



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7

11201 Renner Boulevard
Lenexa, Kansas 66219

30 SEP 2015

Dr. Susan Mosier
Interim Secretary
Kansas Department of Health and Environment
1000 S.W. Jackson, Suite 540
Topeka, Kansas 66612-1368

Dear Dr. Mosier:

RE: Approval of a TMDL document for Eightmile Creek

This letter responds to the submission from the Kansas Department of Health and Environment, originally received by the U.S. Environmental Protection Agency, Region 7, on September 29, 2014, for a Total Maximum Daily Load document which contained a TMDL for total phosphorus and dissolved oxygen. Eightmile Creek was identified on the 2014 Kansas Section 303(d) list as impaired. This submission fulfills the Clean Water Act statutory requirement to develop TMDLs for impairments listed on a state's § 303(d) list. The specific impairment (water body segment and cause) is:

Table with 3 columns: Water Body Name, WBID, Cause. Row 1: Eightmile Creek, KS-WA-18-704_30, Total Phosphorus and Dissolved Oxygen

The EPA has completed its review of the TMDL document with supporting documentation and information. By this letter, the EPA approves the submitted TMDLs. Enclosed with this letter is the Region 7 TMDL Decision Document which summarizes the rationale for the EPA's approval of the TMDL document. The EPA believes the separate elements of the TMDLs described in the enclosed document adequately address the cause of concern, taking into consideration seasonal variation and a margin of safety.

Although the EPA does not approve the monitoring or implementation plans submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDL and determine if future revisions are necessary or appropriate to meet applicable water quality standards. The EPA recognizes that technical guidance and support are critical to determining the feasibility of and achieving the goals outlined in the TMDL document. Therefore, the implementation plan in this TMDL document provides information regarding implementation efforts to achieve the loading reductions identified.

The EPA is currently in consultation under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service regarding this TMDL document. While we are approving the TMDL at the present time, we may decide that changes to the TMDL document are warranted based upon the results of the consultation when it is completed.

The EPA appreciates the thoughtful effort that the KDHE has put into the TMDL document. We will continue to cooperate with and assist, as appropriate, in future efforts by the KDHE to develop TMDLs.

Sincerely,

A handwritten signature in black ink, appearing to read 'Karen A. Flourmoy', written in a cursive style.

Karen A. Flourmoy
Director
Water, Wetlands and Pesticides Division

Enclosure

cc: Mr. John Mitchell, Director, Division of Environment, KDHE
Mr. Tom Stiles, Chief, Watershed Planning, Monitoring and Assessment Section, KDHE



EPA Region 7 TMDL Review

TMDL ID: KS-WA-18-704_30

State: KS

Document Name: EIGHTMILE CREEK

Basin(s): WALNUT RIVER BASIN

HUC(s): 11030018

Water body(ies): EIGHTMILE CR

Tributary(ies): NONE

Cause(s): CHLOROPHYLL-A, DISSOLVED OXYGEN, PHOSPHORUS, TOTAL

Submittal Date: 9/26/2014

Approved: Yes

Submittal Letter and Total Maximum Daily Load Revisions

The state submittal letter indicates final TMDL(s) for specific pollutant(s) and water(s) were adopted by the state, and submitted to the 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 the EPA, date of receipt of any revisions and the date of original approval if submittal is a revised TMDL document.

A total maximum daily load document for Eightmile Creek was submitted to the U.S. Environmental Protection Agency on September 26, 2014. The Kansas Department of Health and Environment submitted the TMDL document by email with a signed submittal letter. The EPA reviewed the TMDL document and provided comments. The KDHE provided revised documents by email on February 5, and March 3, 2015.

Water Quality Standards Attainment

The targeted pollutant is validated and identified through assessment and data. The water body's loading capacity 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. The TMDL(s) and associated allocations are set at levels adequate to result in attainment of applicable water quality standards [40 CFR § 130.7(c)(1)]. A statement that the WQS will be attained is made.

Phosphorus levels in Eightmile Creek are consistently high. Excessive nutrients are not being controlled and are impairing aquatic life, domestic water supply and contact recreation. Dissolved oxygen deficiencies in Eightmile Creek are also potentially impairing aquatic life by falling below the water quality standard of 5.0 milligrams per liter. Analysis of total phosphorus concentrations by season reveals the spring season has the highest median and average total phosphorus concentration at 0.319 mg/L and 0.327 mg/L, respectively. The winter season median of 0.250 mg/L is slightly higher than the summer/fall season median of 0.244 mg/L while the winter and summer/fall season averages are nearly the same at 0.307 mg/L and 0.311 mg/L, respectively.

The spring months of May and June have the highest average monthly flow while the winter months of December and January have the lowest monthly flow. The KDHE stream chemistry station SC704 on Eightmile Creek is a rotational station that is sampled every four years. The stream was sampled on a bi-monthly basis until 2011 when quarterly sampling ensued. A period of relative high flow was the year 2007, with the highest annual average total phosphorus concentration at 0.396 mg/L with a high single sample concentration of 0.865 mg/L collected on January 24, 2007. A slightly higher median total phosphorus was recorded in 1995 at 0.330 mg/L, compared to a 2007 median of 0.325 mg/L. The period of record average and median total phosphorus concentrations are 0.309 mg/L and 0.264 mg/L, respectively. Samples collected during the months of June, October, November and December were below the period of record average while March, May and September had two of three samples that were collected register concentrations greater than the period of record average.

Average and median total phosphorus concentrations are greatest under high flow conditions, consistent with runoff conditions in the watershed. Average and median concentrations under normal and low flow conditions

are nearly equivalent, however, indicating effluent from the city of Rose Hill wastewater treatment facility may be affecting the total phosphorus concentrations in the stream under low flow conditions.

Phosphorus is typically linked to sediment or total suspended solids due to the propensity of those solids to adsorb phosphorus. Under high flow conditions, when runoff of sediment and sediment bound phosphorus is occurring, there is a good correlation between TSS and total phosphorus. As flows move into the normal range this correlation deteriorates and by the time the stream is at low flow the correlation is lost. This decline in correlation as flow decreases and the loss of relationship between TSS and total phosphorus is indicative of the influence of the discharge from the city of Rose Hill WWTF.

Levels of ortho-phosphate, the soluble portion of total phosphorus that is readily available for biological uptake, is present in the effluent of wastewater treatment plants and in the runoff from feedlots and grazing lands and may be detected downstream from the point of entry particularly during periods of low flow.

The DO concentrations in the Eightmile Creek have fallen below the WQS of 5 mg/L twice over the period of record. Both of the DO excursions occurred in the summer/fall season of 2011 when the stream was at low flow. Generally, as stream temperature increases, DO concentrations decrease.

The ultimate endpoint of this TMDL will be to achieve the Kansas WQS by eliminating any of the impacts to aquatic life, domestic water supply or contact recreation associated with excessive phosphorus and objectionable flora as described in the narrative criteria pertaining to nutrients. This reduction in phosphorus and algae will also lead to improved DO conditions allowing the stream to meet the Kansas WQS fully supporting aquatic life as indicated by DO concentrations of 5 mg/L or more. There are no existing numeric phosphorus criteria currently in Kansas. The current EPA suggested benchmarks for stream total phosphorus in the South-Central Cultivated Great Plains Ecoregion is 0.067 mg/L over the 10-state aggregate of Level III ecoregions. A similar total phosphorus benchmark for the Central Great Plains is 0.090 mg/L, spanning from Nebraska to Texas.

The Eightmile Creek watershed is located in the Walnut River Basin. Analysis of total phosphorus concentrations was performed for the ten KDHE stream sampling stations located in the Walnut River Basin. The median of the ten stations' median total phosphorus concentrations and the median of the ten stations' 25th percentile total phosphorus concentrations were calculated to give Phase I and Phase II endpoints of 0.198 mg/L and 0.138 mg/L, respectively.

The greatest complication in setting an endpoint is establishing the linkage of phosphorus levels to applicable biologic response variables. The noisy relationship with phosphorus defies establishing a solitary threshold value and supports an adaptive management approach to reduce current phosphorus loads and concentrations and observe responding improvement in biological metrics, prior to further reduction. Therefore, the primary measure of nutrient loading to Eightmile Creek will be the concentration of floating phytoplankton in the water column, which will be determined by measuring the sestonic chlorophyll *a* concentrations in Eightmile Creek.

The Aquatic Life Use Support Index as described in the KDHE's 2014 303(d) List Methodology, will serve to establish if the biological community reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, domestic water supply and contact recreation. The ALUS Index score consists of five categorizations of biotic condition:

1. Macroinvertebrate Biotic Index is a statistical measure that evaluates the effects of nutrients and oxygen demanding substances on macroinvertebrates based on the relative abundance of certain indicator taxa (orders and families).
2. Ephemeroptera, Plecoptera and Trichoptera abundance as a percentage of the total abundance of macroinvertebrates.
3. Kansas Biotic Index for Nutrients is mathematically equivalent to the MBI, however, the tolerance values are species specific and restricted to aquatic insect orders.
4. The EPT Percent of Count is the percentage of organisms in a sample consisting of individuals belonging to the EPT orders.
5. Shannon's Evenness is a measure of diversity that describes how evenly distributed the numbers of individuals are among the taxa in a sample.

Secondary indicators of the health of the instream biological community include:

1. Sestonic phytoplankton in the water column.
2. Percent DO saturation is the measure of oxygen in the water relative to the water's potential DO concentration. The DO concentrations below 5.0 mg/L put aquatic life under stress while dissolved oxygen percent saturation levels greater than 110 percent are indicative of over-active primary productivity.

3. Excessive nutrients can contribute high levels of biological activity and vigorous photosynthesis which is known to cause pH to rise above 8.5, another indicator of excess primary production.

Therefore, the numeric endpoints for this TMDL document indicating attainment of WQS will be:

1. An ALUS Index score greater than or equal to 14.
2. Maintain sestonic chlorophyll concentration below 5 µg/l.
3. The DO concentrations greater than 5.0 mg/L, DO saturation below 110 percent and above 90 percent.
4. pH below 8.5.

All four endpoints have to initially be maintained over three consecutive years to constitute full support of the designated uses of the Eightmile Creek. These endpoints will be evaluated periodically as phosphorus levels decline in the watershed over time. This TMDL document looks to establish management milestones for phosphorus concentrations in Eightmile Creek that would be the cue to examine the biological conditions in the stream. This TMDL document establishes two milestones to achieve the ultimate endpoint of this TMDL. The first milestone will be a reduction of the median total phosphorus concentration to 0.198 mg/L. A second milestone will be targeted once the first milestone is reached. The second milestone will be a reduction of the total phosphorus median to 0.138 mg/L, reaching a concentration equal to that of the best 25 percent of the stations within the Walnut River Basin.

Achievement of the biological endpoints indicates any loads of phosphorus are within the loading capacity of the stream, WQS are attained and full support of the designated uses of the stream has been restored. Achievement of the DO endpoint specifically, indicates any loads of oxygen demanding substance are within the LC of the stream, the DO WQS is attained and full support of the aquatic life designated use of the stream has been restored. The narrative and numeric WQS and all designated uses will be attained when the TMDLs' targets, milestones and LCs are achieved. The LC at 50 percent flow exceedance is 4.57 pounds per day for phase one, and 3.19 lb/day for phase two.

Designated Use(s), Applicable Water Quality Standard(s) and Numeric Target(s)

The submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria, and a numeric target. If the TMDL(s) 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.

Designated uses for Eightmile Creek (30): expected aquatic life, secondary contact recreation class b, drinking water supply, food procurement, groundwater recharge, industrial water, irrigation and livestock watering.

The impaired uses are expected aquatic life, domestic water supply and contact recreation.

The water criteria are;

Nutrients – Narrative: The introduction of plant nutrients into surface waters designated for domestic water supply use shall be controlled to prevent interference with the production of drinking water (K.A.R. 28-16-28e(d) (3)(D)).

The introduction of plant nutrients into streams, lakes or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the projection of undesirable quantities or kinds of aquatic life (K.A.R. 28-16-28e(c)(2)(A)).

The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating or emergent aquatic vegetation (K.A.R. 28-26-28e(c)(7)(A)).

The concentration of dissolved oxygen in surface waters shall not be lowered by the influence of artificial sources of pollution. dissolved oxygen: 5.0 milligrams per liter (K.A.R. 28-16e(d), Table 1g).

The numeric endpoints for this TMDL indicating attainment of water quality standards will be:

1. An Aquatic Life Use Support Index score greater than or equal to 14. The ALUS Index will serve to establish if the biological community reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, contact recreation and domestic water supply. The ALUS Index score consists of five categorizations of biotic condition:
2. Maintain sestonic chlorophyll *a* concentration below 5 micrograms per liter.
3. The DO concentrations greater than 5.0 mg/L, DO saturation below 110 percent and above 90 percent.

4. pH below 8.5.

This TMDL is established in phases and stages to progressively reduce phosphorus loadings and ambient concentrations with periodic assessment of sestonic chlorophyll *a* and the ALUS Index score. The loading capacity at 50 percent flow exceedance is 4.57 pounds per day for phase one, and 3.19 lb/day for phase two.

The numeric endpoints for this TMDL will achieve the Kansas WQS by eliminating any of the impacts to aquatic life, domestic water supply and contact recreation. The reduction in total phosphorus and algae will lead to the elimination of impacts to and protection of all designated uses as described in the narrative criteria and will improve DO conditions.

Pollutant(s) of Concern

A statement that the relationship is either directly related to a numeric water quality standard, or established using surrogates and translations to a narrative WQS is included. An explanation and analytical basis for expressing the TMDL(s) through surrogate measures, or by translating a narrative water quality standard to a numeric target is provided (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae). For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and a margin of safety that do not exceed the loading capacity. If the submittal is a revised TMDL document, there are refined relationships linking the load to water quality standard attainment. If there is an increase in the TMDL(s), there is a refined relationship specified to validate that increase (either load allocation or wasteload allocation). This section will compare and validate the change in targeted load between the versions.

The state of Kansas does not have a numeric criteria for total phosphorus, but instead has narrative criteria for nutrients. A link has been established between the narrative criteria for nutrients and the numeric total phosphorus target. The current EPA suggested benchmarks for stream total phosphorus in the South-Central Cultivated Great Plains Ecoregion is 0.067 milligrams per liter total phosphorus over the 10-state aggregate of Level III ecoregions. A similar total phosphorus benchmark for the Central Great Plains is 0.090 mg/L.

The target in the TMDL document is a direct reduction of the indicated pollutant of concern, total phosphorus. This TMDL is established in phases and stages to assist in the progressive reduction of total phosphorus loadings and ambient concentrations with periodic assessment of the biological endpoints on the lower reaches of the stream.

The Eightmile Creek watershed is located in the Walnut River Basin. Analysis of total phosphorus concentrations was performed for the ten KDHE stream sampling stations located in the Walnut River Basin. The median of the ten stations' median total phosphorus concentrations and the median of the ten stations' 25th percentile total phosphorus concentrations were calculated to give Phase I and Phase II endpoints of 0.198 mg/L and 0.138 mg/L, respectively.

Average and median total phosphorus concentrations are greatest under high flow conditions, consistent with runoff conditions in the watershed. Average and median concentrations under normal and low flow conditions are nearly equivalent, however, indicating effluent from the city of Rose Hill wastewater treatment facility may be affecting the total phosphorus concentrations in the stream under low flow conditions. Phosphorus is typically linked to sediment or total suspended solids due to the propensity of those solids to adsorb phosphorus. Under high flow conditions, when runoff of sediment and sediment bound phosphorus is occurring, there is a good correlation between TSS and total phosphorus. As flows move into the normal range this correlation deteriorates and by the time the stream is at low flow the correlation is lost.

There is a direct link between the dissolved oxygen standard of 5 mg/L and the DO concentrations targeted within the TMDL document. The DO concentrations in Eightmile Creek have fallen below the water quality standard of 5 mg/L twice over the period of record. The narrative criteria of the Kansas WQS are based on indications of the prevailing biological community. Excessive primary productivity of algae may be indicated by extreme swings in DO or pH as the chemical reaction of photosynthesis and respiration alter the ambient levels of oxygen or acid-base balance of the stream. As stream temperature increases, DO concentrations decrease. To discount the impacts of temperature on the solubility of oxygen in the water column, the percent saturated DO was computed from the data collected. A seasonal pattern remained with higher percent saturation of DO seen during cooler months while declines in the percent saturation are associated with summer months. Higher pH values tend to occur during periods when photosynthesis is ramped up, however, pH has not exceeded the criterion of 8.5 in Eightmile Creek, during the period of record.

The ultimate endpoint of this TMDL will be to achieve the Kansas WQS by eliminating any of the impacts to aquatic life, domestic water supply or contact recreation associated with excessive phosphorus and objectionable flora as described in the narrative criteria pertaining to nutrients. This reduction in phosphorus and algae will also lead to improved DO conditions allowing the stream to meet the Kansas WQS fully supporting aquatic life as indicated by DO concentrations of 5 mg/L or more. The greatest complication in setting an endpoint is establishing the linkage of phosphorus levels to applicable biologic response variables. The noisy relationship with phosphorus defies establishing a solitary threshold value and supports an adaptive management approach to reduce current phosphorus loads and concentrations and observe responding improvement in biological metrics, prior to further reduction. Therefore, the primary measure of nutrient loading to Eightmile Creek will be the concentration of floating phytoplankton in the water column, which will be determined by measuring the sestonic chlorophyll *a* concentrations in Eightmile Creek.

The Aquatic Life Use Support Index as described in the KDHE's 2014 303(d) List Methodology, will serve to establish if the biological community reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, domestic water supply and contact recreation. The ALUS Index score consists of five categorizations of biotic condition:

1. Macroinvertebrate Biotic Index is a statistical measure that evaluates the effects of nutrients and oxygen demanding substances on macroinvertebrates based on the relative abundance of certain indicator taxa.
2. Ephemeroptera, Plecoptera and Trichoptera abundance as a percentage of the total abundance of macroinvertebrates.
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4. The EPT Percent of Count is the percentage of organisms in a sample consisting of individuals belonging to the EPT orders.
5. Shannon's Evenness is a measure of diversity that describes how evenly distributed the numbers of individuals are among the taxa in a sample.

Secondary indicators of the health of the instream biological community include:

1. Sestonic phytoplankton in the water column.
2. Percent DO saturation is the measure of oxygen in the water relative to the water's potential DO concentration. The DO concentrations below 5.0 mg/L put aquatic life under stress while DO percent saturation levels greater than 110 percent are indicative of over-active primary productivity.
3. Excessive nutrients can contribute high levels biological activity and vigorous photosynthesis which is known to cause pH to rise above 8.5, another indicator of excess primary production.

Once measured, the metrics detailed above are then assigned a score and the scores are tallied and a support category assigned as seen in Tables 6 and 7 of the TMDL document. Low MBI scores indicate high quality biological communities. Kansas protocol has been to delineate the boundaries between full and partial aquatic life support and between partial support and nonsupport for aquatic life as MBI scores of 4.5 and 5.4, respectively.

Conditions of full support span phosphorus levels of 0.045 to 0.239 mg/L. Partial support is indicated on streams with phosphorus levels of 0.061 – 0.446 mg/L. Boundaries between full and partial aquatic life support and between partial support and nonsupport for aquatic life are delineated as percent EPT scores of 48 and 30 percent, respectively. Phosphorus levels span the range of 0.045 to 0.446 mg/L while meeting the percent EPT full support criteria and 0.096 to 0.611 mg/L for percent EPT partial support. Other factors impact the biological community of macroinvertebrates beyond the ambient nutrient levels present making identification of a specific threshold of phosphorus concentration difficult to tie to a desired biological condition. The ALUS Index score was designed to assess the response of macroinvertebrate communities to a wide variety of stressors including various toxics, low DO and sedimentation.

Therefore, the numeric endpoints for this TMDL document indicating attainment of WQS will be:

1. An ALUS Index score greater than or equal to 14.
2. Maintain sestonic chlorophyll concentration below 5 µg/l.
3. The DO concentrations greater than 5.0 mg/L, DO saturation below 110 percent and above 90 percent.
4. pH below 8.5.

All four endpoints have to initially be maintained over three consecutive years to constitute full support of the designated uses of the Eightmile Creek. These endpoints will be evaluated periodically as phosphorus levels decline in the watershed over time. This TMDL document looks to establish management milestones for phosphorus concentrations in Eightmile Creek that would be the cue to examine the biological conditions in the stream. This TMDL document establishes two milestones to achieve the ultimate endpoint of this TMDL. The

first milestone will be a reduction of the median total phosphorus concentration to 0.198 mg/L. A second milestone will be targeted once the first milestone is reached. The second milestone will be a reduction of the total phosphorus median to 0.138 mg/L, reaching a concentration equal to that of the best 25 percent of the stations within the Walnut River Basin. The LC at 50 percent flow exceedance is 4.57 pounds per day for phase one, and 3.19 lb/day for phase two. The narrative and numeric WQS and all designated uses will be attained when the TMDLs' targets, milestones and LCs are achieved.

Source Analysis

Important assumptions made in developing the TMDL document, 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. The submittal demonstrates all significant sources have been considered. If this is a revised TMDL document any new sources or removed sources will be specified and explained.

In the absence of a national pollutant discharge elimination system permit, the discharges associated with sources were applied to the load allocation, as opposed to the wasteload allocation for purposes of this TMDL document. The decision to allocate these sources to the LA does not reflect any determination by the EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by establishing these TMDL(s) with some sources treated as LAs, the EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in this TMDL document are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated sum of the WLAs in this TMDL document. Any WLA in addition to that allocated here is not available.

There are two national pollutant discharge elimination system permitted facilities located in the Eightmile Creek watershed. The city of Rose Hill's wastewater treatment facility, KS0098850, is permitted to discharge at an average rate of one million gallons per day and is required to monitor total phosphorus monthly. In addition, the city of Rose Hill WWTF is permitted to use water from the extraneous flow basin lagoons to irrigate adjacent crop or grass land. The Simmons Subdivision, KSJ000528, operates a non-overflowing WWTF that is prohibited from discharging. No wasteload allocation will be established for this permit. The TMDL document also includes a reserve wasteload allocation in anticipation of further development in the SC704 watershed.

Land use within the Eightmile Creek watershed is approximately 58 percent grass and pasture land and 25 percent cultivated crops. There is 6 percent developed land due to presence of the city of Rose Hill in the watershed. Forest, primarily the riparian area along the creek and its tributaries, comprises 8 percent of the watershed's land area. Barren land and open water make up 1.5 percent each in the rest of the watershed.

There are approximately 149,764 head of cattle, including calves, in the counties with land area in the Eightmile Creek watershed. There are also approximately 45,800 head of hogs in those same counties. The animal waste from both confined and unconfined feeding sites is considered a potentially significant source of total phosphorus loading into Eightmile Creek.

There is one state permitted animal feeding operation in the Eightmile Creek watershed. This facility, permit number A-WABU-BA2, is certified for up to 299 head of cattle and is designed to retain a 25-year, 24-hour rainfall/runoff event as well as an anticipated two weeks of normal wastewater from their operations. Typically, this rainfall event coincides with stream flow that occurs less than 1 - 5 percent of the time.

Any concentrated animal feeding operation that does not obtain an NPDES permit must operate as a no discharge facility. Any discharge from an unpermitted CAFO is a violation of Section 301. It is the EPA's position that all CAFOs should obtain an NPDES permit because it provides clarity of compliance requirements, authorization to discharge when the discharges are the result of large precipitation events (e.g., in excess of 25-year and 24-hour frequency/duration) or are from a man-made conveyance.

Any animal feeding operations and unpermitted CAFOs are considered under the load allocation because there is currently not enough detailed information to know whether these facilities are required to obtain NPDES permits. This TMDL document does not reflect a determination by the EPA that such facility does not meet the definition of a CAFO nor that the facility does not need to obtain a permit. To the contrary, a CAFO that discharges has a duty to obtain a permit. If it is determined that any such operation is a CAFO that discharges, any future WLA assigned to the facility must not result in an exceedance of the sum of the WLAs in this TMDL document as approved.

Approximately 26 percent of the households in Cowley County, 28 percent of the households in Butler County and 8 percent of the households in Sedgwick County use septic or other on-site systems. Current model estimates indicate a 10 - 15 percent failure rate for on-site wastewater treatment systems. Because of their small flows and loads, failing on-site septic systems would be a minor source of nutrient loadings within the watershed and would not significantly contribute to the phosphorus impairment.

The population of the Eightmile Creek watershed is approximately 5,258 people. This is an increase of about 9 percent over the 2000 census results with population growth expected to continue in the watershed.

The Eightmile Creek watershed has a very low mean soil permeability value of 0.32 inches/hour. Nearly 70 percent of the watershed has a permeability value less than 1.29 inches/hour, which contributes to runoff during low to very low rainfall intensity events. Runoff is primarily generated as infiltration excess with rainfall intensities greater than soil permeability. As the watershed's soil profiles become saturated, excess overland flow is produced.

Phosphorus is present over the landscape, in the soil profile as well as terrestrial and aquatic biota. Wildlife can contribute phosphorus loadings, particularly if they congregate to a density that exceeds the assimilative capacity of the land or water.

All known sources of total phosphorus have been considered.

Allocation - Loading Capacity

The submittal identifies appropriate loading capacities, wasteload allocations for point sources 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 revised TMDL document the change in loading capacity will be documented in this section. All TMDLs must give a daily number. Establishing TMDL "daily" loads consistent with the U.S. Court of Appeals for the D.C. circuit decision in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015, (April 25, 2006).

The loading capacity is calculated as: $LC = \text{sum of wasteload allocation} + \text{sum of load allocation} + \text{margin of safety}$. Daily loads are computed by multiplying the milestone target total phosphorus concentrations, 0.198 milligrams per liter and 0.133 mg/L, respectively, by flow exceedances along the flow duration curves and a unit conversion factor. As an example for phase one, at the 25 percentile flow, or a flow of 8.37 cubic feet per second the LC is 8.94 pounds per day of total phosphorus. Table 12 within the TMDL document lists the LC at all flow conditions for both phases of implementation. Table 12 of the TMDL document also lists Phase I and II targets for WLA and LA. Table 11 of the TMDL document lists the city of Rose Hill's WLA and the reserve WLA established to anticipate future growth and development in the watershed.

Wasteload Allocation Comment

The submittal lists individual wasteload allocations 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 a water quality standard excursion, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLA. 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 revised TMDL document, any differences between the original TMDL(s) WLA and the revised WLA will be documented in this section.

The wasteload allocation is associated with the city of Rose Hill wastewater treatment facility. The initial Phase I WLA for the city of Rose Hill is based on a the design flow of 1.0 million gallons per day with a total phosphorus concentration of 1.5 milligrams per liter which reflects the refinement of their biological nutrient removal process. Use of the city of Rose Hill's WWTF's extraneous flow basin lagoons to irrigate surrounding agricultural fields should also assist in lowering total phosphorus concentrations.

As an example for Phase I, at the 25 percentile flow exceedance, or a flow of 8.37 cubic feet per second, the WLA is 8.94 pounds per day of total phosphorus and Phase II is 6.23 lb/day. Table 12 within the TMDL document list the WLA at all flow conditions for both phases of implementation.

In Phase II, the city of Rose Hill WWTF would need to implement enhanced nutrient reduction technologies in order to reach a discharge concentration of 0.5 mg/L.

The TMDL document also includes a reserve WLA of 1,533.0 pounds per year or 4.2 lb/day total phosphorus in

anticipation of further development in the SC704 watershed.

The Simmons Subdivision is prohibited from discharging. Zero WLA is established for this permit. The one state permitted animal feeding operation is designed to retain normal wastewater and rainfall/runoff. Zero WLA is established for this permit also.

Load Allocation Comment

All nonpoint source loads, natural background and potential for future growth are included. If no nonpoint sources are identified, the load allocation must be given as zero [40 CFR § 130.2(g)]. If this is a revised TMDL document, any differences between the original TMDL(s) LA and the revised LA will be documented in this section.

Nonpoint source loading is believed to be minimal during low flow conditions when flow in Eightmile Creek is dominated by flow from the wastewater treatment facility discharging above SC704. As an example, for Phase I at the 10 percentile flow exceedance, or a flow of 25.55 cubic feet per second, the load allocation is 10.61 pounds per day of total phosphorus. Table 12 within the TMDL document lists the LA at all flow conditions for both phases of implementation.

Margin of Safety

The submittal describes explicit and/or implicit margins of safety 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 revised TMDL document, any differences in the MOS will be documented in this section.

The margin of safety provides some hedge against the uncertainty in phosphorus loading into Eightmile Creek that stems predominantly from the point source dischargers in the watershed. This TMDL document uses an implicit MOS relying on conservative assumptions to assure future wasteload allocations will not cause further excursion. Design flow was used for the city of Rose Hill wastewater discharge to set WLA. Current monitoring data indicates Rose Hill does not discharge at this rate. The biological endpoints to be used to assess the narrative criteria have to be maintained for three consecutive years before attainment of water quality standards can be claimed. Because there is often a synergistic effect of phosphorus and nitrogen on instream biological activity, concurrent efforts by the city of Rose Hill to reduce the nitrogen content of its wastewater should complement the effect of phosphorus load reduction in improving the biological condition of Eightmile Creek.

Seasonal Variation and Critical Conditions

The 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 the WQS. If this is a revised TMDL document, any differences in conditions will be documented in this section.

Seasonal average flows indicates the spring (April - June) flow more than double the flows seen during the summer/fall (July - October) and winter (November - March) seasons.

Samples collected during the months of June, October, November and December were below the period of record average. Samples collected during March, May and September had two of three samples register total phosphorus concentrations greater than the period of record average.

Analysis of total phosphorus concentrations by season reveals the spring season has the highest median and average total phosphorus concentrations. The winter season median is slightly higher than the summer/fall season median while the winter and summer/fall season averages are nearly the same. The slightly higher spring season total phosphorus concentrations are likely due to seasonal rain events that generate runoff conditions that carry nutrients from the watershed to Eightmile Creek.

Average and median total phosphorus concentrations are greatest under high flow conditions, consistent with runoff conditions in the watershed. Average and median TP concentrations under normal and low flow conditions are nearly equivalent. Indications are that effluent from the city of Rose Hill wastewater treatment facility is affecting total phosphorus concentrations in the stream under low flow conditions.

The TMDL document's load duration curve method represents flow under all conditions. Because the wasteload allocations, load allocations and TMDLs are applicable at all flow conditions, they are also applicable and protective over all seasons. The advantage of the load duration curve method is that all flow conditions are considered and the constraints associated with using a single-flow critical condition are avoided. Seasonal

variation is accounted for in the TMDL document since the endpoint accounts for all flow conditions throughout the year.

Public Participation

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

An active internet website was established at <http://www.kdheks.gov/tmdl/index.htm> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Walnut Basin. A public hearing on the Walnut River Basin TMDLs was held in Emporia, Kansas on August 28, 2014, to receive comments on this TMDL document. The Walnut River Basin Advisory Committee met to discuss the TMDLs in the basin on August 28, 2014, in Augusta, Kansas. No comments were received on this TMDL document.

Monitoring Plan for TMDL(s) Under a 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 water quality standards, and a schedule for considering revisions to the TMDL(s) (where a phased approach is used) [40 CFR § 130.7]. If this is a revised TMDL document, monitoring to support the revision will be documented in this section. Although the EPA does not approve the monitoring plan submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDLs and determine if future revisions are necessary or appropriate to meet applicable water quality standards.

Future stream sampling will occur bimonthly at rotational station SC704 every fourth year, with 2015 being the next scheduled sampling year. The monitoring will include the initiation of sestonic chlorophyll sampling. Monitoring of total phosphorus during runoff events will help direct abatement efforts toward major nonpoint sources. Monitoring of total phosphorus below the outfall of the city of Rose Hill's wastewater treatment facility will help assess improvements in their nutrient removal processes.

In 2015, macroinvertebrate and periphyton sampling will occur at an accessible location on Eightmile Creek. In 2020, an evaluation will be made as to the degree of implementation that occurred within the watershed. The stream will be evaluated for possible delisting in 2025, after Phase I. The decision for delisting will come about in the preparation of the 2026 303(d) list. Should modifications be made to the applicable water quality criteria during the ten-year implementation period, consideration for restoration, desired endpoints of this TMDL document and implementation activities may be adjusted accordingly. If the biological endpoints are achieved over 2015 - 2025, the conditions described by the narrative nutrient criteria will be viewed as attained and Eightmile Creek will be moved to Category 2 on the 2026 Integrated Report. If not, Phase II of this TMDL document begins in 2026.

Once the water quality standards are attained, the adjusted ambient phosphorus concentrations on Eightmile Creek will be the basis for establishing numeric phosphorus criteria through the triennial WQS process to protect the restored biological and chemical integrity of Eightmile Creek.

Reasonable Assurance

Reasonable assurance only applies when less stringent wasteload allocation are assigned based on the assumption that nonpoint source reductions in the load allocation 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. States are not required under Section 303(d) of the Clean Water Act to develop TMDL implementation plans and the EPA does not approve or disapprove them. However, this TMDL document provides information regarding how point and nonpoint sources can or should be controlled to ensure implementation efforts achieve the loading reductions identified in this TMDL document. The EPA recognizes that technical guidance and support are critical to determining the feasibility of and achieving the goals outlined in this TMDL document. Therefore, the discussion of reduction efforts relating to point and nonpoint sources can be found in the implementation section of the TMDL document, and are briefly described below.

The states have the authority to issue and enforce state operating permits. Inclusion of effluent limits into a state operating permit and requiring that effluent and instream monitoring be reported to the state should provide reasonable assurance that instream water quality standards will be met. Section 301(b)(1)(C) requires that point source permits have effluent limits as stringent as necessary to meet WQS. However, for wasteload allocations to serve that purpose, they must themselves be stringent enough so that (in conjunction with the water body's other loadings) they meet WQS. This generally occurs when the TMDL(s)' combined nonpoint source load allocations and point source WLAs do not exceed the WQS-based loading capacity and there is reasonable assurance that the

TMDL(s)' allocations can be achieved. Discussion of reduction efforts relating to nonpoint sources can be found in the implementation section of the TMDL document.

The primary agents for program participation will be the city of Rose Hill, the KDHE and the Kansas State Extension. The primary participants for implementation will be the city of Rose Hill wastewater program together with agricultural and livestock producers operating immediately adjacent to Eightmile Creek and its tributaries. Implementation activities to address nonpoint sources should focus on those areas with the greatest potential to impact nutrient concentrations adjacent to these streams.

Reduction strategies for the wastewater treatment facility operated by the city of Rose Hill should be evaluated by the end of 2015 with subsequent planning, design and construction of any necessary enhanced biological nutrient reduction completed within the next permit cycle after 2016. Nonpoint source pollutant reduction practices should be installed before 2016 with follow up implementation over 2017 - 2025. If biological conditions warrant, Phase II implementation will begin in 2026 and continue through 2036.

In 2026, an evaluation of the phase two total phosphorus goals at SC704 will be conducted together with an assessment of the biological community. It is anticipated that the city of Rose Hill should have implemented appropriate nutrient treatment upgrades and phosphorus data in the watershed should show indications of declining concentrations.

Phase I is focused on wastewater treatment at Rose Hill and implementation of best management practices in the riparian and livestock grazing areas of the watershed to effectively reduce the phosphorus loading to the stream. Phase II priorities will expand nonpoint source abatement along Eightmile Creek, and further reductions in wastewater phosphorus loads at Rose Hill. Due to the need to reduce the high nutrient loads in the watershed this TMDL document will be a high priority for implementation.

This watershed lies within the Lower Walnut (Subbasin 11030017) and is among the top sixteen 8 digit Hydrological Unit Codes targeted for state action to reduce nutrients. Use of biological nutrient removal technology has been well established to reduce nutrient levels in wastewater, including phosphorus. Nutrient control has also been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. The proper implementation of comprehensive livestock waste management plans has proven effective at reducing nutrient runoff associated with livestock facilities.

Under the current version of the Continuing Planning Process, the next anticipated revision would come in 2015, which will emphasize implementation of watershed restoration and planning strategy activities. Recommendations of this TMDL document will be considered in the Kansas Water Plan implementation decisions under the State Water Planning Process for Fiscal Years 2015 - 2025.

The State Water Plan 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 watershed and water resources of highest priority. Typically, the state allocates at least 50 percent of the fund to programs supporting water quality protection. This watershed and its TMDL document are located within a high priority area and should receive support for pollution abatement practices that lower the loading of sediment and nutrients.