



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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APR 23 2008

IDEM
OFFICE OF
WATER QUALITY

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REPLY TO THE ATTENTION OF:

WW-16J

Marylou Poppa Renshaw, Chief
Watershed Planning Branch
Office of Water Quality
Indiana Department of Environmental Quality
100 North Senate Avenue
Indianapolis, Indiana 46204

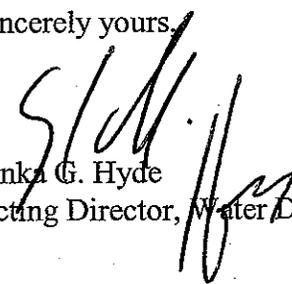
Dear Ms. Renshaw:

The United States Environmental Protection Agency has reviewed the final Total Maximum Daily Loads (TMDL) from the Indiana Department of Environmental Management for waterbody segments in the Duck, Pipe, Killbuck, and Stony Creek Watersheds, in Indiana. The TMDLs are for *E.coli* impairments in these waterbodies.

Based on this review, EPA has determined that the Indiana TMDLs for *E.coli* meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves 38 TMDLs for *E.coli* for the waterbody segments in Duck, Pipe, Killbuck, and Stony Creek Watersheds in Indiana. The statutory and regulatory requirements, and EPA's review of Indiana's compliance with each requirement, and the listed segments are described in the enclosed decision document.

We wish to acknowledge Indiana's effort in submitting this TMDL and look forward to future TMDL submissions by the State of Indiana. If you have any questions, please contact Mr. Kevin Pierard, Chief of the Watersheds and Wetlands Branch at 312-886-4448.

Sincerely yours,


Tinka G. Hyde
Acting Director, Water Division

Enclosure

cc: Andrew Pelloso, IDEM

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U.S. A. 100-101

1950-1951

TMDL: Duck Creek, Killbuck Creek, Pipe Creek, and Stony Creek Watersheds
(Tributaries to West Fork of the White River), Indiana

Date:

**DECISION DOCUMENT FOR APPROVAL OF
DUCK CREEK, KILLBUCK CREEK, PIPE CREEK, AND STONY CREEK
WATERSHEDS (TRIBUTARIES TO THE WEST FORK OF THE WHITE RIVER)
TMDLS IN INDIANA**

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

- (1) the spatial extent of the watershed in which the impaired waterbody is located;
- (2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
- (3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;

- (4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
- (5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Identification of impaired segments: As shown in Table 1 below, this decision document addresses TMDLs for impaired segments in the Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds of the West Fork White River, and their tributaries. These waterbodies are impaired due to *E. coli*.

Spatial Extent of Watershed: The Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds are located in central Indiana, in Tipton, Madison, Delaware, and Hamilton Counties (Figure 1-1 of the TMDL submittal). These four watersheds are located within the upper portion of the West Fork White River Basin.

The Duck Creek watershed is approximately 105 square miles in area and includes portions of Tipton, Madison, and Hamilton Counties. The City of Elwood is completely situated within the Duck Creek watershed boundary. Major tributaries to Duck Creek are Little Duck Creek, Pollywog Creek, Bear Creek and Lamberson Ditch.

The Pipe Creek watershed is 153 square miles in area and includes portions of Hamilton, Madison, and Delaware Counties. The City of Alexandria and Towns of Frankton, Summitville, and Orestes are within the watershed, and the Town of Gaston is partially within the watershed. The major tributaries to Pipe Creek are Mud Creek, Lilly Creek, and Alexandria Creek.

The Killbuck Creek watershed is approximately 104 miles in area and is somewhat more urbanized than the other watersheds. The watershed includes parts of Madison and Delaware Counties. Two of the larger cities in the area, Muncie and Anderson are partially contained within the watershed. Major tributaries are Little Killbuck Creek, Mud Creek, Jacks Creek and Pleasant Run Creek.

The Stony Creek watershed is 57 square miles in area and evenly distributed between Hamilton and Madison Counties. The Town of Lapel is within the Stony Creek boundary and the larger city of Noblesville, a suburb of Indianapolis, is partly within the boundary of the watershed. A small portion of the Town of Anderson is within the upper Stony watershed boundary. Major tributaries to Stony Creek include William Lock Ditch and the William Lehr Ditch.

Table 1. Waterbody Segments Listed as Impaired for *E. coli* Bacteria in 2004 that are addressed by this *E. coli* TMDL

Stream Name	Impairment	Segment ID
Killbuck Creek	E. coli	INW0141_00
Killbuck Creek - Thruston Ditch	E. coli	INW0142_00
Jakes Creek - Eagle Branch	E. coli	INW0143_00
Killbuck Creek - Pleasant Run Creek	E. coli	INW0144_00
Killbuck Creek	E. coli	INW0145_00
Killbuck Creek	E. coli	INW0145_T1016
Little Killbuck Creek - Nelson Brook	E. coli	INW0146_00
Killbuck Creek - to mouth	E. coli	INW0147_T1017
Indian Creek (Madison)	E. coli	INW0149_00
Pipe Creek - Yeager Finley Menard Ditch	E. coli	INW0151_00
Pipe Creek	E. coli	INW0152_00
Pipe Creek	E. coli	INW0152_T1020
Pipe Creek	E. coli	INW0153_T1021
Pipe Creek	E. coli	INW0154_T1022
Pipe Creek	E. coli	INW0156_T1023
Pipe Creek	E. coli	INW0157_T1024
Pipe Creek	E. coli	INW0158_T1025
Pipe Creek - Hamilton County	E. coli	INW0159_00
Pipe Creek - Swanfelt Ditch to County Line	E. coli	INW0159_T1026
Duck Creek - Todd Ditch	E. coli	INW0161_00
Little Duck Creek basin	E. coli	INW0162_00
Duck Creek - Elwood to Little Duck Creek	E. coli	INW0162_T1028
Big Duck Creek	E. coli	INW0162_T1228
Polywog Creek	E. coli	INW0163_00
Duck Creek - Little Duck Creek to Polywog Creek	E. coli	INW0163_T1029
Duck Creek	E. coli	INW0164_T1030
Bear Creek - West Fork Bear Creek	E. coli	INW0165_00
Duck Creek	E. coli	INW0166_00
Duck Creek	E. coli	INW0166_T1031
Long Branch	E. coli	INW0166_T1227
Sugar Run and other tributaries	E. coli	INW0172_00
Stony Creek - Headwaters	E. coli	INW0174_00
Stony Creek - William Lock Ditch Tributaries	E. coli	INW0175_00
Stony Creek	E. coli	INW0175_T1039
William Lehr Ditch and other tributaries	E. coli	INW0176_00
Stony Creek	E. coli	INW0176_T1040
North Trib - Noblesville	E. coli	INW0177_00
Stony Creek	E. coli	INW0177_T1041

Pollutant of concern: The pollutant of concern is *E. coli*.

Priority ranking: IDEM states in their 2006 and 2008 303(d) list methodologies that their TMDL development schedule corresponds with their basin-rotation water quality monitoring schedule. The development of most TMDLs is based on the schedule to take advantage of all available resources. Prioritization is based on whether the designated uses are being met, the

magnitude of the impairment, and other plans for the watershed. For example, some watershed groups may want to implement some Best Management Practices (BMPs) and assess their success without a TMDL, or may be awaiting guidance from the U.S. EPA.

Pollutant sources: There are potential point sources and nonpoint sources of *E. coli* in the Duck, Pipe, Killbuck and Stony Creek watersheds.

Point Sources – Waste Water Treatment Plants: Table 4-1 of the TMDL submittal (Table 2 below) contains the NPDES permitted facilities identified by IDEM that discharge or potentially discharge *E. coli*. Duck Creek has 1 facility, Pipe Creek has 8 facilities, Killbuck Creek has 7 facilities (of the 5 municipal discharges, two have been voided, two have residual chlorine limits and one has *E. coli* limits (Section 4.1.1 of the TMDL)) and Stony Creek has 2 facilities, (Lapel Municipal WWTP and Tall Timber Mobile Home park are both incorrectly listed under Killbuck Creek in Table 4-1 of the TMDL)¹. In the descriptions below for each watershed, “discharges” refers to individual outfalls for facilities. As stated in Section 4.1.1 of the TMDL, any NPDES facility having *E. coli* effluent limits includes the respective geometric mean and single sample standards of 125 col/100 mL and 235 col/100 mL as the numeric values for the limits.

As explained on page 4-2 of the TMDL, under IDEM’s previous Fecal Coliform bacteria standard, facilities with design flows under 1.0 MGD (typically minor municipals and semi-publics) were required to maintain a specific total residual chlorine level in the chlorine contact tank. Facilities were not required to have *E. coli* effluent limits or conduct monitoring for *E. coli* bacteria, provided they maintained specific total residual chlorine levels in the chlorine contact tank. This approach was based on IDEM’s previous Fecal Coliform-based bacteria Standard. No correlation between the total residual chlorine levels and *E. coli* bacteria has been conclusively drawn by IDEM. Further, IDEM stated that exceedences of *E. coli* bacteria limits may still occur when the chlorine contact tank requirements are met. IDEM stated that *E. coli* limits will be considered during the next permit cycle for the facilities that fall under this category in the TMDL.

Table 2 (from Table 4-1 of the TMDL) showing NPDES facilities

Watershed	Permit Number	Facility Name	Receiving Stream
Duck Creek	IN0032719	ELWOOD MUNICIPAL STP	West Fork White River Via Big Duck Creek
Pipe Creek	IN0020028	FRANKTON MUNICIPAL WWTP	Pipe Creek
	IN0020044	ALEXANDRIA MUNICIPAL STP	Pipe Creek
	IN0020338	GASTON MUNICIPAL STP	Pipe Creek
	IN0024562	SUMMITVILLE MUNICIPAL WWTP	Illiff Drain to Mud Creek
	IN0031356	PIPE CREEK REST AREA NORTH I69	Richards Ditch to Pipe Creek
	IN0038857	I-69 AUTO TRUCK PLAZA INC	Yeager Finley Manard Ditch
	IN0060011	KENNEDY MACHINE & TOOL WWTP	Pipe Creek
	ING080128	I-69 AUTO TRUCK PLAZA	Yeager Finley Manard Ditch
Killbuck Creek	IN0025151	WES-DEL JR-SR HIGH SCHOOL	Thurston Ditch to Killbuck Creek
	IN0025402	COUNTRY VILLAGE SUBDIVISION	Killbuck Creek
	IN0053627	RESTING WHEELS MOB. HOME COURT	Drainage tile to Little Killbuck Creek
	IN0054666	BUCKEYE TERMINALS LLC - MUNCIE	Unnamed Ditch to Mudd Creek
	IN0059170	BALL STATE UNIVERSITY - COAL	Eagle Branch Jakes Creek

¹ Refer to clarifying Email with Staci Goodwin, March 28, 2008

	IN0061301	MOUNT PLEASANT UTILITIES, LLC	Pleasant Run Creek
	IN0061841	GREENS FORK MUNICIPAL WWTP	Greens Fork
Stony Creek*	IN0020087	LAPEL MUNICIPAL WWTP	Stony Creek
	IN0025526	TALL TIMBER MOBILE HOME PARK	Unnamed Tributary to Stony Creek

* per Staci Goodwin, March 28, 2008 email.

Duck Creek: The Elwood Sewage Treatment Plant is the largest municipal discharge in the study area, and is permitted to discharge up to 3.22 MGD. In an Agreed Order between the City of Elwood and IDEM, the City acknowledged that the daily maximum effluent limit for *E. coli* was violated between April and September 2001, a period which coincides with IDEM's 2001 targeted sampling of *E. coli* in the watershed.

Pipe Creek: There are eight municipal discharges², one industrial discharger and two water treatment plant discharges in the Pipe Creek watershed. All eight of the municipal permits in this watershed have limits and monitoring requirements for *E. coli*, the largest of which is the Alexandria Water Pollution Control Plant, which can discharge up to 1.2 MGD. The industrial facility and water treatment plant discharges do not have *E. coli* permit limits.

Killbuck Creek: The watershed has five municipal discharges. Two of the 5 municipal discharger permits have ceased discharging. One has permit limits for *E. coli*. Two have total residual chlorine permits limits. IDEM has stated that *E. coli* limits will be considered during the latter two facilities' next permit cycle (Section 4.1.1 of the TMDL).

Stony Creek: Two dischargers in the Stony Creek watershed have *E. coli* limits. The largest municipal discharge, the Lapel Municipal WWTP, has a maximum permitted flow of 0.36 MGD.

Combined Sewer Overflows (CSOs): IDEM regulates CSOs in Indiana through the state's NPDES program by implementation of strategies to maintain and manage existing CSO systems (Section 4.1.2 of the TMDL).

Duck Creek: The City of Elwood has 14 CSO outfalls located in the Duck Creek watershed. Both wet weather and dry weather discharges from its CSO outfalls occurred during the period of IDEM's 2001 targeted *E. coli* sampling (April – September). The City submitted a revised CSO Plan for improving operation and maintenance of its CSO outfall structures to IDEM on December 29, 2006. Implementation of this CSO plan is expected to result in *E. coli* load reductions to Duck Creek.

Pipe Creek: Alexandria currently has only one active CSO outfall, and Summitville has 2 active CSO outfalls in the watershed. CSO Long Term Control Plans (LTCPs) for those two communities were submitted and are currently under review.

Killbuck Creek: No CSO outfalls are known to discharge to Killbuck Creek. Although parts of both Anderson and Muncie are contained within the hydrologic boundary of the Killbuck Creek watershed, the CSO outfalls are outside of the watershed to the West Fork White River.

² Ibid.

Stony Creek: The City of Noblesville has 8 active CSO outfalls, two of which discharge to the North Tributary subwatershed of Stony Creek.³

Sanitary Sewer Overflows: Sanitary Sewer Overflows (SSOs) are untreated or partially treated sewer overflows from a sanitary sewer collection system. They are considered unpermitted and illegal discharges. There is one potential SSO site within the Pipe Creek watershed, located at the Frankton WTP.

Concentrated Animal Feeding Operations (CAFOs): There are no CAFO's as defined under the USEPA NPDES regulations in the Duck Creek, Pipe Creek, Killbuck Creek, or Stony Creek watersheds (Section 4.1.4 of the TMDL).

MS4 Stormwater Communities: The Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds contain parts of four communities (Anderson, Muncie, Noblesville, and Alexandria) and three counties (Delaware, Hamilton, and Madison) that are designated as NPDES Phase II MS4 entities (Section 4.1.5 of the TMDL). All of these MS4 permits have been issued.⁴

Straight Pipes: There are currently no known straight pipes (septic systems that discharge raw sewage directly to streams without treatment) in the area, although some may exist (Section 4.1.6 of the TMDL). On-site septic systems are approved and permitted by the Indiana Department of Health. When straight pipe discharges are found, the Health Department performs a confirmation with water samples and dye studies. These connections are illegal and immediate septic system installation is required within 30 days. These potential sources were considered in the overall approach to estimating loads from septic systems.

Nonpoint Sources: Section 4.2 of the TMDL document describes potential nonpoint sources of bacteria that are diffuse and cannot be identified as entering a waterbody at a single discreet location. For Duck Creek, Pipe Creek, Killbuck Creek, and Stony Creek, significant sources of *E. coli* include failing septic systems, runoff from row crop agricultures, pasture land runoff, wildlife and domestic pet waste.

Failing Septic Systems: IDEM explained that there are a number of factors in central Indiana that play a role in septic tank failures, such as high seasonal water tables, limited leach field filtration due to areas of compact glacial till and bedrock interference, and high filtration due to leach field interaction with quickly draining soils (Section 4.2.1 of the TMDL). The presence of agricultural drain tiles through central Indiana is another contributing factor to *E. coli* loading. There is anecdotal evidence that some septic systems for newer developments in the study area are experiencing leach field interference with retired and/or abandoned tile drains. As some of these abandoned tile drains have collapsed, limited filtration conditions are created that have caused septic system back ups during wet weather events.

³ Email from Staci Goodwin, April 2, 2008. In Lapel, no CSO outfalls exist. Lapel had a wet well overflow condition that was corrected in 2005.

⁴ Ibid.

According to a 1997 survey of county health officials, the number of failing septic systems in each county including illegal connections to tile drain pipes and straight pipes ranged from 15% to 75%.

Agriculture:

Land application of agricultural manure: For the Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds, estimates of cow, pig and sheep populations were calculated using the total number of cows, pigs, and sheep in Delaware, Madison, Hamilton and Tipton counties (Section 4.2.2.2 and Table 4-2 of the TMDL). A GIS analysis was performed to determine the percentage of each county included in the four watershed study area (Table 4-3 of the TMDL). The TMDL contains estimates of farm animals in the study area portions of Delaware, Madison, and Hamilton and Tipton Counties (Table 4-4 of the TMDL). *E. coli* rates from livestock were based on manure application rates and literature values for bacteria counts from different livestock sources.

Direct deposition of manure from pasture lands: Figures 2-10 through 2-13 of the TMDL show the landuses in each watershed. Small patches of land area associated with grazing pasture use are commonly adjacent to tributaries of Duck, Killbuck, Pipe and Stony Creeks. In a recent study of Stony Creek watershed, Hamilton County staff noted cattle with direct access to a stream and trampling riparian vegetation by cattle adjacent to the waterbody (Section 4.2.2.3 of the TMDL). Estimates of free-ranging animal populations in the watersheds were calculated by subtracting the CFO populations in Table 4-2 from the total estimated numbers in Table 4-4 (Page 4-17 of the TMDL), and are shown in Table 4-5 of the TMDL.

Confined feeding operations: Confined Feeding Operations (CFOs) are governed by State regulations and are defined as a nonpoint source and considered under the load allocation for the TMDL (Section 4.2.3 of the TMDL). In Indiana, CFO regulations (327 IAC 16, 327 IAC 15) require that operations "not cause or contribute to an impairment of surface waters of the state".

The locations of CFOs in the Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds are shown in Figures 4-8, 4-9, 4-10, and 4-11; and Table 4-6 of the TMDL. Thirteen active CFO facilities have been identified in the Duck Creek, Pipe Creek, Killbuck Creek, and Stony Creek watersheds (Section 4.2.3 of the TMDL).

Wildlife: IDEM reported that the predominant wildlife species in the study area are deer, raccoon, and Canadian geese (Section 4.2.4 of the TMDL). Populations were calculated in the watershed by estimating the population density of each species and assuming that all land use categories are accessible to the species.

Domestic Pets: IDEM expects domestic animals to be a more significant source in urban areas where greater densities of pets are found (Section 4.2.5).

Land Use: IDEM used the National Land Cover Dataset to provide the sources of land use/land cover for this TMDL (Section 2.3 of the TMDL). Each watershed is dominated by row crop agriculture. The row crops and pasture land acreage, when considered together, make up over 90% of the land coverage in Duck, Pipe and Stony Creek. The sum of row crop and pasture land

in the Killbuck Creek watershed is about 81%. Corn and soybeans are the predominant crops in all four watersheds. Table 2-2, and Figures 2-10 through 2-13 in the TMDL provide a detailed summary for the land use in each of the four watersheds.

Annual row crop distribution data were used by IDEM in order to identify specific locations where tile drainage is probable due to soil characteristics (Section 2.5 of the TMDL). Figures 2-22 through 2-25 of the TMDL show the row crop distribution in all four watersheds. Tile drainage is important to note because of the way that tiles "short circuit" natural surface infiltration drainage that would remove pollutants.

Growth: Population changes between 1990 and 2000 for ten municipalities that are at least partially contained within the watershed are given in Table 2-1 of the TMDL. With the exceptions of Orestes and Muncie, all municipalities experienced growth over the past ten years. No allocation was set aside for future growth.

EPA finds that the TMDL submittal from IDEM satisfies all requirements concerning this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment:

The TMDL submittal describes designated uses, numeric criteria, and antidegradation policy of the Clean Water Act.

Use Designation: The impaired designated use for the waterbodies in the Duck, Killbuck, Stony and Pipe Creek watersheds is for total body contact recreational use during the recreational season, April 1st through October 31st.

Numeric Standard: 327 IAC 2-1-6(d) established the total body contact recreational use *E. coli* Water Quality Standard (WQS) for all waters in the non-Great Lakes system as follows:

“*E. coli* bacteria, using membrane filter (MF) count, shall not exceed one hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period nor exceed two hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period.”

Targets: For the Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds during the recreational season (April 1st through October 31st), the target levels are set at the *E. coli* water quality standard of (a) 125 per one hundred milliliters as a 30-day geometric mean based on not less than five samples equally spaced over a thirty day period and (b) 235 per one hundred milliliters for any single sample.

EPA finds that the TMDL submittal from IDEM satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for stream flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:

Loading capacity:

The loading capacity is the *E. coli* water quality standard, that is, 125/100 ml (geometric mean (5) samples equally spaced over a thirty (30) day period), nor exceed 235/100ml (one (1) sample in a thirty (30) day period.) (Section 6.0 of the TMDL). This *E. coli* TMDL is concentration-based consistent with 327 IAC 5- 2-11.1(b) and 40 CFR, Section 130.2 (i) and the TMDL is equal to the geometric mean and single sample maximum *E. coli* WQS for the recreational season (April 1 through October 31). IDEM believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The U.S. EPA agrees with this, as stated in the preamble of "The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule" (69 FR 67218-67243, November 16, 2004) on page 67224 "...the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based." IDEM will be relying on the geometric mean portion of the WQS to track implementation activity and results.

Method for cause and effect relationship:

For most pollutants, TMDLs are expressed on a mass loading basis (e.g. pounds per day). For *E. coli* indicators, however, mass is not an appropriate measure because *E. coli* is expressed in terms of organism counts, with concentration being the amount of matter in a given volume. This approach is consistent with EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the Duck Creek, Pipe Creek, Killbuck Creek and Stony Creek watersheds, IDEM used Indiana's WQS for pathogens which has a geometric mean for a 30 day period and a single sample maximum of an amount of bacteria colonies per 100 milliliters of receiving water. Thus, the loading capacity is expressed as a concentration, i.e. the amount of bacteria colonies per volume of water. A loading capacity is "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). So, a loading capacity set at the WQS will assure that the water does not violate WQS.

Critical conditions:

E. coli sources to the Duck, Pipe, Killbuck, Stony watersheds arise from a mixture of dry and wet weather-driven conditions, and there is no single critical loading condition that would achieve the *E. coli* WQS. The TMDL states that for the Duck, Pipe, Killbuck, Stony watersheds and the contributing sources, there are a number of different allowable loads (Page 6-1 of the TMDL). The TMDL is for the recreational season between April – October 31.

EPA finds that the TMDL submittal from IDEM satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background.

Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:

Load Allocation: The load allocation for nonpoint sources is 112.5 cfu per one hundred milliliters as a geometric mean based on not less than five samples equally spaced over a thirty-day period, and 211.5 cfu per one hundred milliliters as a single sample maximum from April 1 through October 31.

In Section 7.0 of the TMDL, IDEM explained that the Duck Creek, Pipe Creek, Killbuck Creek, and Stony Creek TMDLs contain an explicit MOS of 10% incorporated into the Load Allocation portion of the TMDL. The LA represents a 10% reduction from the WQS ($125 \times 10\% = 12.5$; $235 \times 10\% = 23.5$). The LA will use the geometric mean of each sampling location to determine the reduction necessary to comply with WQS at each site.

EPA finds that the TMDL submittal from IDEM satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:

The WLA for all NPDES permitted facilities including CSOs is set at the WQS of 125 cfu/100 mL as a geometric mean based on not less than five samples equally spaced over a thirty day period and 235 cfu/100 mL as a single samples maximum, from April 1 through October 31.

The WLAs for straight pipe discharges and CAFOs is set to 0.⁵

The SSO WLA is set to 0 per one hundred milliliters, since SSOs are considered illegal discharges.

EPA finds that the TMDL submittal from IDEM satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:

For the Duck Creek, Pipe Creek, Killbuck Creek, and Stony Creek TMDLs, IDEM incorporated an explicit MOS of 10% into the Load Allocation portion of the TMDL (Section 7 of the TMDL). IDEM determined this is appropriate based upon the fact that the largest *E. coli* loads to the watershed are from nonpoint sources. The MOS accounts for any uncertainty associated with estimates of existing loads, spatial distribution of land uses and soils, instream *E. coli* decay rates, and achievable load reduction efficiencies of the referenced management practices. When applied to the Indiana single sample *E. coli* standard of 235 CFU / 100 mL, the 10% MOS value corresponds to that loading which would account for instream *E. coli* concentrations of 23.5 CFU / 100 mL. Accordingly, the allowable *E. coli* load for each assessment location corresponds to that which would result in instream concentrations of no more than 211.5 CFU / 100 mL.

The allowable *E. coli* load is further reduced at monitoring locations where the geometric mean of the estimated concentrations, resultant from the above reductions, is still above the geometric mean standard of 125 CFU / 100 mL. For those locations, additional *E. coli* load reductions are applied until the resultant geometric mean of the estimated concentrations is no more than the amount that is 10% below the geometric mean standard (i.e. no more than 112.5 CFU / 100 mL). (Section 7 of the TMDL)

EPA finds that the TMDL submittal from IDEM contains an appropriate MOS satisfying all requirements concerning this sixth element.

⁵ Ibid

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:

Seasonality in the TMDL is addressed by expressing the TMDL in terms of the *E. coli* WQS for total body contact during the recreational season (April 1st through October 31st) as defined by 327 IAC 2-1-6(d). There is no applicable total body contact *E. coli* WQS during the remainder of the year in Indiana. Because this is a concentration-based TMDL, *E. coli* WQS will be met regardless of flow conditions in the applicable season (Section 8 of the TMDL).

EPA finds that the TMDL submittal from IDEM satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:

The discussion of Reasonable Assurance in the TMDL is found in Section 10 of the TMDL.

- Activities to address the most significant sources of *E. coli* in the watershed are associated with agricultural application of manure, livestock (CAFO, CFO and other), failing septic systems, wildlife, domestic animals, and CSOs
- Indiana expects reductions from CSO long term control plans.

- Several existing watershed projects are focused on the TMDL watersheds. The White River Watershed Project is conducting a focused assessment of the Killbuck Creek/ Mud Creek subwatershed. Major goals include identifying failing septic and including them in ongoing sewer project, identifying and repairing existing and failing drain tiles, identifying agricultural conservation practices in the watershed, better quantify loadings from geese, and provide public outreach regarding sources of pollutant loadings in the watershed.
- Madison County SWCD received a Section 319 grant to create a watershed management plan for a 14 digit HUC within Madison County, and replace 4 failed septic systems, as well as educate the public regarding septic system maintenance. The project has reduced *E. coli* loads and has potential for future reductions.
- A Watershed Master Plan was developed for the Stony Creek watershed, and biomonitoring, water quality and habitat assessment for the Hamilton County portion of the watershed was conducted. Results of the study provided a list of BMPs to implement for sediment and pathogen loadings including: (a) conservation tillage, (b) replacement of existing dammed areas with in-stream wetlands, (c) retrofitting of suburban retention ponds, (d) implementation of rain gardens, (e) construction of Newbury-type riffles, (f) riparian tree buffer restoration, and (g) and expansion of vegetated filter strips.
- Potential future activities in addition to those listed above include adherence to documented manure application rates, no-till farming, centralized composting, livestock exclusion, public outreach to domestic animal owners, and wildlife population control measures

EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:

A variety of monitoring projects are described above under reasonable assurance (Section 10 of the TMDL). The LA will use the geometric mean of each sampling location to determine the reduction necessary to comply with WQS at each site.

EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:

Actions in the TMDL watershed are included in the Reasonable Assurance discussion in Section 9 above. EPA reviews, but does not approve, implementation plans. EPA finds that this criterion has been adequately addressed.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:

An initial kickoff stakeholder meeting for the Duck Creek, Pipe Creek, Killbuck Creek, and Stony Creek TMDLs was held on August 25, 2004, at the Anderson Public Library, 111 East 12th Street, Anderson, IN. During that meeting, IDEM personnel described the Indiana TMDL Program, discussed the specific reasons why TMDLs are being performed in the four watersheds, identified specific water quality and public health concerns regarding *E. coli*, and distributed a questionnaire to attendees to help identify additional sources of data that could be instrumental to the TMDLs.

Additional public meetings were held on April 7, 2005, in Anderson, IN and Noblesville, IN, to present the draft TMDL report. Written public comments to the draft TMDL were accepted for 30 days through May 6, 2005. Copies of the draft TMDL were posted on the IDEM's Web site. U.S. EPA provided comments on the draft TMDL and they were adequately addressed in the final TMDL. IDEM stated there were no significant comments on the draft TMDL (see email from Staci Goodwin dated 3/28/08).

EPA finds that the TMDL submittal from Indiana satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment:

EPA received the Duck, Pipe, Killbuck, and Stony Creek Watersheds TMDL report on March 5, 2008, accompanied by a submittal letter dated March 5, 2008.

In the submittal letter, IDEM stated "The TMDL accompanying this letter is the Final TMDL submission from the State of Indiana for the Duck, Pipe Killbuck and Stony Creek Watersheds, which includes the following Segment IDs: INW0141_00, INW0142_00, INW0143_00, INW0144_00, INW0145_00, INW0145_T1016, INW0146_00, INW0147_T1017, INW0149_00, INW0151_00, INW0152_00, INW0152_T1020, INW0153_T1021, INW0154_T1022, INW0156_T1023, INW157_T1024, INW0158_T1025, INW0159_00, INW0159_T1026, INW0161_00, inw0162_00, INW0162_T1028, INW0162_T1228, INW0163_00, INW0163_T1029, INW164_T1030, INW0165_00, INW0166_00, INW0166_1031, INW0166_T1227, INW0172_00, INW0174_00, INW0175_00, INW0175_T1039, INW0176_00, INW0176_T1040, INW0177_00, INW0177_T1041." 38 segments are listed in the submittal letter.

The letter also states that the TMDL is being submitted per the requirement under Section 303(d) of the Clean Water Act and 40 CFR 130, and addresses the impairment of *E. coli* in the Duck, Pipe, Killbuck, and Stony Creek Watersheds.

EPA finds that the TMDL transmittal letter submitted by Indiana satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, EPA finds that the IDEM submittal for the Duck, Pipe, Killbuck and Stony Creek Watersheds satisfies the elements of an approvable TMDL. This approval addresses the impairment of *E. coli* for 38 segments in the Duck, Pipe, Killbuck, and Stony Creek Watersheds, for a total of 38 TMDLs.

EPA's approval of this TMDL does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

