UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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

MAY 26 2010

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WATER PROTECTION PROGRAM

Mr. Scott Totten, Acting Director
Water Protection Program
Water Protection and Soil Conservation Division
Missouri Department of Natural Resources
P. O. Box 176
Jefferson City, Missouri 65102

Re: Approval of Mound Branch TMDL

Dear Mr. Totten:

This letter responds to the Missouri Department of Natural Resources (MDNR) submission of a Total Maximum Daily Load (TMDL) document which contained a low dissolved oxygen TMDL for Mound Branch segment 1300. The document was originally received by the United States Environmental Protection Agency (EPA), Region 7, on March 24, 2010. Revisions were made to the original submittal and the final version was resubmitted on April 30, 2010.

Mound Branch was identified on the 2008 Missouri 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 impairments (water body segment and pollutant) are:

Water Body Name	WBID	Pollutant
Mound Branch	MO_1300	low dissolved oxygen

EPA has completed its review of the TMDL document with supporting documentation and information. By this letter, EPA approves the submitted TMDL. Enclosed with this letter is the EPA Region 7 TMDL Decision Document summarizing the rationale for EPA's approval of the TMDL. EPA believes the separate elements of the TMDL 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 and determine if future revisions are necessary or appropriate to meet applicable water quality standards.

RECYCLE

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 this TMDL at the present time, we may decide that changes to the TMDL are warranted based upon the results of the consultation when it is completed.

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

EPA Region 7 TMDL Review

TMDL ID: MO_1300 **State:** MO

Document Name: MOUND BRANCH

Basin(s): OSAGE-LOWER MARAIS DES CYGNES

HUC(s): 10290102

Water body(ies): MOUND BRANCH

Tributary(ies): EAST MOUND BRANCH, ROOT BRANCH, TRIBUTARY TO MOUND BRANCH, WILLOW BRANCH

Pollutant(s): CBOD, LOW DISSOLVED OXYGEN, TOTAL NITROGEN, TOTAL PHOSPHORUS, TOTAL SUSPENDED SOLIDS

Submittal Date: 3/24/2010 **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 March 24, 2010. Revisions to this document were received by email on April 30, 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.

The Mound Branch TMDL was developed to address the low dissolved oxygen (DO) impairment of Mound Branch segment MO_1300. A TMDL is needed for Mound Branch because it is not meeting the WQS for DO. 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 biochemical oxygen demand (BOD). 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 of dead, decaying algae also removes oxygen from water.

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, the EPA nutrient ecoregion reference concentrations were used. For the ecoregion where Mound Branch is located, the reference concentration for total nitrogen (TN) is 0.855 mg/L, and the

reference concentration for total phosphorus (TP) is 0.092 mg/L. This TMDL will not specifically target chlorophyll a, but will use a linkage between nutrient concentrations and chlorophyll a response to achieve the ecoregion reference concentrations.

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 of all available TSS measurements (44 mg/L) in the geographic region in which Mound Branch is located.

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. The reduction of 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 60 percent flow exceedance are 106.73 pounds per day (lbs/day), 12.13 lbs/day, and 675.09 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).

The designated beneficial uses of Mound Branch 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 TSS measurements (44 mg/L) 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 60 percent flow exceedance are 106.73 lbs/day, 12.13 lbs/day, and 675.09 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.

An essential component of developing a TMDL is establishing a relationship between the source loadings and resulting water quality. For this TMDL, the relationship between the source loadings of BOD and nutrients from DO levels is generated by the water quality model QUAL2K. The QUAL2K model is suitable for simulating the hydraulics and water quality conditions of a small river. It is a one-dimensional model with the assumption of a completely mixed system for each computational cell. QUAL2K is well accepted within the scientific community because of its proven ability to simulate the processes important to DO conditions within streams. The processes employed in QUAL2K address nutrient cycles, algal growth, and DO dynamics. The

WLA for CBOD5 was derived from the QUAL2K modeling run that resulted in meeting DO WQS.

The data available suggests that high nutrient loads are contributing to excessive algal growths in Mound Branch. The excessive algal growths, in turn, are causing low DO to occur late at night when the algae are consuming but not producing oxygen. Large amounts of algae may also be contributing to low DO when the plants die and decay. The Butler Wastewater Treatment Plant (WWTP) may be contributing to the high nutrient loads but there may also be contributions from other upstream sources. To address nutrient levels, the EPA nutrient ecoregion reference concentrations were used. For Ecoregion Level III, 40 (Central Irregular Plains) where Mound Branch is located, the reference concentration for TN is 0.855 mg/L, and for TP is 0.092 mg/L. The LC for TN and TP is defined by LDCs set at the ecoregion reference concentrations. An established link between instream nutrient concentrations and chlorophyll a response was used to achieve the ecoregion reference concentrations and define this TMDL as a numeric value.

The TMDL sets targets to reduce nutrient concentrations (TN and TP) to a level that will decrease algal productivity, thereby reducing the algal biomass available for decay and decomposition. This reduction of available algae will lead to a reduction in oxygen demanding substances in the water column (CBOD) and on the stream bottom as sediment oxygen demand (SOD).

A TMDL establishing an allocation for suspended solids was developed. In this case, where sufficient pollutant data for the impaired stream are not available a reference approach was used. In this approach, the target for pollutant loading is the 25th percentile of the EDU condition calculated from all TSS data available within the EDU in which the water body is located. The LC for TSS is defined by a LDC set at the 25th percentile of TSS measurements available in the EDU. 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 DO WQS of 5 mg/L 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.

There are five facilities in the Mound Branch watershed that have national pollutant discharge elimination system (NPDES) permits through the state of Missouri. One of the permits within the watershed is site specific, one is a general permit, and three are storm water permits. The general permit listed below does not discharge to the stream, but does have storm water runoff during rain events. Storm water permits may contribute nutrients at high flow, but are not expected to contribute nutrients at low flow. These permits are not considered to contribute to the low DO impairment during low flow conditions.

Permits

Facility	Permit Number	Design Flow Million Gallons/Day
City of Butler WWTP	MO0096229	1.5
MFA Oil Bulk Plant - Butler	MOG350276	General Permit
South Side Lumber Company	MOR22A022	Storm water Permit
MFA West Central Agriservices, LLC	MOR240433	Storm water Permit
Heiman Agri Services, Inc.	MOR240469	Storm water Permit

The city of Butler's WWTP underwent an upgrade that was completed in March 2003 and has a design flow of 1.5 million gallons per day, or 2.3 cubic feet per second (cfs). Butler's WWTP is a source of nutrients, organic material, and oxygen demanding substances to the downstream sampling locations. DO problems were also observed upstream of the WWTP which indicates that organic material (and possibly nutrients) could also be originating from nonpoint sources. The four other facilities in the watershed are not considered to be contributors to the low DO problem. They are all located upstream of the WWTP, but have no runoff during critical low flow conditions.

Infiltration and inflow associated with the sanitary sewer collection system is another potential source of nutrients and organic material. A sanitary sewer collection system is the network of pipes and pumps that convey sewage to a WWTP. Infiltration and inflow allow excess storm water to enter the sewage collection system, which leads to sanitary sewer overflows and wet weather treatment issues at WWTPs. Collection systems across the country are aging and communities are struggling to address the needed maintenance. Maintenance of sanitary sewer collection systems is often addressed through a WWTP's Missouri State Operating Permit (MSOP).

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 Mound Branch watershed.

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 Mound Branch watershed is unknown. An estimate was made based on approximately 406 people in the rural watershed area with 2.5 persons per household gives potentially 162 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. Since approximately 7 percent of the Mound Branch watershed is classified as urban, urban storm water runoff is considered a potentially significant source of substances and conditions contributing to the low DO problem. Approximately 2.32 percent of the riparian corridor is classified as urban. There are no municipal separate storm sewer systems (MS4s) within the Mound Branch watershed.

Other urban nonpoint sources that have the potential to add nutrients to Mound Branch are cattle operations within the city limits of Butler, city of Butler's golf course, city of Butler's composting site, and city/county livestock show grounds.

Lands used for agricultural purposes can be a source of nutrients and oxygen-consuming substances. Accumulation of nitrogen and phosphorus on cropland occurs from decomposition of residual crop material, fertilization with chemical and manure fertilizers, atmospheric deposition, wildlife excreta, and irrigation water. The land use/land cover data indicates that approximately 28 percent of the watershed consists of cropland and nearly 41 percent of the riparian corridor along Mound Branch is classified as cropland.

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. Other types of land use includes forest (4.98 percent), herbaceous, open water, and wetland (all totaling 5.4 percent). Wetlands comprise 22.97 percent of the riparian corridor. Herbaceous, open water and forest total 12.3 percent of the riparian corridor.

There are no known state-permitted concentrated animal feeding operations (CAFOs) in the watershed, but the presence of lower density livestock populations could be contributing to the nutrient and sediment loads in Mound Branch. The cattle are most likely located on the approximately 18,016 acres of grassland/pastureland in the watershed, and runoff from these areas can be potential sources of nutrients and oxygen-consuming substances. Animals grazing in pasture areas deposit manure directly upon the land surface 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, increasing the possibility of erosion and contaminated runoff during a storm event. Grassland makes up 55 percent of the watershed land use and approximately 22 percent of the riparian corridor.

In the absence of an NPDES permit, the discharges associated with sources were applied to the LA, as opposed to the WLA for purposes of this TMDL. The decision to allocate these sources to the LA does not reflect any determination by EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by establishing these TMDLs with some sources treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in

this TMDL are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated sum of the WLAs in this TMDL. WLA in addition to that allocated here is not available.

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. However, many large CAFOs (mostly the poultry and swine sectors) contend that they do not discharge nor propose to discharge therefore are not required to obtain an NPDES permit. It is EPA's opinion that many of the "no discharge" CAFOs do not have adequate land application area to ensure the agronomic uptake of land applied waste or are not designed, constructed, operated, or maintained so that they do not discharge or propose to discharge. Furthermore, there are many animal feeding operations (AFOs) that meet the definition of a medium CAFO (i.e., discharge via a man-made conveyance) but are unpermitted and have not limited their impact on waters by applying Best Professional Judgment to effluent reductions.

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 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.

All known sources have been considered.

Allocation - Loading Capacity

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

The LCs for TN, TP, and TSS at the 60 percent flow exceedance are 106.73 lbs/day, 12.13 lbs/day, and 675.09 lbs/day, respectively. For TN, TP, and TSS, the MOS is implicit, the LAs are zero at low flow (100 percent flow exceedance), 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 WLA for the Butler WWTP is 10.10 lbs/day at all flow conditions. All other permits have a WLA of zero.

The TP sum WLA for the Butler WWTP is 1.15 lbs/day at all flow conditions. All other permits have a WLA of zero.

The TSS sum WLA for the Butler WWTP is 210.10 lbs/day at all flow conditions. All other permits have a WLA of zero.

The CBOD5 WLA for the city of Butler's WWTP (at design flow 2.325 cfs) is set at 18.8 lbs/day. The WLA for CBOD5 was derived from the QUAL2K modeling that resulted in meeting the DO WQS.

The entire WLA reduction is allocated to the city of Butler's WWTP. Compared to the city of Butler, the other four general and storm water permitted facilities in the watershed discharge an insignificant volume of effluent and are unlikely to discharge during critical low flow periods. All permits' WLA (not including Butler WWTP) will remain equal to their existing permit limits.

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 Mound Branch TMDL are for all nonpoint sources of TN, TP, and TSS. The LAs were calculated based on the total of all headwater and lateral inflow loads used in the QUAL2K model for the allocation scenario model run. The LAs are intended to allow the DO target to be met at all locations within the stream.

The CBOD5 LA is set at 3.2 lbs/day. The LA for CBOD5 was derived from the QUAL2K modeling that resulted in meeting DO WQS and is derived from the low flow condition corresponding to the August 2003 sampling event.

As an example, at the 60 percent flow exceedance the LA for TN is 96.63 lbs/day, for TP is 10.98 lbs/day, and for TSS 464.99 lbs/day. During critical conditions when flow is at its lowest, and there is effectively no flow from nonpoint sources, the LAs for all targeted pollutants is 0 (zero) 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 target the 25th percentile of all TSS concentration data available in the EDU in which Mound Branch is located. TN and TP targets are also conservative because they are based on the 25th percentile of all TN and TP data available in the ecoregion.

Seasonal Variation and Critical Conditions

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

The impairment of Mound Branch is low DO. The critical condition for low DO is during low flow conditions when discharge from Butler WWTP will dominate in-stream pollutant loading. Low DO can occur due to increased nutrients and organic sediments being carried into the water body through storm water runoff. These conditions are more likely to occur during seasonal periods having significant precipitation. Seasonal variation has been implicitly taken into account within the TMDL calculations by identifying a LC that is protective of the critical low flow period sampled in August 2003. QUAL2K TMDL development for low dissolved oxygen during critical low-flow conditions are expected to be protective year round.

The TMDL LDC represents flow under all possible stream conditions and seasons, and avoids the constraints associated with using a single-flow critical condition. Using a LDC for TMDL development during these conditions will be protective.

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 Mound Branch is included on the approved 2008 303(d) List for Missouri. The public notice period for the draft Mound Branch TMDL was October 30, 2009 to December 14, 2009. The public notice, the TMDL Information Sheet, and the TMDL document were posted on the MDNR Web site, making them available to anyone with Internet access. The public notice announcement was also sent to a variety of interest groups. Comments received and MDNR's response to those comments have been placed in the Mound Branch administrative record file. Seven comments were received and MDNR responded and made changes to the draft TMDL.

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].

Post-TMDL monitoring will be scheduled and carried out by MDNR three years after the TMDL is approved, or in a reasonable period of time following any TMDL compliance schedule outlined in the permit and the application of any new effluent limits.

The MSOP for the city of Butler's WWTP was renewed on February 11, 2010, and retained effluent limits for BOD of 10 mg/L weekly average and 10 mg/L monthly average. MDNR intends the implementation of TMDL WLAs for CBOD5, TSS, TN and TP to occur using a phased approach.

The MSOP for the city of Butler's WWTP requires instream monitoring downstream of the WWTP to provide additional data with which to assess the impact of the permit limits on Mound Branch. Instream data currently collected monthly in Mound Branch includes flow (a 24-hour estimate), DO, pH, ammonia, nitrate plus nitrite as nitrogen and temperature. These data will be used for screening purposes to compare the stream's current condition with future, post-TMDL conditions.

MDNR will routinely examine physical habitat, water quality, invertebrate community and fish community data collected by other state and federal agencies in order to assess the effectiveness of TMDL implementation. One example is 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.

For nonpoint sources, follow-up monitoring would be scheduled for three years after best management practices are installed and effective. Also, monitoring is required in the Marais des Cygnes, Marmaton and Little Osage Rivers Watershed Management Action Plan as a measure of success (see Section 12.2 of the TMDL).

Reasonable Assurance

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

Reasonable 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 MSOPs. Inclusion of effluent limits derived from TMDL WLAs into a state permit, and monitoring of the effluent reported to MDNR, should result in compliance with WQS. If post-TMDL monitoring indicates that point source reductions are not achieving the desired improvements in water quality, MDNR will reevaluate the TMDL for further appropriate actions. These actions may include additional permit conditions on the Butler WWTP (including effluent limits for TN and TP). The MSOP for the city of Butler's WWTP requires instream monitoring downstream of the WWTP to provide additional data with which to assess the impact of the permit limits on Mound Branch. Instream data currently collected monthly in Mound Branch includes flow (a 24-hour estimate), DO, pH, ammonia, nitrate plus nitrite as nitrogen and temperature. These data will be used for screening purposes, to compare the stream's current condition with future, post-TMDL conditions.

A CWA Section 319 Nonpoint Source Implementation Grant was awarded to the Osage Valley Resource Conservation and Development Council to implement a watershed management plan relating to Mound Branch. The project start date was July 1, 2009, and will terminate on June 30, 2013, with a total project cost of $1,928,338. The project seeks to improve water quality in Mound Branch by increasing the average DO levels and reducing the average ammonia levels and sediment loading. Management practices to be implemented include conservation tillage, field borders, agricultural and urban riparian buffers, filter strips, planned grazing systems, stream bank erosion rehabilitation, residue management, integrated crop and nutrient management, urban lawn nutrient and pest management, urban lawn clippings, composting and modifying onsite wastewater treatment systems.