



## EPA Region 7 TMDL Review

TMDL ID:NE-MT1-10100

State: NE

**Document Name:**

PAPILLION CREEK WATERSHED

**Basin(s):** MISSOURI TRIBUTARIES RIVER BASIN

**HUC(s):** 10230001, 10230006

**Water body(ies):** BIG PAPILLION CREEK, MISSOURI RIVER, OMAHA CREEK,  
PAPILLION CREEK, WEST PAPILLION CREEK

**Tributary(ies):** BUTTER FLAT CREEK, COLE CREEK, LITTLE PAPILLION CREEK,  
THOMAS CREEK

**Pollutant(s):** E. COLI

**Submittal Date:**4/6/2009

**Approved:**Yes

### Submittal Letter

*State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.*

The TMDL document for Papillion Creek Watershed was officially submitted by the Nebraska Department of Environmental Quality (NDEQ) with a cover letter sent March 31, 2009, and received by the U.S. Environmental Protection Agency (EPA) on April 6, 2009. A revised version of the TMDL was submitted by email attachment on May 20, 2009.

### Water Quality Standards Attainment

*The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.*

The Papillion Creek Watershed LC is expressed through the use of a load duration curve (LDC) for each of the impaired segments. The relationship between the targeted pollutant and the WQS is direct. The TMDL target is based on the numeric water quality criteria for *E. coli* bacteria of less than or equal to ( $\leq$ )126/100 milliliters (ml) as a 30 day geometric mean. The TMDL for the segments are given as percent reductions by segments listed below.

#### Targeted *E. coli* Load Reduction

Segment WBID	Targeted Reduction
MT1-10100	94%
MT1-10110	94%
MT1-10111	96%
MT1-10111.1	98%
MT1-10120	93%
MT1-10200	87%

The allowable pollutant load is based upon the available stream flow volume. That is, LCs are developed for each flow by multiplying the WQS by the selected stream flow and a conversion factor (C) with the equation being defined by:  $LC = WQS * Flow * C$

For example, at segment MT1-10100 with a flow of 39 cubic feet per second (cfs) (50 percent flow) has a LC for *E. coli* bacteria of 3.545E+11/100 ml. The TMDL and allocations are set at a level adequate to result in attainment of applicable WQS.

### Numeric Target(s)

*Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.*

The pollutant causing the impairment(s) of the WQS designated beneficial use is *E. coli* bacteria. Assigned beneficial uses for all listed segments are Primary Contact Recreation, Aquatic Life Warm Water Class A & B; Agriculture water supply Class A and Aesthetics (NDEQ 2006a). Excessive *E. coli* had been determined to be impairing the primary contact recreation beneficial use. Water quality targets for *E. coli* bacteria are 126/100 ml as a geometric mean and will apply to all segments listed in this TMDL during the recreational period of May 1 - September 30.

### Pollutant(s) of concern

*An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.*

The TMDL target is based directly on the numeric water quality criteria for *E. coli* bacteria of  $\leq 126/100$  ml, a 10% MOS has been assigned. The LA for *E. coli* bacteria is  $\leq 113/100$  ml. All dischargers have a WLA of *E. coli* bacteria  $\leq 126/100$  ml; non dischargers have a WLA of zero (0).

### Source Analysis

*Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.*

Land Uses: The majority of the basin is urbanized with the far reaches remaining as agricultural land. The anticipated build out date for the watershed is 2040 with about 3-4 square miles of land consumption per year. Urbanization includes areas that are developed as clustered residential.

Sources of *E. coli* bacteria in the watershed for all segments include both point and nonpoint sources (including natural sources). Loads are quantified with flow duration curves. Point sources include specific permitted sources given in the TMDL by segments. There are two National Pollutant Discharge Elimination System (NPDES) permitted waste water treatment facilities (WWTF) that discharge either directly to or into a tributary of the Papillion Creek Watershed. The two NPDES point sources are listed below.

**NPDES Point Sources Discharging to the Papillion Creek Watershed**

Recreation Segment	Receiving Water	Facility	NPDES Permit Number
MT1-10120	Big Papillion Creek	Kennard WWTF	NE0122157
MT1-10200	West Papillion Creek	Elkhorn WWTF	NE0040096

Along with the more traditional NPDES permits, a combined sewer system overflow (CSO) permit has been

issued to the City of Omaha and municipal separate storm sewer system (MS4) permits have been issued to the City of Omaha and other entities in the urbanized area. The permitted facilities are listed below.

**NPDES Permits for Papillion Stormwater and CSO Discharges**

Facility/Entity	Permit Identification	Discharge Type
Boys and Girls Town	NER200006	MS4
City of Bellevue	NER200002	MS4
City of Elkhorn (Omaha)	NER200008	MS4
City of LaVista	NER200005	MS4
City of Omaha	NE0133698	MS4
City of Omaha	NE0133680	CSO
City of Papillion	NER200003	MS4
City of Ralston	NER200004	MS4
Douglas County	NER200001	MS4
Sarpy County	NER200007	MS4

Additional point sources are identified as contributing to the *E. coli* impairment within all of the main stem segments that include numerous animal feeding operations and possible illicit discharges; livestock waste control facilities LWCF if the operation has discharged, or has the potential to discharge and livestock waste to waters of the state are also considered potential sources. Figure 2.1.5.1b in the TMDL, shows the facilities within the Papillion Creek Watershed that have been issued or requested a permit. These facilities are designed to contain any run-off that is generated by storm events that are less in intensity than the 25-year, 24-hour rainfall. A map showing animal feeding operations in the Papillion Creek Watershed that have been issued, are requesting a State Construction or Operating Permit, or requesting an inspection, are provided within the TMDL. Any animal feeding operations with sufficient number of animals to warrant a NPDES permit will have full containment of their wastewater as a condition of the permit.

**Nonpoint Sources:**

Sources accounted for as nonpoint sources for purposes of this TMDL include failing septic tanks, onsite wastewater systems, runoff from livestock pastures, improper or over application of biosolids, and urban storm water not regulated by an NPDES permit.

A variety of wildlife is native to or have adapted to the diverse habitat of the Papillion Creek Watershed. Big game, upland game, furbearers, waterfowl, and non-game species have been documented to reside within the basin. Due to the diverse nature, distribution and delivery method, nonpoint and natural sources will not be separated. The monitoring data that fall to the left of the boundary are considered to be the result of nonpoint and natural background sources. The primary natural source of *E. coli* is wildlife.

In the absence of an NPDES permit, the discharges associated with sources were applied to the LA, as opposed to the WLA for purposes of this TMDL. The decision to allocate these sources to the LA does not reflect any determination by EPA as to whether they are, in fact, unpermitted point source discharges within this watershed. In addition, by establishing these TMDLs with some sources treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in this TMDL are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated  $\sum$ WLA in this TMDL. WLA in addition to that allocated here is not available.

It appears all known sources have been considered.

**Allocation - Loading Capacity**

*Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2 (i)]. If this is a phase II TMDL the change in LC will be documented in this section.*

Both point sources and nonpoint sources (including natural sources) have been identified to be contributing to the pollutant loads being delivered to Papillion Creek Watershed.

A TMDL is defined as:

$$LC \text{ (TMDL)} = WLA + LA + \text{Background} + MOS$$

The LC is based upon flow position in the hydrograph and is defined by:

$$LC = \text{Flow} * E. coli \text{ bacteria } 126/100 \text{ ml} * C$$

**WLA Comment**

Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.

For *E. coli*, the WLA of NPDES permitted facilities are set at an *E. coli* bacteria monthly geometric mean of 126/100 ml. These water quality criteria are applied to "end-of-pipe" concentrations and are applicable at all stream flows greater than the 7-day, 10-year low flow. WLA for facilities classified as non-discharging will be zero (0). The daily load can be calculated by multiplying the effluent flow by 126/100 ml by a conversion factor. For example at segment MT1-10200 with a flow of 39 cfs (50 percent flow), the WLA would be 4.78E+09/day. The daily load expression for all segments is found in Appendix B in the TMDL. Any animal feeding operations with sufficient number of animals to warrant a NPDES permit will have full containment of their wastewater as a condition of the permit. The WLA for any such operation is zero.

**WLA Daily Load**

Percent of Flows Exceed	MT1-10100	MT1-10110	MT1-10111	MT1-10111.1	MT1-10120	MT1-10200
100%	0	0	0	0	9.25E+05	9.63E+08
90%	0	0	0	0	9.25E+05	4.78E+09
80%	0	0	0	0	9.25E+05	4.78E+09
70%	0	0	0	0	9.25E+05	4.78E+09
60%	0	0	0	0	9.25E+05	4.78E+09
50%	0	0	0	0	9.25E+05	4.78E+09
40%	0	0	0	0	9.25E+05	4.78E+09
30%	0	0	0	0	9.25E+05	4.78E+09
20%	0	0	0	0	9.25E+05	4.78E+09
10%	0	0	0	0	9.25E+05	4.78E+09
0%	0	0	0	0	9.25E+05	4.78E+09

**LA Comment**

Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.

Calculation of daily loads requires flow at percentiles of exceedance given in a load duration curve. The targeted LA for *E. coli* bacteria are given by coliform forming units (cfu)/day loads in the table below. The LA is calculated for each interval as follows:  $LA_i = Q_i * 126/100 \text{ ml} * C$ .

**LA Daily Load**

Percent of Flows Exceed	MT1-10100	MT1-10110	MT1-10111	MT1-10111.1	MT1-10120	MT1-10200
80%	1.66E+11	1.03E+11	2.5E+10	6.49E+08	6.76E+10	5.205E+10
50%	3.19E+11	1.97E+11	4.79E+10	1.24E+09	1.3E+11	1.046E+11
20%	7.15E+11	4.41E+11	1.07E+11	2.79E+09	2.91E+11	2.43E+11
0%	3.07E+13	1.89E+13	4.61E+12	1.2E+11	1.25E+13	1.066E+13

**Margin of Safety**

Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is

*implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.*

The submittal uses both implicit and explicit MOS. To account for uncertainty in the nonpoint source load reduction, an explicit targeted reduction for *E. coli* will be set at 90 percent of the water quality target (*E. coli* bacteria  $\leq$  126/100 ml). Specifically the reduction shall be applied to meet the *E. coli* bacteria seasonal geometric mean of  $\leq$  113/100 ml.

The implicit MOS assumptions include decay and/or die-off. *E. coli* die-off was not assumed when accounted for in either the source assessment or in establishment of the load reduction. The entire concentration/load from the source was assumed to be present within the water body and the reductions should focus on the load.

The facilities that discharge directly to all segments within the Papillion Creek Watershed designated with the primary contact recreation use will be required to meet the WQS at the end-of-pipe. WWTF disinfection systems are often designed and operated to achieve 100 percent reduction in the indicator *E. coli* bacteria or 0/100 ml. The actual NPDES permitted point source contribution is likely less than expected by the TMDL.

#### **Seasonal Variation and Critical Conditions**

*Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.*

The water quality criterion is only applicable during the Title 117 defined recreation season that occurs May 1 through September 30. Because of this, the water quality and stream volume data were limited to this time period. Seasonal variation and critical conditions are addressed in the TMDL by the use of a LDC. This method of assigning LC at all variations in flow, in concert with the application of the WQS recreational season, defines a daily load regardless of season.

#### **Public Participation**

*Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].*

The availability of the TMDLs in draft form was published on NDEQ's internet site with the public comment period running from approximately January 22, 2009 to March 1, 2009. Interested stakeholders were informed via email of the availability of the draft TMDLs.

In response to the public noticed TMDL the City of Omaha submitted several comments. A copy of the comments and NDEQ's response is included as an attachment to the TMDL submittal package. Minor language changes were made to the TMDL as a result of these comments.

#### **Monitoring Plan for TMDL(s) Under Phased Approach**

*The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].*

Future monitoring will generally be consistent with the rotating basin monitoring scheme. Annually, two or three river basins in the same geographic location are the focus of the monitoring effort. The Papillion Creek Watershed was monitored in 2005, and will again be targeted in 2010.

Compliance monitoring will be conducted at NPDES permitted facilities to verify permit limitations are being adhered to. The NPDES permits require self-monitoring of the effluent by the permittee with the frequency of the monitoring being based on the discharge characteristics. The data is then reported to NDEQ quarterly, semiannually, or annually and entered into the EPA's Integrated Compliance Information System. The compliance monitoring and self-monitoring information will be used in assessing the success of the TMDL.

#### **Reasonable Assurance**

*Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.*

Reasonable Assurance is not required as the WLA for all point sources are set at a level that will attain *E. coli* WQS.