



EPA Region 7 TMDL Review

TMDL ID: IA 04-LDM-0040_1

State: IA

Document Name: DES MOINES RIVER

Basin(s): LOWER DES MOINES RIVER BASIN, UPPER DES MOINES RIVER BASIN

HUC(s): 07100004, 07100008, 7100004, 7100008

Water body(ies): DES MOINES R, DES MOINES RIVER, DES MOINES RIVER, DES MOINES

Tributary(ies): BEAVER CREEK, BLACK CAT CREEK, BOONE RIVER, BRUSHY CREEK, BUCK CREEK, BUFFALO CREEK, BUTCHER CREEK, CAMP CREEK, DRAINAGE DITCH 206, EAGLE CREEK, EAST FORK RIVER, FOUR MILE CREEK, JACK CREEK, LINDSEY CREEK, LITTLE EAGLE CREEK, LIZARD CREEK, LYON'S CREEK, MIDDLE RIVER, MUD CREEK, NORTH RIVER, OTTER CREEK, PILOT CREEK, PLUM CREEK, PRAIRIE CREEK, RACCOON RIVER, ROCK CREEK, SAYLOR CREEK, SAYLORVILLE RESERVOIR, SOUTH RIVER, SPRING CREEK, WALNUT CREEK, WHITE FOX CREEK

Pollutant(s): E. COLI

Submittal Date: 10/28/2009

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 was submitted for approval by the state of Iowa in a letter dated October 23, 2009, and received by the U.S. Environmental Protection Agency (EPA) on October 28, 2009. A revised version of the TMDL was submitted by email attachment on December 21, 2009.

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.

All five of the Des Moines River segments covered by this TMDL are impaired based on the results of monitoring for indicator bacteria (*Escherichia coli* [*E. coli*]) - ten percent of bacteria samples exceed the single sample maximum value. The LC for *E. coli* bacteria is set, based on both the geometric mean (geomean) of 126 *E. coli* organisms per 100 milliliters (mL) and the single sample maximum concentration of 235 *E. coli* organisms per 100 mL. The LC is expressed with a load duration curve (LDC), which uses stream discharge and a WQS target to define the LC at all percentiles of flow exceedance (or recurrence). The LCs for both geomean and single maximum values for each of the individual impaired segments are given in the table as follows. These LCs will result in the achievement of WQS in the targeted segments.

Segment ID	Flow Condition	LC (Geomean)	LC (Maximum)
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	(percent recurrence)	(organisms/day)	(organisms/day)
IA 04-UDM-0010_1 IA 04-UDM-0010_2	High Flow (0-10)	4.41E+13	8.22E+13
	Moist (10-40)	2.40E+13	4.47E+13
	Mid-Range (40-60)	8.54E+12	1.59E+13
	Dry (60-90)	2.62E+12	4.89E+12
	Low Flow (90-100)	6.60E+11	1.23E+12
IA 04-LDM-0040_1 IA 04-LDM-0040_2	High Flow (0-10)	8.32E+13	1.55E+14
	Moist (10-40)	4.29E+13	7.99E+13
	Mid-Range (40-60)	1.57E+13	2.93E+13
	Dry (60-90)	5.21E+12	9.72E+12
	Low Flow (90-100)	1.70E+12	3.16E+12
IA 04-LDM-0040_3	High Flow (0-10)	7.12E+13	1.33E+14
	Moist (10-40)	3.67E+13	6.84E+13
	Mid-Range (40-60)	1.29E+13	2.40E+13
	Dry (60-90)	4.41E+12	8.22E+12
	Low Flow (90-100)	1.34E+12	2.50E+12

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 WQS for the impaired segments covered by this TMDL are given in the table below.

Segment ID	Designated Uses	Impaired Use	<i>E. coli</i> Criteria
IA 04-UDM-0010_1	Class A1, Class B(WW-1), Class HH	Class A1	126 organisms/100 mL (Geomean) 235 organisms/100 mL (Single Sample Maximum) Primary Contact Recreation Period: March 15 to November 15
IA 04-UDM-0010_2	Class A1, Class B(WW-1), Class C, Class HH		
IA 04-LDM-0040_1	Class A1, Class B(WW-1), Class HH		
IA 04-LDM-0040_2	Class A1, Class B(WW-1), Class HH		
IA 04-LDM-0040_3	Class A1, Class B(WW-1), Class HH		

The three IA 04-LDM-0040 segments (1, 2, and 3) for Class A1 use have been on the Iowa 303(d) List since 2004. The IA 04-UDM-0010_2 segment appears on the 303(d) List in 2006 and the IA04-UDM_0010_1 segment is included the 303(d) List in 2008. All of these 5 segments are given High Priority for TDML development in the state's 303(d) List.

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 source linkage for *E. coli* bacteria impairment is direct. *E. coli* bacteria loads are allocated for the major contributors to mitigate the impairment. The allocations are calculated, based on the geometric mean and the single sample maximum so a daily maximum load can be quantitatively determined.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.

The bacteria loadings were calculated, based on the United States Geological Survey (USGS) gaging stations located in the watershed. There are a total of 57 National Pollution Discharge Elimination System (NPDES) permitted facilities. Except for the two open feedlot operation sites (cattle number greater than 1,000), the 55 facilities discharge the permitted bacteria loads to the Des Moines River. The allowable loads from these facilities, along with the estimated loads from unsewered communities, are summarized based on the geometric mean and the single sample maximum WQS, in the WLA section.

The major contributor that causes the bacteria impairment is associated with nonpoint sources and identified using the Bacteria Indicator Tool (spreadsheet bacteria model). Nonpoint sources of bacteria loads come from runoff from developed urban areas, grazing livestock, manure applied to fields, wildlife, and failed onsite septic tank systems. The background condition due to wildlife is included in the model. The quantification of these nonpoint source-related loads are provided in the LA section.

Based on the information before us, the state's decision to apply the discharges associated with unpermitted sources to the LA, as opposed to the WLA for purposes of this TMDL is acceptable. The decision to allocate these sources to the LA does not reflect any determination by EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by approving this TMDL with some sources treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in this TMDL are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated sum of the WLA in this TMDL.

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.

LCs were given for each of the impaired segments, which were carefully addressed in this TMDL document. WLAs were set at the WQS for end-of-pipe for each NPDES facility. LAs were calculated as the difference between the TMDL and the WLA + MOS. The MOS is an explicit load of 10 percent of the TMDL load.

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.

There are 45 permitted wastewater treatment plants (WWTP), 10 municipal separate storm sewer system (MS4) facilities, and two open feedlot operation sites that require NPDES permits in the watershed. The WLAs for these facilities are given in the following table. In Iowa, open feedlots with cattle numbering greater than 1,000 are required to have NPDES permits (any facility defined as a confined animal feeding operation is required to have a NPDES permit). The NPDES for these two open feedlots in this TMDL are non-discharged permits.

NPDES	Facility Name	<i>E. coli</i> bacteria (Geomean)	<i>E. coli</i> bacteria (Maximum)
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Number		(organisms/day)	(organisms/day)
WWTP			
IA0035416	Adair	9.55E+08	2.67E+09
IA0067156	Adair-Casey School	8.36E+07	2.33E+08
IA0038628	Ankeny	3.82E+10	1.08E+11
IA0023396	Bondurant	2.46E+09	9.22E+09
IA0058491	Boxholm	1.58E+09	2.94E+09
IA0063215	Camp Dodge	1.89E+09	7.05E+09
IA0024554	Carlisle	7.07E+09	5.12E+10
IA0027197	Casey	3.58E+08	9.35E+08
IA0068004	Country Living Mobile Home Park	6.97E+08	1.30E+09
IA0071935	Cumming	9.55E+07	2.44E+08
IA0044130	Des Moines	6.40E+11	1.78E+12
IA0066001	IDNR lake Aquabi State Park	1.72E+08	3.21E+08
IA0071226	Easter Seal Soc. of IA	4.06E+08	7.57E+08
IA0041891	Grand Junction	7.26E+08	1.35E+09
IA0041912	Granger	1.48E+09	3.80E+09
IA0035939	Grimes	1.02E+10	2.59E+10
IA0066761	Hartford	1.24E+09	2.89E+09
IA0027669	Indianola	1.19E+10	3.85E+10
IA0075531	Iowa Assoc. of Municipal Utilities	8.59E+06	2.49E+07
IA0068756	IDOT Rest Area #01 I-80 Adair	5.73E+08	1.07E+09
IA0068764	IDOT Rest Area #02 I-80 Adair	5.73E+08	1.07E+09
IA0068870	IDOT Rest Area #17 & #18 I-35 Ankeny	5.73E+08	1.07E+09
IA0068403	Lift, LLC	2.39E+08	4.45E+08
IA0031836	Martensdale	3.82E+09	7.12E+09
IA0071374	Menlo	2.17E+09	4.05E+09
IA0030511	Milo	9.07E+08	3.12E+09
IA0021997	Mitchellville	8.07E+09	4.30E+10
IA0058891	New Virginia San Dist.	9.45E+09	1.76E+10
IA0063321	N. Polk School Dist.	6.68E+07	2.94E+08
IA0033243	Norwalk	1.11E+10	3.14E+10
IA0041904	Ogden	3.38E+09	6.44E+09
IA0062961	Patterson	1.91E+09	3.56E+09
IA0035921	Pleasantville	2.17E+09	1.11E+10
IA0063355	Runnells	3.34E+08	9.80E+08
IA0065528	Saylorville-Bob Shetler	1.38E+08	2.58E+08
IA0033740	Slater	4.39E+09	8.19E+09
IA0039896	St. Charles	3.34E+08	6.23E+08
IA0072451	St. Marys	5.73E+08	1.07E+09
IA0068071	Sunnybrook Mobile Home Park	1.91E+08	1.34E+09
IA0066966	Thomas Mitchell Park	1.48E+08	2.76E+08
IA0040991	Truro	5.30E+09	9.88E+09
IA0074829	Walnut Cr. Nat. Wildlife ref.	6.21E+07	2.32E+08
IA0067903	Wilshire Mobile Home Court	5.87E+08	1.10E+09
IA0034291	Winterset	8.36E+09	2.23E+10
IA0057517	Woodward	5.83E+09	1.09E+10
MS4 and Open Feedlots			
IA0078603	Altoona	1.86E+12	3.48E+12
IA0078611	Ankeny	7.88E+11	1.47E+12
IA0078786	Bondurant	4.09E+11	7.62E+11

IA0075540	Des Moines	8.00E+12	1.49E+13
IA0078883	Grimes	1.07E+12	2.00E+12
IA0078212	Johnston	1.52E+12	2.84E+12
IA0078913	Norwalk	5.93E+11	1.11E+12
IA0078751	Pleasant Hill	7.21E+11	1.34E+12
IA0078620	Urbandale	2.40E+12	4.47E+12
IA0078778	West Des Moines	2.88E+12	5.37E+12
IA0038911	Brenton Brothers, Inc.	0	0
IA0080837	Holz BrotherS, Inc.	0	0

There are 26 small communities that are unsewered in the watershed. The wasteload allocation of these communities is calculated based on the per capita design flow (100 gallons per capita per day) and listed in this TMDL as follows.

Location of unsewered communities	Number of unsewered communities	<i>E. coli</i> bacteria (Geomean) (organisms/day)	<i>E. coli</i> bacteria (Maximum) (organisms/day)
Des Moines River	26	6.44E+08	1.20E+09
Raccoon River	34	1.09E+09	2.02E+09

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 LA is set by $LA = TMDL - WLA - MOS$. The LAs for the impaired segments are given in the table shown below.

Segment ID	Flow Condition (% recurrence)	<i>E. coli</i> bacteria (Geomean) (organisms/day)	<i>E. coli</i> bacteria (Maximum) (organisms/day)
IA 04-UDM-0010_1 IA 04-UDM-0010_2	High Flow, 0-10	3.47E+13	6.46E+13
	Moist, 10-40	1.88E+13	3.51E+13
	Mid-Range, 40-60	6.69E+12	1.25E+13
	Dry, 60-90	2.33E+12	4.34E+12
	Low Flow, 90-100	5.68E+11	1.05E+12
IA 04-LDM-0040_1 IA 04-LDM-0040_2	High Flow, 0-10	7.11E+13	1.33E+14
	Moist, 10-40	3.66E+13	6.80E+13
	Mid-Range, 40-60	1.33E+13	2.47E+13
	Dry, 60-90	4.56E+12	8.35E+12
	Low Flow, 90-100	1.40E+12	2.45E+12
IA 04-LDM-0040_3	High Flow, 0-10	5.19E+13	9.61E+13
	Moist, 10-40	2.64E+13	4.87E+13
	Mid-Range, 40-60	8.86E+12	1.59E+13
	Dry, 60-90	3.33E+12	5.62E+12
	Low Flow, 90-100	5.66E+11	4.68E+11

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.

This bacteria TMDL has an explicit MOS of 10 percent for both the geometric mean (126 *E. coli* organisms/100 mL) and the single sample maximum (235 *E. coli* organisms/100 mL) targets during the primary contact recreation period from March 15 to November 15.

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.

Seasonality and any critical conditions have been addressed in the submittal. This TMDL was developed using the load duration curve (LDC) analysis and Bacteria Indicator Tool (spreadsheet bacteria model), based on the Iowa WQS primary contact recreation period from March 15 to November 15. Five flow conditions, including the critical flows, were addressed in the LDC analysis. Because the primary contact recreation season was incorporated in the analysis, this TMDL has evaluated the seasonal variability of bacteria loads.

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)].

Six public meetings (three in 2008 and three in 2009) were held to gather public/stakeholder comments and suggestions for the development of this TMDL. The meeting at Urbandale on September 15, 2008, was well attended with various interested parties including municipalities, environmental groups, businesses, and citizens. The Iowa Department of Natural Resources (IDNR) staff explained the importance of establishing WLAs for WWTP and municipal storm water permit holders, and LAs for nonpoint sources as well as the state's bacteria standards. The draft TMDL was available on IDNR's website during the 30-day public notice period (September 17 - October 16, 2009). During this period, two written comments were received and addressed through written communications.

EPA agrees there has been opportunity for meaningful public input to this 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].

Ongoing bacteria monitoring in the Des Moines River is expected to continue at the Iowa State University/U.S. Army Corps of Engineers (ISU/USACE) sites identified. The Des Moines Water Works will also continue the frequent bacteria monitoring at its drinking water intakes.

IDNR has proposed a new monitoring procedure that will help identify the potential sources that contribute the bacteria impairment in the river. This monitoring procedure includes:

- (1) Collecting bacteria samples at all the USGS gages to better identify pollutant sources in the study watershed. Currently, seven of the eleven gages including Beaver Creek, Fourmile Creek, North River, Middle River, South River, and Walnut Creek are not sampled.
- (2) Analyzing bacteria samples for both *E. coli* and fecal coliform. This would allow the data directly to be comparable to the historic fecal coliform data.
- (3) Installing automatic runoff samplers and continuous flow meters on small tributaries such as Mud and Camp Creeks near their confluences with the Des Moines River.
- (4) Installing automatic runoff samplers with stage measurement at several locations on the Des Moines River to help capture the urban runoff bacteria loading.

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 as more stringent LAs are not being allocated in lieu of less stringent WLAs. However, funding assistance for controlling nonpoint sources of bacteria loads are available, such as the Clean Water Act Section 319 grants. These grants will be used for implementing best management practices (BMP) to control the LAs.