

KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Mission Lake
Water Quality Impairment: Atrazine

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Delaware

County: Brown

HUC 8: 10270103

HUC 11: 020 (Grasshopper Creek Watershed)

Drainage Area: Approximately 8.1 square miles.

Conservation Pool: 71 acres, maximum depth = 4 meters

Tributary Arm: Mission Creek

Designated Uses: Primary Contact Recreation; Food Procurement; Domestic Water Supply; Industrial Water Supply; Aquatic Life Support

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: Expected Aquatic Life Support and Domestic Water Supply are impaired from Atrazine

Water Quality Standard: Atrazine: 3 $\mu\text{g/l}$ (ppb) (KAR 28-16-28e(c)(2)(F)(ii) and (3)(A))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Not Supporting Aquatic Life

Monitoring Sites: Station 013601 in Mission Lake.

Period of Record Used: 1989, 1994, 1996, 1997, 1998

Lake Record:

Site Name	Date	Atrazine (ug/L)
LM013601	07/10/89	4.00000
LM013601	05/31/94	13.00000
LM013601	07/09/96	0.54000
LM013601	07/08/97	3.70000
LM013601	07/21/98	0.56000

Current Condition: Lake consistently has elevated Atrazine concentrations, averaging 4.4 ppb in the five surveys taken at the lake. Atrazine concentrations may be reducing based on subsequent improvements in application rates and incorporation since 1994.

Desired Endpoints of Water Quality at Mission Lake over 2004 - 2008

Overall, the endpoint of this TMDL will be to minimize the percent of samples over the atrazine criteria within Mission Lake, such that only one excursion from criterion is seen within a three-year period over 2004-2008. This TMDL endpoint meets water quality standards as measured and determined by Kansas Water Quality Assessment protocols and EPA guidance relative to toxicants. 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.

Seasonal variation in endpoints will not be defined by this TMDL since the reservoir integrates the spring runoff season with the high use summer season by its flow detention characteristics. The desired endpoint will apply to samples taken between April and September over 2004-2008. Monitoring data plotting below the applicable TMDL curves will indicate attainment of the water quality standards.

Atrazine levels in the seasonal flood pool between 1078' and 1082' will be above 3 ppb once in three years.

This endpoint will be reached as a result of expected 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 endpoints indicate loads are within the loading capacity of the lake, water quality standards are attained with minimal excursions and full support of the designated uses of the lake has been restored. Relative to domestic water supply, full support will be realized when samples do not exceed an annual average of 3 ppb nor are any drinking water use restriction in effect at Tuttle Creek.

3. SOURCE ASSESSMENT

The primary source of atrazine within Mission Lake is probably runoff from agricultural lands in the Mission Creek drainage where herbicide has been applied. Land use coverage analysis indicates 77% of the watershed is in cropland. In 1997, Brown County had 84,600 acres of corn, 25,600 acres of sorghum and 104,400 acres of soybeans planted. Similar ratios are expected within the Mission Creek drainage.

Soils in the watershed appear to be low in permeability (average permeability of 0.4"/hr). Under most conditions, 90-94% of the watershed will contribute runoff.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Point Sources: Since there are no point sources located in the lake watershed and this impairment is primarily associated with agricultural non-point source pollution, there will be no Wasteload Allocation assigned to point sources for nutrients under this TMDL.

Non-Point Sources: As described in the Source Assessment, the drainage has a high proportion of cropland and a strong propensity for runoff. The Load Allocation is estimated loadings of atrazine reduced by 25% annually in order to achieve full support of the lake uses, leaving 3.8 pounds of atrazine within the lake.

Defined Margin of Safety: The margin of safety will be taken as 0.3 pounds of atrazine below the load allocation, allowing 3.5 pounds to be retained by the lake.

State Water Plan Implementation Priority: Because this lake has a domestic water supply function, some activity in non-point source pollution reduction conducted under the Governor's Water Quality Initiative and is associated with other TMDLs regarding the water quality of Grasshopper Creek subwatershed 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 lake's watershed is in the Delaware Subbasin** (HUC8: 10270103). The Unified Watershed Assessment assigned a priority ranking of 3 to the Lower Kansas (Highest Priority for restoration work.)

Priority HUC 11s and Stream Segments: The drainage of this lake is within a single HUC 11 (020). The priority segment would be Mission Creek (40).

5. IMPLEMENTATION

Desired Implementation Activities

1. Implement proper mix of pesticide use best management practices, including incorporation, application timing, banding, alternative weed control and buffer zones
2. Implement necessary storage and handling site best management practices
3. Install necessary grass buffer strips along streams.
4. Increase label compliance by applicators
5. Harmonize water quality protection measures and use directions on labels of products containing atrazine

Implementation Programs Guidance

Non-Point Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of atrazine runoff from grain sorghum cropland.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.
- c. Guide federal programs such as the Environmental Quality Improvement Program, which are dedicated to priority subbasins through the Unified Watershed Assessment, to priority subwatersheds and stream segments within those subbasins identified by this TMDL.

Water Resource Cost Share & Non-Point Source Pollution Control Programs - SCC

- a. Provide pesticide management areas for storage, mixing and handling.
- b. Provide pesticide management practices to minimize pesticide spillage

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects in cropland areas

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 grain sorghum producers on pesticide management
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff and construction of pesticide handling pads

Pesticide Management Program - KDA

- a. Implement pesticide bulk containment regulations
- b. Increase label compliance by pesticide applicators
- c. Harmonize product labels regarding use and protection measures
- d. Continue basin pesticide education efforts through Kansas State and commodity associations

Timeframe for Implementation: Pollution reduction practices should be installed within the priority subwatershed and along the priority stream segments during the years 2000-2004

Targeted Participants: Primary participants for implementation will be agricultural producers operating within the drainages of the priority subwatersheds. Implemented activities should be

targeted at those areas with greatest potential to impact the lake. Nominally, this would be activities located within one mile of the streams including:

1. Total corn and sorghum acreage
2. Location of tile drain outlets draining into streams.
3. Location of pesticide storage, mixing and handling sites
4. Cultivated riparian areas
5. Number of pesticide applicators
6. Use of pesticide products containing atrazine

Some inventory of local needs should be conducted in 2000 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

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 eighty percent of the producers responsible for the land use activities cited in the local assessment participating in the implementation programs provided by the state. Additionally, sampled data from Mission Lake should indicate evidence of reduced atrazine levels in the conservation pool elevations relative to the conditions seen over 1988-1998.

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.

Reasonable Assurances:

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

1. K.S.A. 2-2439 empowers the Secretary of Agriculture to oversee pesticide management, registration and use in the state.
2. K.S.A. 2-2472 empowers the Secretary of Agriculture to establish Pesticide Management Areas to protect public health, safety and welfare and the natural resources of the state from pesticide pollution.
3. 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.

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 Brown County \$100,870 of 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 county for the next fiscal year. However, costs are likely to be associated with monitoring in the lake and watershed. Most pesticide application management practices can be made without cost-share considerations.

Effectiveness: Pesticide management has proven to be effective in reducing atrazine levels in Perry Lake. Many voluntary approaches were promoted through the Pesticide Management Area established on the Delaware River Subbasin. Most of those producers raised corn. The key to effectiveness will be equivalent participation by other producers in the Mission Lake drainage area. The milestones established under this TMDL are intended to gauge the level of participation in those programs implementing this TMDL.

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 through extension of the Pesticide Management Area in order to meet the desired endpoints expressed in this TMDL.

6. MONITORING

KDHE will continue to collect seasonal samples from Mission Lake twice in the five-year period 2000-2004 and twice during 2005-2008.

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 drainage and current condition of Mission Lake. Subsequent decisions will be made regarding implementation approach and follow up of additional implementation.

Consideration for 303d Delisting: Mission Lake 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.