KANSAS-LOWER REPUBLICAN BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: **Kansas River (Topeka)**
Water Quality Impairment: Ammonia

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Middle Kansas River **Counties**: Shawnee

HUC 8: 10270102 **HUC 11s**: Not applicable

Drainage Area: Approximately 500 sq. mi. between Topeka and Wamego

Main Stem Segments: 10; Main stem Kansas River between the Mission Creek confluence and the confluence with Soldier Creek

Tributary Segments: Not applicable

Designated Uses: Primary and Secondary Contact Recreation; Special Aquatic Life Support; Domestic Water Supply; Food Procurement; Irrigation; Industrial; Ground water Recharge; Livestock

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

Impaired Use: **Special Aquatic Life Support on Segment 10**

Water Quality Standard: **1.27 mg/l Ammonia (as N) at pH of 8.0**

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

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

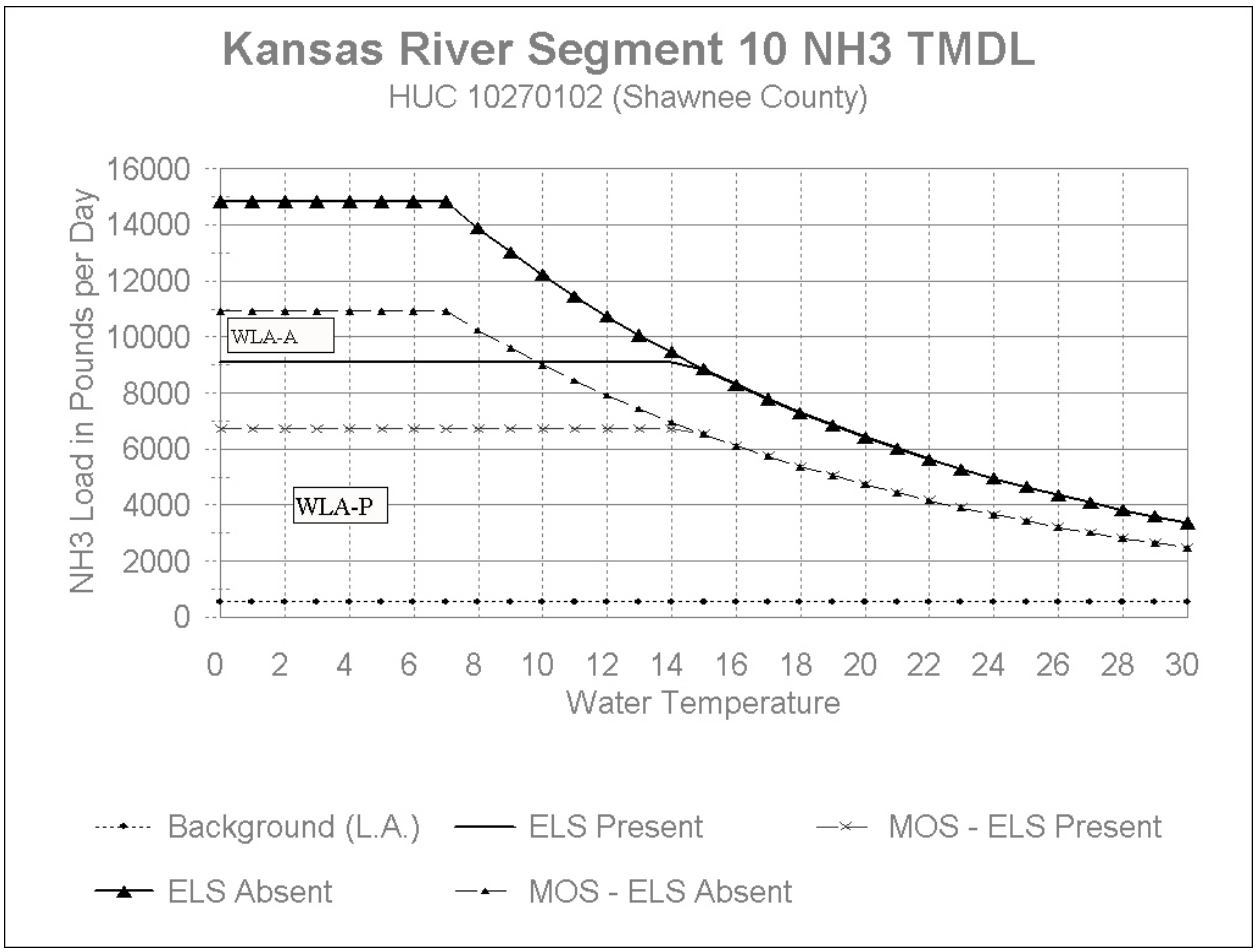
Monitoring Sites: Station 258 at Topeka; 143 at East of Topeka

Period of Record Used: Ammonia Wasteload Modeling was used

Flow Record: USGS Station 06889000: Recorded daily data 1968-1997

Long Term Flow Conditions: 30Q10 =670 cfs

Current Condition: Wasteload modeling indicates impairment to aquatic life from elevated ammonia concentrations in river at critical low flow. Because of Special Aquatic Life Use designation, mixing zones on the river are limited to 25% of the river within 300 meters downstream of the outfall.



Total Maximum Daily Load = 4600 Pounds per Day of Ammonia (as N)

3. SOURCE INVENTORY AND ASSESSMENT

NPDES: There are a number of NPDES permitted facilities along the river segment, however only two discharge ammonia under their permits. Both permits are held by the City of Topeka. Both permits have been expired since 1995.

North Topeka Plant has an existing permit to discharge up to 2 mg/l of Ammonia (as N) at a design flow of 12 MGD (18.6 cfs).

Topeka Oakland Plant is under an existing permit to discharge up to 17 mg/l of Ammonia (as N) at a design flow of 16 MGD (24.3 cfs).

Population projections for Topeka indicate that the city will likely grow by 20% by the year 2020, water use will grow as well but the increase in waste water going through the treatment system will remain within the design flow of the treatment plant, offsetting the need for an expansion in the foreseeable future. The city is in the process of upgrading the plant.

Non-point Sources: Because the impairment is anticipated under critical dry conditions, minimal non-point source contributions are anticipated. Analysis of low flows on tributaries to the Kansas River, indicate flows of under 1 cfs should be anticipated from these unregulated tributary streams. Background concentrations entering the reach are assumed to be 0.10 mg/l of Ammonia (as N), a value which is fairly supported by ambient data collected at the Willard sampling site on the Kansas River. Background concentrations entering the Oakland portion of the river is influenced by the ammonia loads from the North Topeka plant and should be about 0.15 mg/l of Ammonia (as N).

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

Point Sources: Wasteload Allocations for the whole river after accounting for background loads and a margin of safety are **3600 Pounds per Day of Ammonia (as N)**. Under existing permits, the North Topeka plant has a potential loading of 200 Pounds per Day of Ammonia (as N) and Oakland has 2270 Pounds per Day of Ammonia (as N). The total of these loadings is 2470 Pounds which is within the calculated Wasteload Allocation. However, the mixing zone policy of the Water Quality Standards restricts the mixing of the wastewater from these dischargers to 25% of the river. The mixing zone of the North Topeka Plant effluent is assimilitated to full mixing in the river at the Sardou Bridge marking the beginning of the reach receiving Oakland effluent.

By restricting the mixing zone to 25% of the river at Oakland, it effectively reduces the wasteload allocation to 25% of the whole river allocation or**1070 Pounds per Day of Ammonia (as N)**. Given this limited mixing zone, reductions in current potential loading will be necessary at the Oakland Plant. A total reduction of close to 50% is anticipated to be necessary to comply with the mixing zone requirements. Complicating the issue, dye studies and river modeling of the mixing zone indicate that the effluent plume from the plant hugs the downstream shore and is elongated for several miles. Therefore, for this stream segment, efforts will need to be taken to better diffuse the effluent into the receiving streamflow.

Non-Point Sources: Based on the instream background level of 0.15 mg/l of Ammonia (as N), the Load Allocation under this TMDL will be **540 Pounds per Day of Ammonia (as N)**. No other non-point source allocations are seen to be necessary.

Defined Margin of Safety: The Margin of Safety will be set at 10% of the TMDL or **460 Pounds of Ammonia (as N)**.

State Water Plan Implementation Priority: Because this stream segment may be improved through point source pollution reduction in a relatively short timeframe, this TMDL will be a **High Priority** for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Middle Kansas Subbasin (HUC 8: 10270102) with a **priority ranking of 4 (Highest Priority for restoration work).**

Priority HUC 11s and Stream Segments: Because of the point source nature of the TMDL, no attention needs to be directed to the adjoining HUC 11 subwatersheds. The priority stream segment of this TMDL will be the Kansas River receiving the wasteloads from the North Topeka and Oakland Plants; Stream Segment 10.

5. IMPLEMENTATION

Desired Implementation Activities

1. Issue NPDES permits with appropriate ammonia limits so water quality standards are met at critical low flow conditions.

Implementation Programs Guidance

NPDES - Municipal Program - KDHE

a. Issue renewed NPDES permit for Topeka with ammonia limits and schedule of compliance for any Oakland treatment plant upgrades which are necessary to reduce ammonia loading in order to meet water quality standards.

b. Evaluate any information on mixing zone geometry within Segment 10 to ascertain the appropriate level of diffusion and dilution of effluent which safely protects designated uses in the segment.

c. Evaluate information suggesting a 3-fold increase in winter limits in ammonia concentrations is permissible.

d. Evaluate projected population growth and associated wasteloads and sufficiency of treatment plant design to accommodate receiving waste.

e. Evaluate need for financial loan assistance to Topeka to fund treatment plant expansion and upgrade.

Timeframe for Implementation: NPDES Permits should be issued by 2000. Any necessary schedule of compliance should have initial phase begun before 2004. Treatment upgrades which are necessary should be completed prior to 2008.

Targeted Participants: Primary participants for implementation will be public works personnel at Topeka.

Milestone for 2004: The year 2004 marks the mid-point of the ten year implementation window for the segment. At that point in time, initial phases in plant upgrades necessary for compliance with the existing permit and the renewed permit issued by 2005.

Delivery Agents: KDHE staff in the Municipal Programs will develop the appropriate permits, schedules of compliance and review of plans. Review of technical information and studies will be made by KDHE staff of the Technical Services section and the Bureau of Environmental Field Services.

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. 65-3335 empowers the Secretary of KDHE to provide financial assistance for wastewater treatment through the State Revolving Loan Fund.

Funding: The State Revolving Loan Fund is operated through the Municipal Program at KDHE and provides low interest loans for wastewater treatment improvement. Since its inception, $128 million in loans have been made to municipal dischargers in the state.

Effectiveness: Nitrification techniques within mechanical treatment plans such as the North Topeka Plant have been very effective in reducing ammonia concentrations within wastewater effluent. Typical levels of ammonia concentrations from upgraded treatment are in the 2 mg/l range.

6. MONITORING

KDHE will continue to monitor streamflow, pH, temperature and ammonia along the Kansas River. Intensive sampling will be made if flow conditions fall below 670 cfs at the Topeka gage. Routine sampling of effluent quality will be a condition of the issued permits with testing frequency consistent with Kansas Surface Water Implementation Procedures.

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 and May 4, 1999.

Municipal: November 12, 1998, January 25, 1999; March 1, 1999; and May 10, 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 permit compliance by Topeka. Adjustments to any schedule of compliance will be made to permits issued by 2005.

Consideration for 303d Delisting: This stream segment will be evaluated for delisting under Section 303d, based on the compliance with the permits issued by 2000. If any necessary upgrades in treatment are in place prior to 2004, the stream may be delisted in the 2004 303d list. Any upgrades which will be completed prior to 2008 will support delisting in the 2008 303d list. Should modifications be made to the applicable water quality criteria during 2000-2008, considerations for continued listing or earlier delisting may be made over the next ten years.

Incorporation into Continuing Planning Process, Water Quality Management Plan: 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.

Approved April 28, 2000.