantly Natural Source  
North Branch of White Rock Creek (60) - Predominantly Natural Source  
Ash Creek (65) - Predominantly Natural Source  
Antelope Creek (66) - Predominantly Natural Source  
Wolf Creek (67) - Predominantly Natural Source  
Long Branch (68) - Predominantly Natural Source

**Designated Uses:** Expected Aquatic Life Support; Primary Contact Recreation; and all other uses on Main Stem

**1998 303d Listing:** Table 1 - Predominant Non-point Source Impacts

**Impaired Use:** Expected Aquatic Life

**Water Quality Standard:** 5 µg/liter for Chronic Aquatic Life (KAR 28-16-28e(c)(2)(F)(ii))

In stream segments where background concentrations of naturally occurring substances, including chlorides, sulfates and selenium, 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 303d:** Not Supporting Expected Aquatic Life

**Monitoring Sites:** Station 508 near Burr Oak

**Period of Record Used:** 1990 to 1998

**Flow Record:** White Rock Creek flow was calculated seasonally (30 years of average daily streamflow) from White Rock Creek near Burr Oak (USGS Station 06853800).

**Long Term Flow Conditions:** Median flow = 6.5, 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. Flow duration data were examined from the Burr Oak Gaging Stations for each of the three defined seasons: Spring (Apr-Jun), Summer-Fall (Jul-Oct) and Winter (Nov-Mar). High flows and runoff equate to lower flow durations, baseflow and point source influences generally occur in the 85-99% range. Load curves were established for the selenium 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 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.

Excursion from WQS were seen for all seasons during the 1990 - 1998 sampling period. Thirty three percent of Spring samples and 60% of Summer-Fall samples were over the criterion. The Winter season experienced a 100% frequency of excursion from WQS. Overall 71% of the samples were over the criteria. This would represent a baseline condition of non-support of the impaired designated use.

**PERCENT OF SAMPLES OVER WATER QUALITY STANDARDS BY FLOW AND SEASON**

STREAM NAME	I M P A I R M E N T	S E A S O N	MAGNITUDE	DURATION					F R E Q U E N C Y	Current Condition of Water Quality at Site 508 Over 1990-1998
				0 TO 10 %	10 TO 30 %	30 TO 60 %	60 TO 90 %	90 TO 100 %		
WHITE ROCK CREEK	S E L E	S	% OVER MANAGE- MENT GOAL	0	33	0	0	0	1/3 = 33%	10/14 = 71% Exceedence
		S F	% OVER MANAGE- MENT GOAL	0	40	20	0	0	3/5 = 60%	
		W	% OVER MANAGE- MENT GOAL	51	34	17	0	0	6/6 = 100%	

**Desired Endpoints of Water Quality (Implied Load Capacity) at Site 508 over 2004 - 2008:**

Overall, the endpoint of this TMDL will be to reduce the percent of samples over the applicable developed criteria to less than 10% of samples taken over the monitoring period of 2004-2008. This TMDL endpoint meets water quality standards as measured and determined by Kansas Water Quality Assessment protocols. These assessment protocols are similar to those used to cite the stream segments in this watershed as impaired on the Kansas 1998 Section 303d list.

Consistent with the Kansas Implementation Procedures for Surface Water, a numeric criteria based on the background concentration may be developed using the mean concentration of instream measurements gathered when streamflow was less than the median flow on White Rock Creek. A minimum of five data points are needed to determine the background concentration. The median flow for White Rock Creek near Burr Oak is 6.5 cfs. During the 1990 to 1998 sampling period only 2 samples were collected below the median flow. More samples need to be collected below the median flow rate to establish a background concentration for selenium in White Rock Creek.

Seasonal endpoints will be developed in 2004 to reflect additional sampling and confirmation of impaired status. Seasonal variation incorporated in this TMDL through analysis of the seasonal consistency of elevated selenium 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

Runoff from this watershed drains soils high in selenium. Much of the water can be attributed to naturally high levels of selenium content. Some aggravation or impairment might be associated with irrigation return flows off lands with flood irrigation. The Bureau of Reclamation is currently assessing the selenium issue associated with the Lovewell irrigation lands and reservoir. There are no point sources associated with the issue, it is a non-point pollution situation with a mix of anthropogenic and natural contributions. Best management practices associated with irrigation return flows are likely to be recommended as part of the Bureau of Reclamation contract renewal for the Lovewell Irrigation District.

### 4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Additional sampling and assessment will be necessary to ascertain the amount of natural background selenium loading within the watershed and contributions due to irrigation return flows. The allocations will be non-point load allocation in orientation.

**Point Sources:** Since there are no point sources in the watershed, there will be no Wasteload Allocation under this TMDL.

**Non-Point Sources:** The selenium load is non-point in nature, including natural background levels. The Load Allocation will be in the range of 0.18 pounds per day of selenium at the median flow down to 0.03 pounds per day of selenium at the 7Q10.

**Defined Margin of Safety:** The Margin of Safety will be ten percent of the applicable selenium load, ranging from 0.02 pounds per day at median flow to 0.003 pounds per day at 7Q10.

**State Water Plan Implementation Priority:** Because this watershed has a very low potential for runoff and a background level of selenium loading has not been established at the monitoring site, this TMDL will be a Low Priority for implementation.

**Unified Watershed Assessment Priority Ranking:** This watershed lies within the Middle Republican River (HUC 8: 10250016) with a priority ranking of 48 (Low 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 2004.

## **5. IMPLEMENTATION**

### **Desired Implementation Activities**

1. Minimize anthropogenic oriented contributions of selenium loading to river.

### **Implementation Programs Guidance**

Until the 2004 assessment of the continuation of monitoring is made, no direction can be made to those implementation programs.

**Timeframe for Implementation:** Continued monitoring over the years 2000-2004.

**Targeted Participants:** No targets until 2004 assessment.

**Milestone for 2004:** The year 2004 marks the mid-point of the ten year implementation window for the watershed. At that point in time, additional monitoring data from Station 508 will be re-examined to establish a background concentration of selenium for the watershed. With the background level established, the data will be reviewed to confirm the impaired status of the streams within this watershed. Should the case of impairment remain, source assessment, allocation and implementation activities will ensue

**Delivery Agents:** Depending upon confirmation of impairment and assessment of probable sources, the primary delivery agents for program participation will be the Kansas Bostwick Irrigation District and the U.S. Bureau of Reclamation.

### **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 TMDL is a Low Priority consideration and should not receive funding until after 2004.

**Effectiveness:** Improvements in reducing selenium loading to streams can be accomplished through appropriate management of irrigation return flows. Minimal control can be exerted on natural contributions to loading.

## 6. MONITORING

KDHE will continue to collect bimonthly samples at Station 508, including selenium samples over each of the three defined seasons. Sampling below the median flow value of 6.5 cfs will be emphasized in order to establish a background level for selenium. Based on that sampling, the status of 303d listing will be evaluated in 2004. 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 2004-2008. The use of real time flow data on the White Rock at Burr Oak will be used to direct all sampling efforts in this watershed.

## 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 impairment present and what implementation is necessary within the watershed of the White Rock Creek and its current condition of water quality.

**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 1999-2003. Therefore, the decision for delisting will come about in the preparation of the 2004 303d list. Should the streams continue to be listed as impaired in 2004, the next evaluation for delisting will occur with the preparation of the 2008 Section 303d list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, development of desired endpoints of this TMDL and implementation activities will 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 Years 2004.

Approved January 26, 2000.