



EPA Region 7 TMDL Review

TMDL ID:MO_1946

State:MO

Document Name: INDIAN CREEK

Basin(s): UPPER MISSISSIPPI-MERAMEC

HUC(s): 07140102, 7140102

Water body(ies): COURTOIS CREEK, INDIAN CREEK, INDIAN CREEK, TRIBUTARY TO

Tributary(ies): COURTOIS CREEK, INDIAN CREEK, TRIBUTARY TO INDIAN CREEK

Pollutant(s): LEAD, ZINC

Submittal Date:5/28/2010

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.

The TMDL document for Indian Creek (Courtois Creek and Tributary to Indian Creek) was formally submitted by the Missouri Department of Natural Resources (MDNR) in a letter received by the United States Environmental Protection Agency (EPA), Region 7, on May 28, 2010. Revisions to the TMDL document were sent by email on August 31, 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 TMDL document was written to address the impairments of dissolved lead, dissolved zinc and metals that were included on the 2008 Missouri 303(d) List for the following waters: segment 1946 of Indian Creek and segment 1943 of Courtois Creek were listed for dissolved lead and metals; segment 3663 of Tributary to Indian Creek was listed for dissolved lead and dissolved zinc. The pollutant listing of metals for Indian Creek and Courtois Creek is a change from Missouri's EPA-approved 2004/2006 303(d) List in which dissolved zinc was cited as the pollutant of concern. This document provides TMDLs for dissolved lead and dissolved zinc because these are the pollutants for which there are available data that indicate an impairment of the protection of aquatic life designated use. Additionally, a biological assessment study of these streams conducted in 2001 and 2002 found the streams' aquatic invertebrate communities to be exhibiting lower species diversity and fewer individuals when compared to representative reference streams. It is believed lead is the primary pollutant resulting in metal toxicity for which the current metals impairment was based, and that reducing lead concentrations to or below WQS will result in eliminating the effects of metals toxicity to the streams' aquatic life. The LCs are determined by load duration curves (LDCs) addressing the chronic dissolved lead and chronic dissolved zinc numeric criteria.

Lead and Zinc:

The chronic WQSs for dissolved lead and dissolved zinc had observed exceedances; no acute criteria exceedances were observed. The lead and zinc endpoints, listed in the TMDL, are based on the chronic dissolved lead and dissolved zinc WQS expressed as LDCs using estimated flow at each watershed outlet.

For segment 1946 (Indian Creek), the LCs at median flow (60 percent flow exceedance), are 0.25 and 8.9

pounds per day (lbs/day) dissolved lead and dissolved zinc, respectively.

For segment 3663 (Tributary to Indian Creek), the LCs at median flow (60 percent flow exceedance), are 0.03 and 0.89 lbs/day dissolved lead and dissolved zinc, respectively.

For segment 1943 (Courtois Creek), the LCs at median flow (60 percent flow exceedance), are 1.69 and 63.14 lbs/day dissolved lead and dissolved zinc, respectively.

WQS should be attained when the listed LCs are achieved.

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 applicable Missouri WQS for the lead and zinc TMDLs is:
10 CSR 20-7.031(4)(B)1

Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded.

Current lead and zinc criteria for the protection of aquatic life use are expressed in dissolved form in units of micrograms per liter (ug/L). These criteria are hardness dependent and calculated from the formulas shown below from Table A of 10 CSR 20-7.031:

Dissolved Lead

Acute = $e^{(1.273 \cdot \ln(\text{hardness}) - 1.460448)} \cdot (1.46203 - (\ln(\text{hardness}) \cdot 0.145712)) = \text{ug/L}$

Chronic = $e^{(1.273 \cdot \ln(\text{hardness}) - 4.704797)} \cdot (1.46203 - (\ln(\text{hardness}) \cdot 0.145712)) = \text{ug/L}$

Dissolved Zinc

Acute = $e^{(0.8473 \cdot \ln(\text{hardness}) + 0.884211)} \cdot 0.978 = \text{ug/L}$

Chronic = $e^{(0.8473 \cdot \ln(\text{hardness}) + 0.785271)} \cdot 0.986 = \text{ug/L}$

where "e" is the base of the natural logarithm (approximately 2.718) and "ln" is the natural logarithm.

The applicable Missouri WQS for hardness are:

Hardness	50-74	75-99	100-124	125-149	150-174	175-199	200-224	225-249	250+
Lead ug/L									
Acute	30	47	65	82	100	118	136	154	172
Chronic	1	2	3	3	4	5	5	6	7
Zinc ug/L									
Acute	65	92	117	142	165	188	211	233	255
Chronic	59	84	107	129	151	172	193	213	233

The 25th percentile hardness value must be used to calculate hardness-dependent metals criteria (per 10 CSR 20-7.031).

	25th percentile Hardness	Lead		Zinc	
		Acute	Chronic	Acute	Chronic
Courtois Creek	170 mg/L	114 ug/L	4.5 ug/L	134 ug/L	168 ug/L
Indian Creek	225 mg/L	154 ug/L	6 ug/L	233 ug/L	213 ug/L
Tributary to Indian Creek		154 ug/L	6 ug/L	233 ug/L	213 ug/L

Tributary to Indian Creek runs for 0.3 miles and is entirely contained within Washington County, and is

contained within the Indian Creek watershed. Hardness data for Tributary to Indian Creek was not available. The Indian Creek values are representative of the entire Indian Creek watershed including Tributary to Indian Creek.

The water quality targets for lead and zinc will be based on the chronic criteria to ensure aquatic life will be protected from acute and chronic toxicity. Targets (bolded in the table above) for Courtois Creek are 4.5 ug/L for lead and 168 ug/L for zinc. Targets for Indian Creek and the Tributary to Indian Creek are 6 ug/L for lead and 213 ug/L for zinc.

The beneficial uses for both Indian Creek (1946) and Tributary to Indian Creek (3663) are:

- Livestock and Wildlife Watering
- Protection of Warm-water Aquatic Life
- Protection of Human Health (Fish Consumption)
- Whole Body Contact Recreation - Category B

The beneficial uses for Courtois Creek (1943) are:

- Livestock and Wildlife Watering
- Protection of Cool-water Aquatic Life
- Protection of Warm-water Aquatic Life
- Protection of Human Health (Fish Consumption)
- Whole Body Contact Recreation - Category A
- Secondary Contact Recreation

Courtois Creek (12 miles in Crawford County only) is included as an Outstanding State Resource Water (10 CSR 20-7 Table (E)).

For segment 1946 (Indian Creek), the LCs at median flow (60 percent flow exceedance), are 0.25 and 8.9 pounds per day (lbs/day) dissolved lead and dissolved zinc, respectively.

For segment 3663 (Tributary to Indian Creek), the LCs at median flow (60 percent flow exceedance), are 0.03 and 0.89 lbs/day dissolved lead and dissolved zinc, respectively.

For segment 1943 (Courtois Creek), the LCs at median flow (60 percent flow exceedance), are 1.69 and 63.14 lbs/day dissolved lead and dissolved zinc, 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.

The dissolved lead and dissolved zinc targets are directly linked to Missouri numeric WQS. The LCs are determined by LDC addressing the chronic dissolved lead and chronic dissolved zinc numeric criteria. The water quality targets for lead and zinc will be based on the chronic criteria to ensure aquatic life will be protected from acute and chronic toxicity. The TMDL LDC represents 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 during the development of the TMDL. The pollutant listing of metals for Indian Creek and Courtois Creek is a change from Missouri's EPA-approved 2004/2006 303(d) List in which dissolved zinc was cited as the pollutant of concern. This document provides TMDLs for dissolved lead and zinc, because these are the pollutants for which there are available data that indicate an impairment of the protection of aquatic life designated use. It is believed lead is the primary pollutant resulting in metal toxicity for which the current metals impairment was based. It is also believed reducing lead concentrations to or below WQS will result in eliminating the effects of metals toxicity to the streams' aquatic life.

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.

Missouri's inventory of mines notes the former existence of nine historic lead and zinc mining sites in the impaired Courtois Creek watershed. These historic mine sites, three former Renault Lead Company mines and six unnamed sites, are all located outside the Indian Creek and Tributary to Indian Creek watersheds. Any potential contributions of lead and zinc loading from these sites would be to Courtois Creek and are expected to be minor. There are no tailings impoundments associated with the historic mine sites and seven of the nine sites are located near the downstream end of the impaired segment of Courtois Creek.

Metals loading from the Indian Creek watershed has been identified as the primary source of lead and zinc to Courtois Creek. This was determined by analyzing data collected both above and below the confluence of Indian Creek and Courtois Creek and do not indicate that a lead or zinc impairment exists on Courtois Creek above the confluence.

There are also 15 historic sand, gravel and other non-lead or zinc related mine sites within the impaired Courtois Creek watershed. None of these sites are expected to significantly contribute lead or zinc to the impaired water bodies.

Of the six facilities located in the watershed, discharges from the Doe Run-Viburnum Operations (MO0000086) are expected to be the main contributor of lead and zinc to the impaired water bodies. The Doe Run-Viburnum Operations facility has five permitted outfalls that discharge mine water, precipitation and runoff from the facility, tailings impoundments and the upper watershed. One of these outfalls also potentially receives effluent from the City of Viburnum wastewater lagoon (MO0055751), which has an outfall approximately 2 miles upstream. The Doe Run Company also has a storm water permit for an outfall near the Old Viburnum Tailings Impoundment, which is a 427 acre tailings pile that is one of two tailings impoundments managed by the Doe Run Company in the Viburnum area. The second tailings impoundment, located just south of the first, is known as the New Viburnum Tailings Impoundment and spans approximately 403 acres. Both of these tailings impoundments are contributors of lead and zinc loading to the impaired water bodies during large runoff-producing storm events.

The mining area is within the St. Joe Minerals Corporation-Viburnum Superfund site, which is named after Doe Run's predecessor. Superfund is a federal government program to clean uncontrolled hazardous waste sites and is administered by the EPA or a state agency with EPA approval. The St. Joe Mineral Corporation-Viburnum site is not included on EPA's National Priorities List of hazardous waste sites. The National Priorities List is the EPA's list of priorities among the known hazardous waste sites throughout the United States and is intended to aid in determining which sites warrant further investigation.

Permitted Facilities

Permit Number	Facility Name	Facility Type
MO0000086	Doe Run - Viburnum Operations	Lead Mine
MO0055751	Viburnum Wastewater Lagoon	Publicly Owned Treatment Works
MO0103420	Viburnum Trailer Park Lagoon	Publicly Owned Treatment Works
MOG490268	Viburnum Quarry	Limestone Quarry
MOR108711	Doe Run Buick SSA Borrow	Storm Water - Land Disturbance
MOR22A227	Advanced Resaw LLC	Storm Water - Wood Products

Because tailings impoundments are unlined, seepage of dissolved metals from the tailing impoundments into the groundwater represents a potential secondary source of metals contamination to the impaired water bodies. Surface runoff may be significant during large storm events. As precipitation infiltrates tailing piles and moves through the subsurface, metals may become dissolved and enter the streams via the groundwater recharge pathway. Although the amount and extent of any seepage into groundwater as a possible secondary source of metals contamination is unknown, monitoring well data at depth suggests that little of the leachate reaches the deep groundwater. This is probably because deep groundwater in this part of the Ozarks may be pressurized.

In addition to the tailings impoundments, haul roads and other disturbed areas within the mining area may contribute metal loading to the impaired water bodies as a result of storm events. The submittal recognizes the possibility of nonpoint source loading of lead and zinc contaminated soils from runoff due to haul and access roads and in non-mining areas, soil contamination of lead and zinc occurs in these areas as a result of mine

concentrate or tailings being moved either unintentionally through vehicle debris or intentionally for use as fill material. These sources may also contribute lead and zinc to surface waters as a result of runoff-producing storm events. This runoff may contain automotive sources of lead (e.g., tire residues, exhaust fumes, battery fluid and motor oil).

Metal loading from the Doe Run Company's mining area, a point source that includes tailings piles, dewatering ponds, disturbed mining land, and the St. Joe Minerals Corporation-Viburnum Superfund site is expected to be the main contributor of lead and zinc loading to the watersheds.

Urban land use covers 1.31 percent and barren (mine tailings, etc.) covers 1.12 percent of the total watershed areas. Other land uses include grassland (7.92 percent), forested/woodland (88.86 percent), row crop (0.21) and open water total (0.58 percent).

Undisturbed and vegetated areas of the watershed are expected to only contribute minor amounts of dissolved lead and dissolved zinc.

While nonpoint sources of dissolved lead and zinc are minor or negligible under critical low-flow conditions, historic and legacy lead and zinc within the stream system can be sources of these metals, especially during higher flows. As conservative pollutants, these metals do not degrade and historic lead and zinc can become re-suspended into the water column and carried downstream via natural fluvial processes. Metals, including lead and zinc, may adsorb to organic and inorganic sediment surfaces, which may result in significant metals suspension and re-deposition during and immediately following high-flow storm events. This process allows previously unavailable lead and zinc to enter the water column and become a water quality concern. It is therefore reasonable and necessary to have LAs for lead and zinc at higher flows to account for nonpoint source instream loading of these pollutants.

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.

There are no state-permitted concentrated animal feeding operations (CAFO) in the watershed.

Animal feeding operations (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.

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.

It appears all known sources have been included.

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 submittal provides LC, WLA, LA and MOS for each pollutant and each segment covered by this TMDL document. Load duration curves were used to express the TMDL for dissolved lead and dissolved zinc. In the Indian Creek, Tributary to Indian Creek, and Courtois Creek watersheds, metal loading is coming exclusively from the Doe Run mining area, which includes tailings piles, overflowing dewatering ponds and runoff from the

disturbed mining land. For these reasons, the predominant load reduction will be achieved by reducing or eliminating pollutant loading from the Doe Run-Viburnum Operation facility.

WLA Comment

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

For segment 1946 (Indian Creek), the WLA at all flows are 0.12 and 4.11 lbs/day dissolved lead and dissolved zinc, respectively.

For segment 3663 (Tributary to Indian Creek), the WLA at all flows are 0.01 and 0.41 lbs/day dissolved lead and dissolved zinc, respectively.

For segment 1943 (Courtois Creek), the WLA at all flows are 0.78 and 29.12 lbs/day dissolved lead and dissolved zinc, respectively.

The WLA is set to the lesser of either the applicable water quality-based, technology based effluent limits or the TMDL loading at the 80 - 100 percent flow exceedance for dissolved lead and dissolved zinc in the Indian Creek, Tributary to Indian Creek and Courtois Creek watersheds. This flow exceedance was chosen as it is most representative of critical low flow discharge conditions and is anticipated to be protective at all flow conditions. During critical conditions when flow is at its lowest, and there is effectively no flow from nonpoint sources, point source discharges would have the greatest impact on stream integrity.

A calculated WLA does not authorize a discharge from an unpermitted point source. However, WLAs may be used to improve water quality during future remedial actions, and be incorporated into appropriate enforceable documents (e.g., National Pollutant Discharge Elimination System permits, Applicable Relevant and Appropriate Requirements, storm water permits, etc.).

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.

For segment 1946 (Indian Creek), the LAs at median flow (60 percent flow exceedance), are 0.13 and 4.79 lbs/day dissolved lead and dissolved zinc, respectively.

For segment 3663 (Tributary to Indian Creek), the LAs at median flow (60 percent flow exceedance), are 0.02 and 0.48 lbs/day dissolved lead and dissolved zinc, respectively.

For segment 1943 (Courtois Creek), the LAs at median flow (60 percent flow exceedance), are 0.91 and 34.02 lbs/day dissolved lead and dissolved zinc, respectively.

During critical conditions when flow is at its lowest and there is effectively no flow from nonpoint sources (80-100% flow exceedance), 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.

The MOS for these TMDLs is implicit and is based on the conservative assumptions used in developing and applying the TMDL load duration curves. Using the load duration curve approach ensures water quality standards are achieved under all flow regimes. Conservative assumptions were also used in setting WLA values at the 99th percent flow exceedance. This value is expected to be protective of water quality during low flow conditions in a conservative manner.

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 TMDL LDC represents 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 during the development of the TMDL. Because the TMDL is applicable under all flow conditions, it is also applicable for all seasons. Seasonal variation is therefore implicitly taken into account within the TMDL calculations.

Metals toxicity levels that threaten the integrity of aquatic communities occur during low flow and high flow periods, so these periods are considered the critical condition for the dissolved zinc and dissolved lead target. Annual low-flow conditions in Missouri typically occur between July 1 and September 15. When flow is at its lowest, and there is effectively no flow from nonpoint sources, point source discharges would have the greatest impact on stream integrity. Historic and legacy lead and zinc within the stream system can be sources of these metals, especially during higher flows. It is necessary to account for lead and zinc at higher flows to account for nonpoint source in-stream loading of these pollutants.

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 document was first placed on a 30-day public notice from September 8, through October 8, 2009. This comment period was extended to October 22, 2009. Three comments were received during this comment period and resulted in revisions of the TMDL targets, WLA and LA. This document was then placed on a second 30-day public notice from November 13, through December 13, 2009. An additional comment was received and additional revisions to the TMDL targets, calculated flows and allocations were made. Following these additional revisions, this document was placed on a 45-day public notice from March 23, through May 07, 2010. Three comments were received during this final public notice period and revisions were made to the TMDL. MDNR posted the notice, information sheet and the TMDL document on MDNR's Website, making them available to anyone with access to the Web. Groups that received the public notice announcement include the Missouri Clean Water Commission, the Water Quality Coordinating Committee, the Missouri Department of Conservation, three stream team volunteers in the watershed, any affected facilities, individuals or organizations that commented during the first and second public comment periods, and the five state legislators who represent Washington, Crawford and Iron counties.

Announcement of the public notice period for this TMDL was also issued as a press release to local media outlets in the proximity of the Indian Creek and Courtois Creek watersheds. Any comments received and MDNR's responses to those comments have been placed in the Indian Creek and Courtois Creek TMDL file and included in the submission of the TMDL document.

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 has recommended additional monitoring of metals in sediment for Courtois Creek and sediment toxicity sampling for Indian Creek. No specific monitoring plan has been developed.

Post-TMDL monitoring is usually scheduled and carried out by MDNR approximately three years after the approval of the TMDL or in a reasonable time period following completion of permit compliance schedules and the application of new effluent limits. Any available volunteer water quality monitoring or permittee in-stream monitoring that occurs on Indian Creek, Tributary to Indian Creek or Courtois Creek will be used for screening purposes to compare the stream's current condition with future, post-TMDL conditions. MDNR routinely examines physical habitat, water quality, invertebrate community and fish community data collected by the Missouri Department of Conservation under its Resource Assessment and Monitoring program. This program randomly samples streams across Missouri on a five to six year rotating schedule.

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.

Increased reductions in nonpoint source loads are not being required in lieu of less stringent WLAs so reasonable assurances are not required. The LA is set at zero at critical flow conditions.

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. Discussion of reduction efforts relating to nonpoint sources can be found in the implementation section of the TMDL document.