UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

OCT 25 2010

Mr. John Madras
Director, Water Protection Program
Water Protection and Soil Conservation Division
Missouri Department of Natural Resources
1101 Riverside Drive
Jefferson City, Missouri 65101

Re: Correction to the Spring Branch (Creek) TMDLs

Dear Mr. Madras:

The United States Environmental Protection Agency (EPA) reviewed the Spring Branch (Creek) Total Maximum Daily Load (TMDL) document submittal. EPA completed its review of the TMDLs, supporting documentation and information, and approved the TMDL document in a letter dated October 20, 2010. This letter corrects an error in the previous letter which listed the Spring Branch (Creek) TMDL document as submitted and approved for the pollutants total nitrogen (TN), total phosphorus (TP) and total suspended solids (TSS). The Spring Branch (Creek) TMDL document was submitted and has been approved for the pollutants low dissolved oxygen and organic sediment addressed by reductions in TN, TP and TSS.

Spring Branch (Creek) was identified on the EPA-approved 2008 Missouri Section 303(d) List as impaired for low dissolved oxygen and organic sediment. This submission fulfills the Clean Water Act statutory requirement to develop TMDLs for impairments listed on a state's § 303(d) List. The specific impairments (water body segment and pollutants) are:

Water Body Name	WBID	Pollutants
Spring Branch (Creek)	MO_1870 (3708)	Low Dissolved Oxygen Organic Sediment

EPA commends MDNR on its efforts to submit this TMDL document for Spring Branch (Creek). We appreciate the thoughtful teamwork and partnering effort that Missouri has put

forth in the development of all TMDLs. We will continue to cooperate and assist, as appropriate, in future efforts by Missouri to develop TMDLs.

Sincerely,

William A. Spratlin
Director
Water, Wetlands and Pesticides Division

Enclosures

cc: Mr. John Hoke
Missouri Department of Natural Resources

Mr. Gerald Babao
American Canoe Association

Mr. Paul Sanford
American Canoe Association

Mr. Scott Dye
Sierra Club

Mr. John Simpson
KS Natural Resource Council

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

OCT 20 2010

Mr. John Madras
Acting Director, Water Protection Program
Water Protection and Soil Conservation Division
Missouri Department of Natural Resources
1101 Riverside Drive
Jefferson City, Missouri 65101

Re: Approval of Spring Branch (Creek) TMDLs

Dear Mr. Madras:

This letter responds to the Missouri Department of Natural Resources (MDNR) submission of a Total Maximum Daily Load (TMDL) document which contained total nitrogen, total phosphorus and total suspended solids TMDLs for Spring Branch (Creek) segment 1870 (3708). The document was originally received by the United States Environmental Protection Agency (EPA), Region 7, on September 7, 2010. Revisions were made to the original submittal and the final version was resubmitted on October 13, 2010.

Spring Branch (Creek) was identified on the EPA approved 2008 Missouri Section 303(d) List as impaired for unknown pollutants. This submission fulfills the Clean Water Act statutory requirement to develop TMDLs for impairments listed on a state's § 303(d) List. The specific impairments (water body segment and pollutants) are:

Water Body Name	WBID	Pollutants
Spring Branch (Creek)	MO_1870 (3708)	total nitrogen total phosphorus total suspended solids

EPA has completed its review of the TMDL document with supporting documentation and information. By this letter, EPA approves the submitted TMDLs. Enclosed with this letter is the EPA Region 7 TMDL Decision Document summarizing the rationale for EPA's approval of the TMDLs. EPA believes the separate elements of the TMDL document, described in the enclosed form adequately address the pollutants of concern, taking into consideration seasonal variation and a margin of safety. Although EPA does not approve the monitoring plan submitted by the state, EPA acknowledges the state's efforts. EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDL document and determine if future revisions are necessary or appropriate to meet applicable water quality standards.

EPA is currently in consultation under Section 7 of the Endangered Species Act with the United States Fish and Wildlife Service regarding this TMDL. While we are approving these TMDLs 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.

We appreciate the thoughtful effort that MDNR has put into these TMDLs. We will continue to cooperate with and assist, as appropriate, in future efforts by MDNR to develop TMDLs.

Sincerely,

Karen A. Flournoy

for William A. Spratlin
Director
Water, Wetlands and Pesticides Division

Enclosures

cc: Mr. John Hoke
Missouri Department of Natural Resources

Mr. Gerald Babao
American Canoe Association

Mr. Paul Sanford
American Canoe Association

Mr. Scott Dye
Sierra Club

Mr. John Simpson
KS Natural Resource Council

EPA Region 7 TMDL Review

TMDL ID: MO_1870 **State:** MO

Document Name: SPRING CREEK (3708)

Basin(s): UPPER MISSISSIPPI-MERAMEC

HUC(s): 07140102, 7140102

Water body(ies): SPRING BRANCH (CREEK), SPRING CR., SPRING CREEK

Tributary(ies):

Pollutant(s): CHEMICAL BIOLOGICAL OXYGEN DEMAND 5 DAY AVERAGE, DISSOLVED OXYGEN, TOTAL NITROGEN, TOTAL PHOSPHORUS, TOTAL SUSPENDED SOLIDS

Submittal Date: 9/7/2010 **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.

This TMDL document was formally submitted by the Missouri Department of Natural Resources (MDNR). The United States Environmental Protection Agency (EPA) received this document by mail on September 7, 2010. Revisions to this document were received by email on October 11 and October 13, 2010.

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.

This stream was incorrectly identified as Spring Branch (Creek) in the 2008 Missouri 303(d) List of impaired waters. It is identified as Spring Creek on U.S. Geological Survey topographic maps and in Missouri's WQS (2009 revision-not yet reviewed by EPA). It was called Spring Creek in the TMDL document.

Spring Branch (Creek) drains the countryside around Salem, Missouri, and also receives all of the storm water runoff from the city. A water quality study in 1985 indicated the stream had problems with deposition of solids (sludge) and low levels of dissolved oxygen (DO) downstream from the Salem Wastewater Treatment Facility (WWTF). As a result, Spring Creek was listed in Missouri's 1994 303(d) List of impaired waters. Spring Creek was originally listed for biochemical oxygen demand (BOD) and volatile suspended solids (VSS). BOD is the measure of oxygen used by microorganisms to decompose organic matter. VSS is the organic portion of solids that are lost on ignition (heating to 550 degrees Celsius) and approximates the amount of organic matter contained in a water sample.

Missouri changed the listed causes of impairment from BOD to DO and from VSS to organic sediment on its 2004/2006 303(d) List. Spring Branch (Creek) segment 1870 was resegmented as part of the 2005 revisions to Missouri's WQS. This resulted in the original classified segment being divided into two segments, which are now identified as WBIDs 1870 and 3708. The impaired portion of Spring Creek is part of segment 3708. EPA also revised the length of the impaired segment (from 0.3 to 7.4 miles) on Missouri's 2004/2006 303(d) List to correspond to the segment's entire classified length.

Low DO is an issue because concentrations have been measured at less than the water quality criterion of 5 milligrams per liter (mg/L). DO in streams may be affected by several factors including water temperature, the amount of decaying organic matter in the stream, turbulence at the air-water interface and the amount of photosynthesis occurring in plants within the stream. Organic matter can come from wastewater effluent as well as agricultural and urban runoff, and the rate at which it decays and consumes oxygen is typically measured instream as BOD.

Decaying matter can also accumulate on the bottom of a stream and cause sediment oxygen demand (SOD). SOD is a combination of all of the oxygen-consuming processes that occur at or just below the sediment/water interface. SOD is partly due to biological processes and partly due to chemical processes. Most of the SOD at the surface of the sediment is due to the biological decomposition of organic material and the bacterially facilitated nitrification of ammonia, while the SOD several centimeters into the sediment is often dominated by the chemical oxidation of species such as iron, manganese and sulfide. Nitrogen and phosphorus can also contribute to low DO problems because they can accelerate algae growth in streams. Algae growth in streams is most frequently assessed based on the amount of chlorophyll a in the water. The algae consume DO during respiration at night and have the potential to remove large amounts of DO from the stream. The breakdown and decomposition of dead, decaying algae also removes oxygen from the water column. The low DO problem could be due to one or more of the following:

- Excessive loads of decaying organic solids, as measured by biochemical oxygen demand,
- Too much algae in the stream as a result of excessive phosphorus or nitrogen loading and
- High consumption of oxygen from decaying matter on the streambed.

Pollutants which result in oxygen concentrations below saturation are fine particle size bottom sediment, high nutrient levels (nitrogen and phosphorus), and suspended particles of organic matter. Because these three pollutants vary to a large extent based on anthropogenic influences, they are appropriate targets for a TMDL written to address an impairment of low DO.

To address nutrient levels, both total nitrogen (TN) and total phosphorus (TP) were selected because both nutrients are generally elevated by point and nonpoint sources. The EPA nutrient Ecoregion 39 (where Spring Branch (Creek) is located) Level III-Ozark Highlands, reference concentrations were used. The reference concentration for TN is 0.289 mg/L and the reference concentration for TP is 0.007 mg/L.
The ecoregion nutrient targets are expressed as annual means. The TMDL uses a method to target specific concentrations at differing flows which will result in an annual average equal to the ecoregion target. As such, the ecoregion concentration will not be the target at all flows. These differing concentrations are calculated based on the range of current concentrations and a ratio adjustment such that the ecoregion targets are met.

WWTF's often discharge high levels of organic sediment into receiving streams. Organic sediments are a water quality problem because they can settle onto the bottom of a stream and smother natural substrates (materials in the streambed), aquatic invertebrate animals (like mayfly larvae and crayfish) and fish eggs. High amounts of organic sediment also contribute to sludge on the stream bottom, which has an offensive odor in addition to being unsightly. Through previous studies, MDNR has found that limiting BOD from domestic WWTFs will often result in corresponding reductions in organic sediment that will eliminate an organic sediment impairment.

There are many quantitative indicators of organic sediment, such as total suspended solids (TSS), turbidity and bedload sediment, which are appropriate to describe sediment in rivers and streams. TSS was selected as one of the numeric targets for this TMDL because it enables the use of the highest quality data available, including permit and monitoring data. Since fine particle sized sediment and suspended particles of organic matter are derived from similar loading conditions of terrestrial and stream bank erosion, this TMDL will have TSS as one of its allocations to address both. This target was derived based on a reference approach by targeting the 25th percentile base load concentration (5 mg/L) of all available TSS measurements in the geographic region (Ozark/Meramec) in which Spring Branch (Creek) is located.

TMDLs should have a quantifiable endpoint to measure whether or not the applicable WQS are attained and the associated use(s) protected. 40 CFR 130.7(c)(1) ("TMDLs shall be established at levels necessary to attain and maintain" WQS). If the endpoint is not based on an ambient numeric criterion, then it can be developed from narrative criteria. *See, e.g.,* 40 CFR 122.44(d)(1)(vi).

The targets for TSS, TN and TP were based on load duration curves (LDCs), which determine the TMDL for each of these parameters at every flow probability. These reductions in nutrients and sediment protects the warm water aquatic life use of the stream and the TMDLs should result in WQS attainment. The LC for TN and TP is

defined by a LDC set at the ecoregion reference concentrations. The LC for TSS is defined by a LDC set at the 25th percentile of TSS measurements available in the ecological drainage unit (EDU). The LCs for TN, TP and TSS at the 50 percent flow exceedance are 24.76 lbs/day, 0.60 lbs/day and 428.29 lbs/day, respectively.

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 water quality criterion for DO for all Missouri streams, except cold water fisheries, is a daily minimum of 5 mg/L (10 CSR 20-7.031 Table A).

Spring Branch (Creek) is also listed for organic sediment but there are no specific numeric criteria for this pollutant. All Missouri streams are protected by the general criteria found in the WQS at 10 CSR 20-7.031 (3). The particular criteria that apply to Spring Branch (Creek) state:
(A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.

The designated beneficial uses of Spring Branch (Creek) are:
- Livestock and Wildlife Watering,
- Protection of Warm Water Aquatic Life,
- Protection of Human Health (Fish Consumption) and
- Whole Body Contact Recreation - Category B.

The use that is impaired is Protection of Warm Water Aquatic Life.

To address nutrient levels, the EPA nutrient ecoregion reference concentrations were targeted. To address TSS the 25th percentile of all TSS measurements available in the EDU were targeted. The TMDL LDC's represent flow under all possible stream conditions. The advantage of a LDC approach is that it avoids the constraints associated with using a single-flow critical condition and is applicable under all flow conditions. The LCs for TN, TP and TSS at the 50 percent flow exceedance are 24.76 lbs/day, 0.60 lbs/day and 428.29 lbs/day, respectively.

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.

To address nutrient levels, the EPA nutrient ecoregion reference concentrations were used. For Level III Ecoregion 39 where Spring Branch (Creek) is located, the reference concentration for TN is 0.289 mg/L and for TP is 0.007 mg/L. The LC for TN and TP is defined by LDCs set at the Level III Ecoregion 39 reference concentrations. An established link between TN and TP pollutant targets with narrative WQS was defined by using the Ozark Highlands (Level III Ecoregion 39) reference concentrations in the TMDL as numeric values. The TMDL uses a method to target specific concentrations at differing flows which will result in an annual average equal to the ecoregion target. As such, the ecoregion concentration will not be the target at all flows. These differing concentrations are calculated based on the range of current concentrations and a ratio adjustment such that the ecoregion targets are met.

A TMDL was developed establishing an allocation for suspended solids. Because sufficient pollutant data for the impaired stream was not available a reference approach was used. In this approach, the target or LC for pollutant loading is the 25th percentile of all data available within the Ozark/Meramec EDU in which Spring Branch (Creek) is located. An established link between TSS and sediment was used to define this TMDL as a numeric value.

The WLA, LA and MOS for all pollutants are set to not exceed the LC. Reductions in concentration for all pollutants should ensure the narrative WQS will be met.

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.

The Salem Municipal WWTF is the largest permitted facility in the watershed and has a design flow of 0.741 million gallons per day. It uses an oxidation ditch to treat domestic wastewater and also has reed beds to further process the sludge before it is land applied outside the watershed. The Salem WWTF permit was renewed February 9, 2007, and retained BOD and TSS effluent limits from the previous permit. Those effluent limits are 45 mg/L weekly average and 20 mg/L monthly average BOD, and 45 mg/L weekly average and 30 mg/L monthly average TSS. The Salem WWTF permit includes instream monitoring of Spring Branch (Creek), both upstream and downstream of the WWTF. The permit expires February 8, 2012.

Previous operating permits in Missouri authorized discharges of bypassed wastewater at some facilities during peak flow conditions. Changes to MDNR's regulations have removed this authorization and permits are now issued without bypass discharges being authorized. Discharges resulting from emergency diversion shall be considered an unauthorized bypass pursuant to 40 CFR 122.41 (m) and shall be reported, pursuant to 40 CFR 122.41(m).

The MFA Bulk Plant (MOG350108) is a retail bulk fertilizer distribution center located upstream of the impaired section of Spring Branch (Creek). As noted in the TMDL, from MDNR casual observation, all fertilizer looked to be contained with set backs and modest berms so that fertilizer would not be entering the stream. Farther upstream at Highway 32 is the MFA Oil Company (MOR240135) which also did not appear to be contributing to poor water quality in Spring Branch (Creek). The Commons (MO0126021), Seville Care Center (MO0089974) and Salem Memorial District Hospital (MO0087076) all discharge to tributaries to Spring Branch (Creek). These facilities have very small discharges and are not expected to affect Spring Branch (Creek). At the very headwaters, the Adams Subdivision Association, Inc. (MO0083984) has a two-cell lagoon and discharges to a tributary to Spring Branch (Creek). In September 2006, both cells were very green with duckweed, but there was no observable discharge and the receiving tributary was dry. The lagoons are a potential source of nutrients and low DO and need to be maintained. Since the discharge is very small, the lagoons are not considered a significant source of the impairments.

There are two facilities with general permits and five facilities with storm water permits (see Table 4 within the TMDL for these permit numbers), within the Spring Branch (Creek) watershed. General permits are issued to entities that are similar enough to be covered by a single set of requirements. Storm water permits are issued to activities (e.g., land disturbance) that are similar enough to be covered by a single set of requirements and are expected to discharge in response to storm events.

Illicit straight pipe discharges of household waste are potential point sources in agricultural areas. These are discharges straight into streams or land areas and are different than illicitly connected sewers. There is no specific information on the number of illicit straight pipe discharges of household wastes in the Spring Branch (Creek) watershed.

There are no concentrated animal feeding operations (CAFOs) in the Spring Branch (Creek) watershed. Livestock operations where animals are maintained or fed under confined conditions but which maintain fewer than 300 animal units are not legally defined as CAFOs under state regulations. Additionally, facilities that are defined as CAFOs but which maintain fewer than 1,000 animal units are not required to obtain a Missouri State Operating Permit. The National Agricultural Statistics Service (NASS) reports there are 523 hogs and pigs, 401 sheep and lambs, 1,091 poultry layers and 25,200 poultry broilers in Dent County. Although it is possible that there are also unregulated animal feeding operations (AFOs) within the watershed, these operations are not regulated by MDNR and there is no data available on their numbers or locations. Unregulated operations that do not properly manage animals or their waste may potentially be acting as point sources of nutrients and oxygen-consuming substances that could contribute to a water quality impairment in Spring Branch (Creek).

Any CAFO that does not obtain an NPDES permit must operate as a no discharge operation. Any discharge from

an unpermitted CAFO is a violation of Section 301. It is 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 permitted CAFOs identified in this TMDL would have been assigned a WLA. At this time, AFOs and unpermitted CAFOs are considered under the LA because we do not currently have enough detailed information to know whether these facilities are required to obtain NPDES permits. This TMDL does not reflect a determination by EPA that any 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 or proposes to discharge has a duty to obtain a permit. If it is determined that any such operation is an AFO or 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 as approved.

Countywide data from the NASS were combined with the land cover data for the Muddy Creek watershed to estimate there are approximately 2,800 cattle in the watershed. These cattle are most likely located on the approximately 14,361 acres of grassland/pastureland in the watershed and runoff from these areas can also be a potential source of nutrients and oxygen-consuming substances. Animals grazing in pasture areas deposit manure directly upon the land and, even though a pasture may be relatively large and animal densities low, the manure will often be concentrated near the feeding and watering areas in the field. These areas can quickly become barren of plant cover and increase the possibility of erosion and contaminated runoff during a storm event. When pasture land is not fenced off from the stream, cattle or other livestock may contribute nutrients directly to the stream while walking in or adjacent to the water body. The density of cattle in the Spring Branch (Creek) watershed (65 cattle per square mile) suggests they are a potentially significant source of pollutants.

Failing septic systems are sources of nutrients that can reach nearby streams through both surface runoff and ground water flows. The exact number of onsite wastewater systems in the Spring Branch (Creek) watershed is unknown. An estimate was made based on approximately 555 people in the rural watershed area with 2.4 persons per household gives potentially 231 systems. Based on statewide surveys, 70 percent of these are likely failing. EPA also reports that the statewide failure rate of onsite wastewater systems in Missouri is 30 to 50 percent. Failing onsite wastewater treatment systems should be considered as a potentially significant source of the pollutants of concern in the Spring Branch (Creek) watershed, especially given the karst topography of the region which can rapidly transport pollutants from the surface to subsurface.

The Spring Branch (Creek) watershed is part of the Salem Plateau, an area in the center of Missouri's karst topography region. Karst refers to areas in which soluble rock, such as limestone or dolomite, develops caves and underground conduits for water. Water enters these conduits through losing streams (1) and sinkholes (2). On the topographic map of Spring Branch (Creek), there are eleven springs noted below the WWTF. There are also eight sinkholes below and four above the WWTF along the classified segment. These conditions complicate the management of impacts on water quality in both surface and groundwater from activities such as well drilling and on-site septic systems.

Storm water runoff from urban areas can be a significant source of nutrients and oxygen consuming substances. Lawn fertilization can lead to high nutrient loads and pet wastes can contribute both nutrient loads and oxygen-consuming substances. Phosphorus loads from residential areas can be comparable to or higher than loading rates from agricultural areas. Warmer storm runoff from urban areas such as parking lots and buildings can lead to higher water temperatures that lower the DO saturation capacity of streams. Excessive discharge of suspended solids from urban areas can also lead to streambed siltation problems. Approximately 10 percent of the Spring Branch (Creek) watershed is classified as urban and a significant portion of that area is adjacent to the impaired segment. Urban storm water runoff is considered a potentially significant source of substances and conditions contributing to the low DO problem. There are no MS4s within the Spring Branch (Creek) watershed.

The land uses and land covers for the watershed are grassland (51.43 percent), cropland (0.88 percent) and forest (30.06 percent) with urban areas and herbaceous vegetation occupying 9.05 and 5.75 percent of the watershed, respectively.

Lands used for agricultural purposes can be sources of sediment, nutrients and oxygen-consuming substances in the stream. Accumulation of nitrogen and phosphorus on cropland occurs primarily from decomposition of residual crop material and fertilization with chemical and manure fertilizers, atmospheric deposition, wildlife excreta and irrigation water. Nutrients and organic materials from crop fields are transported to adjacent streams during precipitation events through the processes of surface runoff and soil erosion. These processes can be compounded by tilling of farm fields and by applying fertilizers prior to precipitation events or at rates exceeding

the assimilative capacity of the soil. Land use and land cover data indicate there are 246 cropland acres in the watershed. This is less than one percent (0.88) of the total watershed and also of the riparian buffer.

Riparian areas can be sources of natural background material that could possibly contribute to the low DO problem. Leaf fall from vegetation near the water's edge, aquatic plants, and drainage from organically rich areas like wetlands are all natural sources of materials that consume oxygen and increase sediment. Wooded riparian buffers are instrumental in the detention, removal and assimilation of sediment and nutrients before they reach surface water. A stream with a good riparian zone is generally better able to moderate the impacts of high sediment and nutrient loads than a stream with a poor riparian zone. Almost half of the land in Spring Branch (Creek) watershed is classified as grassland (48 percent). Grassland provides very little shading and can be associated with livestock activity. Another 12 percent is classified as impervious and urban areas. Riparian habitat conditions should be considered as one possible component of water quality problems in Spring Branch (Creek).

Based on the information before us, the state's decision to apply the discharges associated with unpermitted sources to the LA, as opposed to the WLA for purposes of this TMDL, is acceptable. The decision to allocate these sources to the LA does not reflect any determination by EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by approving 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 of the WLA in this TMDL. WLA in addition to that allocated here is not available.

All known sources have been considered.
(1) A losing stream is one which distributes [loses] thirty percent or more of its flow into a bedrock aquifer. These losses would be during low flow conditions and through natural processes, such as through permeable geologic materials.
(2) A sinkhole or sink is a collapsed portion of bedrock above a void. Sinks may be a sheer vertical opening into a cave, or a shallow depression of many acres.

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.

The LCs for TN, TP and TSS at the 50 percent flow exceedance are 24.76 lbs/day, 0.60 lbs/day and 428.29 lbs/day, respectively. For TN, TP and TSS, the MOS is implicit and the sum of the WLA and LA do not exceed the LC.

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.

The TN sum WLA for the Salem WWTF is 1.79 lbs/day at all flow conditions.
The TP sum WLA for the Salem WWTF is 0.04 lbs/day at all flow conditions.
The TSS sum WLA for the Salem WWTF is 31 lbs/day at all flow conditions.
The CBOD5 WLA for the city of Salem's WWTF (at design flow 1.15 cfs) is set at 20.5 lbs/day or 3.3 mg/L.
The WLA for CBOD5 was derived from the QUAL2K modeling that resulted in meeting the DO WQS.

Compared to the city of Salem's WWTF, other permitted facilities in the Spring Branch (Creek) watershed discharge an insignificant volume of effluent and are unlikely to discharge during critical low flow periods. All other permits' WLA (not including Salem WWTF) will remain equal to their existing permit limits.

WLAs in Table 9 of the TMDL document, are presented as a sum for all point source dischargers in the watershed. As an example, at all percent flow exceedances the sum WLA for TN is 1.85 lbs/day, for TP is 0.045 lbs/day and for TSS 31.99 lbs/day.

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.

The LAs for the Spring Branch (Creek) TMDL are for all nonpoint sources of TN, TP and TSS. TMDL LAs for the entire Spring Branch (Creek) watershed were calculated based on the loads expressed in the LDCs. The LAs are intended to allow the nutrient and TSS targets to be met at all locations within the stream under a variety of flow conditions. Allocations for the Spring Branch (Creek) watershed are provided in Table 9 within the TMDL document.

As an example, at the 50 percent flow exceedance the LA for TN is 22.91 lbs/day, for TP is 0.555 lbs/day and for TSS 396.31 lbs/day.

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.

An implicit MOS was incorporated into the TMDL based on conservative assumptions applied to the QUAL2K model and used in the development of the TMDL LDCs. Among the conservative approaches used was to: 1) calculate WLAs by targeting the 25th percentile of all TSS concentration data available in the geographic region (EDU) in which Spring Branch (Creek) is located and 2) to establish WLAs for the Salem WWTF under critical low flow conditions when discharge from this facility will dominate the stream flow.

The use of ecoregion targets in lieu of national or state-wide nutrient targets serves to ensure that implementation will result in pristine or minimally impacted stream systems. The 25th percentile is considered a surrogate for establishing a reference population of the pristine systems. The TN and TP targets are conservative because they are based on the 25th percentile of all TN and TP data gathered from ecoregion 39. These data are not directly influenced by permitted dischargers. In the case of nutrients, the targets are the median calculated from the four seasonal 25th percentile values.

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.

Federal regulations at 40 CFR § 130.7(c)(1) require that TMDLs take into consideration seasonal variation in applicable standards. The Spring Branch (Creek) TMDL addresses seasonal variation in two ways. One is by identifying a LC that is protective of the critical low flow period sampled in May 2008. DO concentrations did not meet WQS during the May 2008 sampling and were lower (i.e., more critical) than those recorded during September 2008. QUAL2K TMDL development for low DO during critical low flow conditions are expected to be protective year round. The second way in which the Spring Branch (Creek) TMDL takes seasonal variation into account is through the use of LDCs. LDCs represent the allowable pollutant load under different flow conditions and across all seasons. The results obtained using the LDC method are more robust and reliable over all flows and seasons when compared with those obtained under critical low-flow conditions and avoids the constraints associated with using a single-flow critical condition.

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)].

This water quality limited segment of Spring Branch (Creek) is included on the approved 2008 Missouri 303(d) List. Four public meetings were held, one each in March, April, May and July 2007. The first public notice period for the draft Spring Branch (Creek) TMDL was from April 7 to May 7, 2009. It was placed on public notice a second time from May 14 to June 28, 2010, in response to comments received during the first notice and subsequent changes made to the document. Before finalizing the Spring Branch (Creek) TMDL the public was notified of a 45-day comment period. Public notices to comment on the draft Spring Branch (Creek) TMDL

were distributed via mail and e-mail to major stakeholders in the watershed or other potentially impacted parties. Finally, the public notice, the TMDL Information Sheet and TMDL were posted on MDNR's Website, making them available to anyone with Internet access. Any comments received, and MDNR's response to those comments, have been placed in the Spring Branch (Creek) administrative record. Three public comments were received overall and the TMDL document has been adjusted where appropriate.

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].

MDNR may schedule and conduct post-TMDL monitoring approximately three years after the TMDL is approved, or in a reasonable period of time following the TMDL compliance schedule outlined in the Salem WWTF state operating permit, and the application of any new effluent limits. The Salem WWTF permit was renewed on February 9, 2007, with an instream monitoring requirement, both upstream and downstream of the WWTF, to further determine the impact of the facility discharge on Spring Branch (Creek). Data to be collected monthly in Spring Branch (Creek) include temperature, DO, pH and ammonia. Nutrient monitoring may be added to this permit to characterize the effluent contribution to instream nutrients.

MDNR will routinely examine physical habitat, water quality, the invertebrate community and fish community data collected by other local, state and federal entities in order to assess the effectiveness of TMDL implementation. One example of such data is that generated by the Resource Assessment and Monitoring Program administered by the Missouri Department of Conservation. This program randomly samples streams across Missouri on a five to six year rotating schedule.

The local stream team gathered DO data at five sites along Spring Branch (Creek) during the 2007 to 2008 school year. These two sources of data (permittee instream monitoring and volunteer monitoring) will be used for screening purposes, to compare the stream's current condition with future, post-TMDL, conditions. It is recommended that additional sampling, including biological sampling, be conducted in the affected segment of Spring Branch (Creek) prior to implementation of the WLAs in order to assess the water body's attainment of designated beneficial uses. These sampling events should occur prior to the end of calendar year 2012 and continue as necessary.

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 assurances are not required within this TMDL because all permitted point sources have received a WLA that is set to meet WQS.

MDNR has the authority to issue and enforce Missouri State Operating Permits. Inclusion of effluent limits into a state operating permit and requiring that effluent and instream monitoring be reported to MDNR should provide reasonable assurance that instream WQS 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 WLAs 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 LAs and point source WLAs do not exceed the WQS-based LC and there is reasonable assurance that the TMDL's allocations can be achieved. Any discussion of reduction efforts relating to nonpoint sources would be found in the implementation section of the TMDL.

MDNR will work with the city of Salem to discuss treatment plant upgrades and funding options and will issue a permit reflective of the WQS that must be met.

Prior to implementation of the TMDL WLAs, either MDNR or the city will determine whether the DO criterion of 5 mg/L found in 10 CSR 20-7.031, Table A is appropriate or if site specific DO criteria for Spring Branch (Creek) are required. This may coincide with MDNR's Triennial Review of the WQS, scheduled for 2012, when new DO criteria may be promulgated. It is recommended that additional sampling, including biological sampling, be conducted in the affected segment of Spring Branch (Creek) prior to implementation of the WLAs in order to assess the water body's attainment of designated beneficial uses. These sampling events should occur prior to the end of calendar year 2012 and continue as necessary.