UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 0 8 2013

REPLY TO THE ATTENTION OF:

WW-16J

John Linc Stine, Commissioner
Regional Environmental Management Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Mr. Stine:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for the Lac qui Parle watershed (ID#07020003) and the Yellow Bank River watershed (ID#07020001), including supporting documentation and follow up information. The Lac qui Parle and Yellow Bank River Watersheds are located in western Minnesota in Lac qui Parle, Yellow Medicine, and Lincoln Counties. The TMDLs were calculated for Total Suspended Solids (TSS), bacteria, and Dissolved Oxygen (DO), addressing turbidity, fecal coliform, and low DO. The TMDLs address the impairment of aquatic life and recreational use.

EPA has determined that these TMDLs 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 Minnesota's 19 TMDLs in the Lac qui Parle River and Yellow Bank River. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting these TMDLs, addressing aquatic life and recreational use, and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde

Tinka G. Hyde
Director, Water Division

Enclosure
cc: Jeff Risberg, MPCA
Katherine Pekarek-Scott, MPCA

TMDL: Lac qui Parle and Yellow Bank TMDL, Minnesota
Date: May 2013

DECISION DOCUMENT FOR THE APPROVAL OF THE LAC QUI PARLE AND YELLOW BANK, MINNESOTA, TMDL

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:

Location Description/Spatial Extent: The Lac qui Parle and Yellow Bank watersheds are located on the western border of Minnesota and extend further westward into South Dakota. The Yellow Bank basin is located north of the Lac qui Parle drainage area. The headwaters of both rivers are located in Deuel and Grant Counties in South Dakota. The branches and various creeks contributing to the Lac qui Parle River flow generally northeastward through Lac qui Parle and Yellow Medicine Counties where they meet just east of Dawson, Minnesota and become the Lac qui Parle River, which discharges above the Lac qui Parle dam and ultimately flows eastward to the Minnesota River. The branches of the Yellow Bank River flow generally northeastward through Lac qui Parle County and join the Minnesota River just east of Odessa, Minnesota. Section 1.2 of the final TMDL document states that approximately 69.7% of the Lac qui Parle drainage is located in Minnesota and the remaining area is in South Dakota (approx. 30.3%). The Minnesota Pollution Control Agency (MPCA) estimates that approximately 13.4% of the Yellow Bank basin is located in Minnesota and the remainder of the area within the basin is in South Dakota (approx. 86.6%). The total drainage (areas in Minnesota and South Dakota) of the Lac qui Parle River and Yellow Bank River basins is 984,166 acres. MPCA estimates that 527,217 acres of 948,166 acres are in Minnesota. For the purposes of the TMDL, the South Dakota portion was factored into the calculation of TMDLs but reaches in South Dakota were not assigned any portion of the allocation.

This TMDL includes eleven Assessment Units (AUs) shown in Table 1.5 of this Decision Document. The segments described in Table 1.5 all eventually flow into either the Yellow Bank River or the Lac qui Parle River as indicated. Aquatic life and recreation designated use are impaired, and the pollutants/stressors are fecal coliform, turbidity, and low dissolved oxygen (DO). This TMDL submittal is for 11 fecal coliform, 7 total suspended solids (TSS), and 1 DO allocation for a total of 19 TMDLs.

The basins are divided into two major agroecoregions (Section 1.3 of the final TMDL document) based on the characteristics of the soils, landscapes, and climate related to crop and animal production. The agroecoregions are the Coteau and the Dryer Blue Earth Till. The Coteau agroecoregion is located primarily in the upper reaches of the Lac qui Parle River watershed and is characterized as having moderately steep slopes (2-6%). The soils of the Coteau agroecoregion are predominantly loamy and well-drained, with high erosive potential due to the topographic characteristics of the agroecoregion. The Dryer Blue Earth Till agroecoregion covers the middle and lower portions of the Lac qui Parle watershed and most of the Yellow Bank River watershed. The soils of the Dryer Blue Earth Till agroecoregion are loamy with certain areas being well-drained and others being poorly-drained soils. The soils of the Dryer Blue Earth Till agroecoregion can be characterized as containing moderate erosion potential and the topography of the Dryer Blue Earth Till agroecoregion is described as containing relatively flat slopes (0-6%). The agriculture practice of field tiling is common in agriculturally developed locations within both the Lac qui Parle and Yellow Bank watersheds and drainage is poor in low areas where drainage tile is not used.

Table 1.5 – Bacteria, Turbidity, and Dissolved Oxygen Impairments in the Lac qui Parle River and Yellow Bank River Watersheds

	Yr Listed	Assessment Unit ID	Affected use	Pollutant or stressor	Target start// completion
Florida Creek, MN/SD Border to W. Br. Lac qui Parle River	06	07020003-521	Aquatic recreation	Fecal coliform	2012//2016
			Aquatic life	Turbidity	2014//2018
Lazarus Creek, Canby Creek to Lac qui Parle River	06	07020003-508	Aquatic recreation	Fecal coliform	2012//2016
			Aquatic life	Turbidity	2014//2018
W. Br. Lac qui Parle River, Unnamed Creek to Unnamed Ditch	06	07020003-512	Aquatic recreation	Fecal coliform	2012//2016
W. Br. Lac qui Parle River, Lost Creek to Florida Creek	06	07020003-516	Aquatic recreation	Fecal coliform	2012//2016
	10[1]		Aquatic life	Turbidity	2009//2011
Lac qui Parle River, Headwaters to Lazarus Creek	06	07020003-505	Aquatic recreation	Fecal coliform	2012//2016
			Aquatic life	Turbidity	2014//2018
Lac qui Parle River, Lazarus Creek to W. Br. Lac qui Parle River	06	07020003-506	Aquatic recreation	Fecal coliform	2012//2016
			Aquatic life	Turbidity	2014//2018
Lac qui Parle River, W. Br Lac qui Parle River to Ten Mile Creek	94	07020003-501	Aquatic life	Low oxygen	2004//2008
	06		Aquatic recreation	Fecal coliform	2012//2016
			Aquatic life	Turbidity	2014//2018
Ten Mile Creek, Headwaters to Lac qui Parle River	06	07020003-511	Aquatic recreation	Fecal coliform	2009//2011
N. Fk. Yellow Bank River, MN/SD Border to Yellow Bank River	06	07020001-510	Aquatic recreation	Fecal coliform	2017//2021
S. Fk. Yellow Bank River, MN/SD Border to N. Fk. Yellow Bank River	06	07020001-526	Aquatic recreation	Fecal coliform	2017//2021
Yellow Bank River, N. Fk. Yellow Bank River to Minnesota River	06	07020001-525	Aquatic recreation	Fecal coliform	2006//2008
	10[1]		Aquatic life	Turbidity	2009//2011

[1] Reach expected to appear on 2010 list of impaired waters

Land use: Section 1.3 of the final TMDL document states that the land use is primarily agricultural. Land use in the Lac qui Parle and Yellow Bank watersheds was classified as 83% corn/soy/other cropland, 7% developed urban, 6% wetlands, 2% grass pasture, 1% woodland forest, and 1% water.

Problem Identification: *Turbidity:* The Executive Summary of the final TMDL document states that excessive amounts of fine sediment in stream environments can degrade aquatic communities. Sediment can reduce spawning and rearing areas for certain fish species. Excess suspended sediment can clog the gills of fish, stress certain sensitive species by abrading their tissue, and thus reduce fish health. When in suspension, sediment can limit visibility and light penetration which may impair foraging and predation activities by certain species. TSS measures the sediment and organic material that inhibit the natural light coming into the system that negatively impacts the biota. Further, excess turbidity may increase the costs of treatment for food processing or drinking water.

Bacteria: Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness. Section 2.2.3 of the final TMDL document states that the bacteria loading was evaluated by month and season in each reach. Exceedances in bacteria, as in turbidity, are more frequent and severe in upper reaches. Results show that the violations of monthly *E. coli* geometric mean standards occur in one or more months for each of the reaches listed, and nine of eleven reaches exceed in three or more months (Table 2.5 of the final TMDL); seasonal geometric means show nine of thirteen exceedances occur in summer, defined as June through August (Table 2.7 of the final TMDL).

Dissolved Oxygen: The low DO problem is discussed in the Executive Summary of the final TMDL. Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased turbidity can reduce dissolved oxygen in the water column, and cause large shifts throughout the day in dissolved oxygen and pH. Shifting chemical conditions within the water column may stress aquatic biota (fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support rough fish species.

Priority Ranking: Section 1.5 of the final TMDL document states that the priority ranking is implicit in the TMDL schedule included in Minnesota's 303(d) list. The schedule shows a starting date for the various segments of the project as early as 2006 and a completion as late as 2021. The Laq qui Parle River and Yellow Bank River watersheds were given a priority ranking for TMDL development due to: the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data and the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Areas within both of these watersheds are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the Laq qui Parle River and Yellow Bank River watersheds, and to the development of TMDLs.

Pollutants of Concern:
Aquatic recreational use: The pollutant of concern for recreational use impairment is bacteria (fecal coliform) which is an indicator for pathogenic bacteria.

Aquatic life use: The pollutants of concern for the aquatic life impairments are excessive sediment siltation (turbidity) which can impact dissolved oxygen concentrations within the water column.

Source Identification: Point sources and nonpoint sources contribute to turbidity, bacteria and low DO impairments in the Lac qui Parle River and Yellow Bank River watersheds.

Point Source Identification: The point sources include permitted treatment facilities (modified from Table 2.10 in the TMDL submittal) and permitted feedlot facilities (Table 2.11 in the TMDL submittal). NPDES permitted facilities may contribute pollutant loads (bacteria) to surface waters through facility discharges of treated wastewater. Permitted facilities discharge treated wastewater according to their NPDES permit. Permitted feedlot facilities are generally not authorized to discharge.

Table 2.10 - Summary of Permitted Treatment Facilities (portion of original table).

Facility	NPDES Permit Number	Assessment Unit ID
AMPI – Dawson	MN0048968	07020003-501
*Ag Processing, Inc.- Dawson	MN0040134	07020003-512
Canby WWTP	MN001236-SD-2	07020003-508
Dawson WWTP	MN0021881	07020003-512
Hendricks WWTP	MN0021121	07020003-505
*Madison WTP	MN0061077	07020003-501
Madison WWTP	MNG55028	07020003-501
Marietta WWTP	MNG580160	07020003-516

Note: *Indicates facilities that are not permitted for bacteria.

Table 2.11 - Summary of Permitted Feedlot Facilities

Facility	NPDES Permit Number	Assessment Unit ID
Randy and Todd Mortenson Farm	MNG440190	07020003-512
Exetare Partnership LLP - Dawson Site	MNG440124	07020003-511
Greg Bothun Farm - Sec 6	MNG440465	07020003-501
Jeffrey Abraham Farm - Sec 21	MNG440738	07020003-511
Lee Johnson Farm	MNG440431	07020003-511
Greg Bothun Farm - Sec 12	MNG440552	07020003-501
Mike & Jared Anhalt Turkey Farm	MNG440930	07020003-521
Cori Bothun Farm - Sec 28	MNG440760	07020003-506
Ten Brook Pork LLP - Site III	MNG440739	07020003-511
Joe Bothun Farm - Sec 1	MNG440553	07020003-501

Charlie Prestholdt Farm	MNG440807	07020003-501
Brent Dahl Farm	MNG440932	07020003-501
David Dahl Hog Farm	MNG440868	07020003-501
Brad Lundy Farm	MNG440837	07020003-501
Brian Boehnke Farm Site F065	MNG440735	07020001-525
Stratmoen Hog Finishing Inc	MNG440424	07020003-511
Alfred Jessen Farm	MNG440534	07020003-511
Wayne Dahl Hog Farm	MNG440446	07020003-501
B-C-H Enterprises LLP - Site I	MNG440425	07020003-511
Robert Verhelst Farm	MNG440952	07020003-505
Hogs Unlimited Inc	MNG440417	07020003-511
Dave DeJong Farm Sec 1	MNG440565	07020003-511

There are no MS4s in the study area, and any general construction or industrial permits are not considered to be a source of bacteria.

Nonpoint Source Identification: The potential nonpoint sources to the Lac qui Parle River and Yellow Bank River watersheds are:

Agricultural land use practices: Runoff from agricultural lands, pastures and smaller feedlots may contain significant amounts of pollutants (bacteria and sediments) which have led to impairments in both watersheds. Manure spread onto fields is often a source of pollutants, and can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off. Sediment can be mobilized in a similar fashion to bacteria. Tile-lined fields and channelized ditches enable pollutants to move into surface waters.

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria directly to the surface waters or resuspend particles that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized bacteria. Smaller animal facilities may add bacteria to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

Failing/noncompliant septic systems: Septic systems are a potential source of bacteria in both the Lac qui Parle River and Yellow Bank River watershed. Septic effluents can leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. The impacts of stormwater flushing of ponded surface waters due to failing septic systems would be greatest following dry or low-flow conditions. Unpermitted septic systems will receive a zero wasteload allocation since discharges from these systems are not legal.

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add sediment to local surface waters. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

Stormwater runoff from small non-MS4 communities: Stormwater runoff from small non-MS4 communities (urban, residential, commercial or industrial land uses) can contribute various pollutants (bacteria and sediments) to local waterbodies. Stormwater from urban areas, which drain impervious surfaces, may introduce pollutants to surface waters. Potential urban sources of bacteria and nutrients can also include wildlife or pet wastes.

Wildlife: Deer, geese, ducks, raccoons, turkeys, and other animals may contribute bacteria to both watersheds.

The Executive Summary states that there are some low oxygenated segments in the headwaters of the watersheds, but primarily the source of low DO is diffuse source detritus loading. Organic matter is added to surface waters from plant/leaf debris, periphyton debris, in-situ production, wastewater effluent, and agricultural animal feces. Additional organic material in the water column can cause shifts in carbonaceous biochemical oxygen demand (CBOD) and nitrogenous biochemical oxygen demand (NBOD). These processes consume DO from the water column thereby making dissolved oxygen unavailable for the needs of the biota in the water column.

Surrogate measures: TSS will be used as a surrogate for sedimentation. Excessive sedimentation in waterbodies impacts the biological community by altering the natural habitat. Abundant channelizing and ditching are used to increase drainage, which then increases sedimentation. There can be resultant decreases in storage and sinuosity, changes in flow characteristics, erosional patterns, channel depth, and other stream characteristics that provide habitat for the fish community.

Biochemical oxygen demand (BOD) will be used as a surrogate for low DO. BOD levels were measured in only one sampling season, but the values of fecal coliform indicators were very high, indicative of direct animal input or animal waste runoff. There is also great diurnal fluctuation of DO likely caused by algal growth or macrophytes in the adjoining wetlands, due to organic enrichment. Increased algal growth affects biota by decreasing visibility, habitat complexity, respiratory effectiveness, and prey availability.

Future growth: Section 4.7 of the TMDL states that there has been a decrease in population in Lac qui Parle County. The county experienced a 4% decrease since 2000, and a 13.1% decrease since 1990 according to the U.S. Census Bureau in 2006. Section 2.7 of the final TMDL document states that discharges from any future permitted locations will have limits that maintain the standards in the rivers. The population in the watersheds in the rural area is expected to build compliant septic systems that will not contribute to the bacteria load that is delivered to the stream. Ongoing efforts to keep livestock out of streams should continue to ensure that bacteria delivery from that source does not occur.

EPA finds that the TMDL document submitted by MPCA 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.

<u>Comment:</u>

Designated Uses:

Section 1.6.1 of the final TMDL document lists all the beneficial use classifications for Minnesota (Minn. Rules Ch. 7050.0140 and 7050.0220).

1. Domestic consumption
2. Aquatic life and recreation
3. Industrial consumption
4. Agriculture and wildlife
5. Aesthetic enjoyment and navigation
6. Other uses
7. Limited resources value
    - A. Cold water sport fish (trout waters), also protected for drinking water
    - B. Cool and warm water sport fish, also protected for drinking water
    - C. Cool and warm water sport fish, indigenous aquatic life, and wetlands, and
    - D. Limited resource value waters

The Lac qui Parle and Yellow Bank designated uses in this TMDL are shown for each segment in Table 1.6 of this Decision Document below. All surface waters are classified as Class 2 waters for aquatic life and recreation. The Class 2 aquatic recreation designated use is described in Minnesota Rule 7050.0140 (3): *"Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare."*

<u>*Narrative Criteria:*</u> Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State: *"For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in*

undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."

MPCA explains that most of the segments below are listed as Class 2C (intended to protect indigenous fish and associated aquatic communities) and 3C (intended to protect water for industrial use and cooling). Other uses are designated in three of the eleven segments.

Table 1.6 –Beneficial Use Classifications (modified from the TMDL)

	Assessment Unit ID	Class
Florida Creek, MN/SD Border to W. Br. Lac qui Parle River	07020003-521	2C and 3C
Lazarus Creek, Canby Creek to Lac qui Parle River	07020003-508	2B
W. Br. Lac qui Parle River, Unnamed Creek to Unnamed Ditch	07020003-512	2C and 3C
W. Br. Lac qui Parle River, Lost Creek to Florida Creek	07020003-516	2C and 3C
Lac qui Parle River, Headwaters to Lazarus Creek	07020003-505	2C and 3C
Lac qui Parle River, Lazarus Creek to W. Br. Lac qui Parle River	07020003-506	2C and 3C
Lac qui Parle River, W. Br. Lac qui Parle River to Ten Mile Creek	07020003-501	2C and 3C
Ten Mile Creek, Headwaters to Lac qui Parle River	07020003-511	2B, 3C, 4A, 4B, 5, and 6
N. Fk. Yellow Bank River, MN/SD Border to Yellow Bank River	07020001-510	2C and 3C
S. Fk. Yellow Bank River, MN/SD Border to N. Fk. Yellow Bank River	07020001-526	2C and 3C
Yellow Bank River, N. Fk. Yellow Bank River to Minnesota River	07020001-525	2B, 3C, 4A, 4B, 5, and 6

Standard for Bacteria: Section 2.1.1 of the final TMDL document states that the chronic standard for *E. coli* is: ***E. coli* of ≤ 126 colony-forming units (cfu)/100 mL**. MPCA believes that meeting this standard will also meet the acute standard. This standard was adopted by MPCA in 2008 when it changed from the **fecal coliform bacteria indicator of ≤ 200 organisms/100 mL**. To clarify, the fecal coliform standard, also referred to as the chronic standard, from the previous Minn. Rules Ch. 7050.0222 subpart 5, as stated in the TMDL: "Fecal Coliform Water Quality Standard for Class 2B waters .....not exceed 200 organisms per 100 milliliters as a geometric mean of not less than five samples in any calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 2,000 organisms per 100 milliliters. The standard applies only between April 1 and October 31." This value is set to which humans or aquatic life may be exposed with no harmful effects, even with exposure for a lifetime.

Some data used in this TMDL were fecal coliform values analyzed previous to 2006; the fecal coliform values were then converted to *E. coli* equivalents. South Dakota has less stringent standards for bacteria (Table 2.9 of this Decision Document below). This approach did not affect South Dakota because no allocations were given for that state, but sources from that state were taken into account. A proportion of the entire loading capacity for the drainage basin was allocated to Minnesota, based on the percentage of total drainage area at the bottom of each listed reach. All of the eleven segments are listed as impaired for fecal coliform (Table 1.5 above).

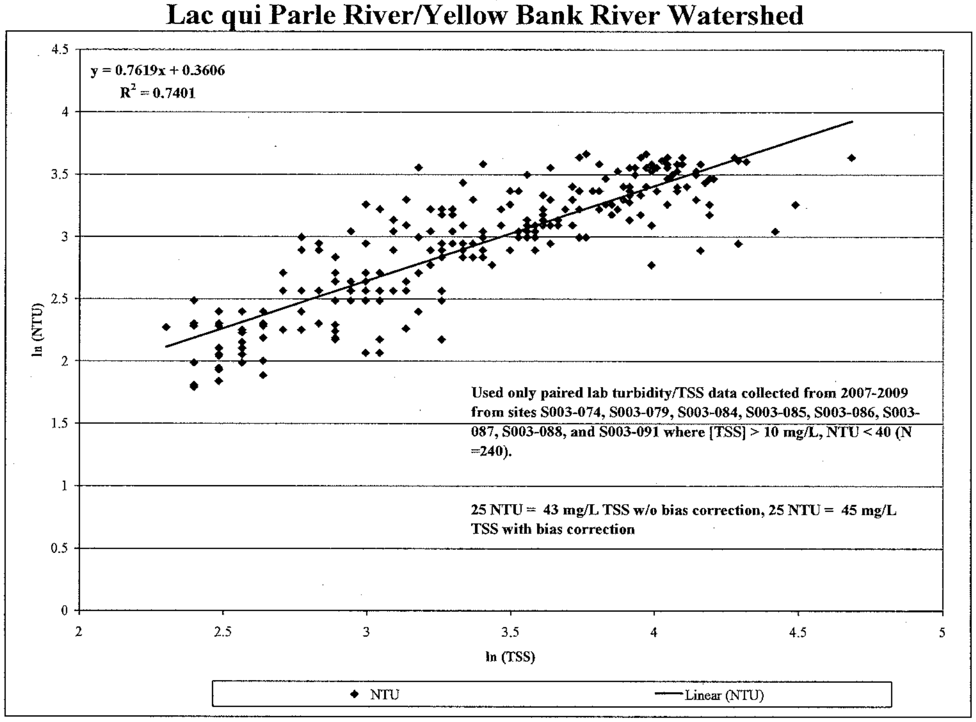
Table 2.9 – Comparison of South Dakota and Minnesota Water Quality Standards for Bacteria for Interstate Streams within the Lac qui Parle-Yellow Bank TMDL Project Area

Parameter	Applicable South Dakota Standard	Applicable Minnesota Standard
Fecal coliform bacteria	≤ 1000 organisms /100 mL	≤ 200 organisms/100 mL
E. coli bacteria	≤630 cfu/100 mL	≤ 126 cfu/100 mL

Standard for TSS: Section 3.2.3 of the final TMDL states that the State of Minnesota has a numeric turbidity standard of 25 Nephelometric Turbidity Units (NTU). For this TMDL, a surrogate relationship was developed between NTU and TSS values, because turbidity is a measure of haziness or cloudiness in the water column that is converted to a potential load. Figure 3.1 of this Decision Document below represents the site-specific relationships between turbidity and TSS ($R^2 = 0.7401$) at eight monitoring sites. Paired data were also used for TSS/transparency relationships and turbidity/transparency relationships at the same monitoring sites and the R^2 values were similar at 0.7707 and 0.7245 respectively, but with a negative slope (Figures 3.2 and 3.3 in the final TMDL document). EPA concurs with MPCA that the surrogate relationships are well-documented and appropriate for this TMDL.

The target utilized for this TMDL for **TSS is 45 mg/L.**

Figure 3.1 - Turbidity/Total Suspended Solids Relationship for Eight Monitoring Sites within the Lac qui Parle River/Yellow Bank River Watershed



Standard for DO: Section 4.1.1 of the final TMDL document states that **5 mg/l of DO is the daily minimum.** There is only one segment impaired for low DO in the study area, segment Lac qui Parle, West Branch Lac qui Parle River to Ten Mile Creek (07020003-501).

Because of the seasonal and diurnal variability in DO concentrations, data sets of only 10 independent observations are seldom sufficient to provide the basis for a confident assessment. For this reason, a total of 20 independent observations are required for DO assessments. In open water months (April through November) measurements should be made before 9:00 am in order to measure the lowest diurnal DO concentration.

A stream is considered impaired if 1) more than 10 percent of the "suitable" (taken before 9:00) May through September measurements, or more than 10 percent of the total May through September measurements, or more than 10 percent of the October through April measurements violate the standard, and 2) there are at least three total violations. A designation of "full support" for DO requires at least 20 suitable measurements from a set of monitoring data that give a representative, unbiased picture of DO levels over at least two different years.

Dissolved oxygen is used by oxygen demanding substances in both the sediment and the water column in a waterbody. A surrogate relationship was investigated between: DO and CBOD of micro-organisms in the water column; NBOD of micro-organisms in the water column; and Sediment Oxygen Demand (SOD) due to the aerobic decay of organic material in streambed sediments. All three oxygen demanding surrogates were used to determine the loading from oxygen demanding sources (i.e., sediment, diffuse sources, etc.). The approach will be further discussed in the next section of this document.

EPA finds that the TMDL document submitted by MPCA 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 steam 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: TMDL = Loading Capacity (LC) = WLA + LA + MOS
Sections 2, 3, and 4 of the TMDL discuss the various methodologies used for each contaminant allocation and reduction. Each method is reviewed with their respective loading capacities below.

E. coli TMDLs: Summaries of the E. coli loading capacities are at the end of this document. Individual reach capacities are shown below. All 11 of the segments are listed for fecal coliform, and allocations were converted to E. coli equivalents as described above. The loading capacity tables below are taken from the TMDL.

Table 2.15 – *E. coli* Loading Capacities and Allocations – Florida Creek: South Dakota border to W. Branch Lac qui Parle River (AUID 07020003-521)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	279.05	82.94	22.91	4.40	0.03
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	251.14	74.65	20.62	3.96	0.03
MOS	27.91	8.29	2.29	0.44	0.00

Table 2.19 – *E. coli* Loading Capacities and Allocations – Lazarus Creek: Canby Creek to Lac qui Parle River (AUID 07020003-508)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	314.80	82.88	32.34	8.12	0.93
Σ WLA					
NPDES Permitted Treatment Facilities	12.40	12.40	12.40	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	270.92	62.19	16.71	*	*
MOS	31.48	8.29	3.23	na	na

Table 2.24 – *E. coli* Loading Capacities and Allocations – West Branch Lac qui Parle River, Unnamed ditch to Unnamed creek (AUID 07020003-512)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	883.04	262.45	72.49	13.94	0.10
Σ WLA					
NPDES Permitted Treatment Facilities	3.84	3.84	3.84	3.84	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	790.90	232.36	61.40	8.71	*
MOS	88.30	26.25	7.25	1.39	na

Table 2.28 – *E. coli* Loading Capacities and Allocations – West Branch Lac qui Parle River, Lost Creek to Florida Creek (AUID 07020003-516)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	343.23	102.01	28.18	5.42	0.04
Σ WLA					
NPDES Permitted Treatment Facilities	1.60	1.60	1.60	1.60	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	307.31	90.21	23.76	3.28	*
MOS	34.32	10.20	2.82	0.54	na

Table 2.33 – *E. coli* Loading Capacities and Allocations – Lac qui Parle River, Headwaters to Lazarus Creek (AUID 07020003-505)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	265.79	69.98	27.30	6.85	0.78
Σ WLA					
NPDES Permitted Treatment Facilities	11.21	11.21	11.21	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	228.00	51.77	13.36	*	*
MOS	26.58	7.00	2.73	na	na

Table 2.37 – *E. coli* Loading Capacities and Allocations – Lac qui Parle River, Lazarus Creek to W. Branch Lac qui Parle River (AUID 07020003-506)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	777.45	204.68	79.86	20.05	2.28
Σ WLA					
NPDES Permitted Treatment Facilities	23.61	23.61	23.61	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	676.09	160.60	48.26	*	*
MOS	77.75	20.47	7.99	na	na

Table 2.42 – *E. coli* Loading Capacities and Allocations – Lac qui Parle River, West Branch Lac qui Parle River to Ten Mile Creek (AUID 07020003-501)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	1600.68	401.20	152.48	60.29	17.69
Σ WLA					
NPDES Permitted Treatment Facilities	41.38	41.38	41.38	41.38	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	1399.23	319.70	95.85	12.88	*
MOS	160.07	40.12	15.25	6.03	na

Table 2.46 – *E. coli* Loading Capacities and Allocations – Ten Mile Creek, Headwaters to Lac qui Parle River (AUID 07020003-511)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	308.51	77.33	29.39	11.62	3.41
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	277.66	69.60	26.45	10.46	3.07
MOS	30.85	7.73	2.94	1.16	0.34

Table 2.49 – *E. coli* Loading Capacities and Allocations – North Fork Yellow Bank River, South Dakota Border to Yellow Bank River (AUID 07020001-510)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	18.29	4.73	1.06	0.50	0.16
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	16.46	4.26	0.95	0.45	0.14
MOS	1.83	0.47	0.11	0.05	0.02

Table 2.52 – *E. coli* Loading Capacities and Allocations – South Fork Yellow Bank River, South Dakota Border to Yellow Bank River (AUID 07020001-526)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	95.32	24.65	5.51	2.62	0.84
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	85.79	22.18	4.96	2.36	0.76
MOS	9.53	2.47	0.55	0.26	0.08

Table 2.56 – *E. coli* Loading Capacities and Allocations – Yellow Bank River, North Fork Yellow Bank River to Minnesota River (AUID 07020001-525)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Billions of colony-forming units per day				
MN TMDL = Σ WLA + Σ LA + MOS	216.35	55.95	12.50	5.94	1.91
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Σ LA	194.71	50.35	11.25	5.35	1.72
MOS	21.64	5.60	1.25	0.59	0.19

E. coli Load Duration Curve (LDC) Methodology:

- The flow record was acquired for the reaches using a daily flow record of 10 year duration at the bottom of each reach;
- A monthly mean flow duration curve was developed, because the standard requires monitoring from April through October. The monthly flow duration curve expresses results in five flow regimes, using the full range of hydrological conditions at each monitoring site. The resultant curves show flow values and the frequency that the flow is exceeded. A range of conditions from flood to low flow are represented;
- Load duration curves were then developed using the average monthly flows multiplied by the standards or target concentrations and plotted on a logarithmic duration curve (Figure 2.2). The line shows the assimilative capacity at all flow regimes. The TMDL for each flow regime was established by using the midpoint flow condition multiplied by the concentration target.

Figure 2.2 - Bacteria Load Duration Curve for Lac qui Parle River (West Br. Lac qui Parle River to Ten Mile Creek, AUID 07020003-501)

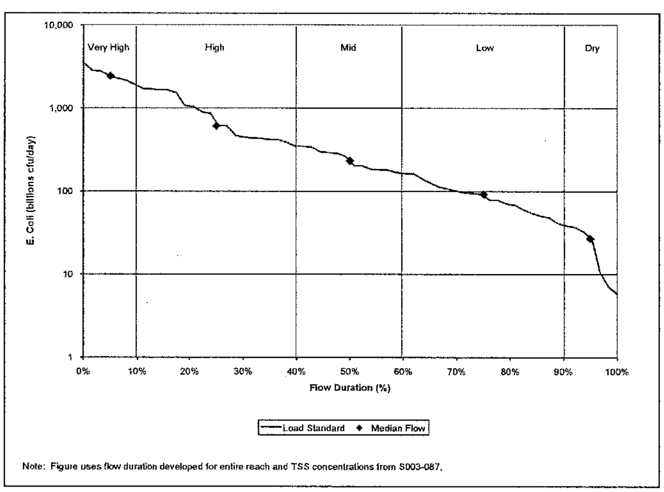
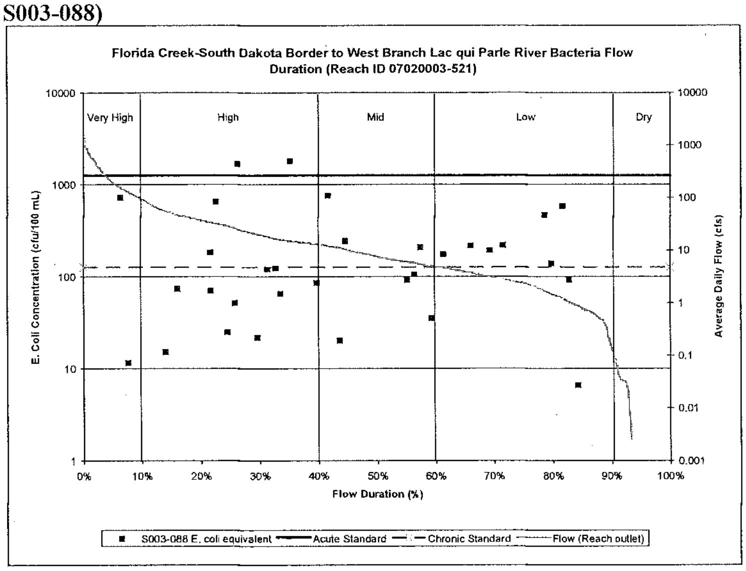


Figure 2.3 of this Decision document below shows an example of one segment of the eleven impaired for recreational use by bacteria. The solid line represents the acute *E. coli* standard and the dashed represents the chronic *E. coli* standard; note exceedances of both standards occur, ranging from high to low flow regimes. High flow exceedances more often occur from precipitation-related sources (stormwater, overland run-off) on the left portion of the plot and non-precipitation related (failing septic systems, cattle in the stream, wastewater discharge) exceedances more often occur under low flow conditions on the right portion of the plot.

Figure 2.3 – Florida Creek (MN/SD border to W. Br. Lac qui Parle River) - *E. coli* Concentrations by Flow Regime (Station S003-088)



Note: Figure presents flow duration information developed at the downstream end of the reach and bacteria concentrations from the station(s) noted.

<u>TSS TMDLs:</u> Seven out of the 11 segments are impaired by turbidity. Summaries of the TSS loading are at the end of this document. The TSS loading capacities below are taken directly from the TMDL.

Table 3.14 - TSS LCs and Allocations – Florida Creek: South Dakota border to W. Branch Lac qui Parle River (AUID 07020003-521)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	10.74	1.52	0.41	0.13	0.01
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
Industrial Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
Σ LA	9.65	1.37	0.37	0.12	0.01
MOS	1.07	0.15	0.04	0.01	0.00

Table 3.18 – TSS LCs and Allocations – Lazarus Creek: Canby Creek to Lac qui Parle River (AUID 07020003-508)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	11.07	2.05	0.58	0.19	0.03
Σ WLA					
NPDES Permitted Treatment Facilities	0.44	0.44	0.44	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.01	<0.01	<0.01	*	*
Industrial Stormwater	0.01	<0.01	<0.01	*	*
Σ LA	9.50	1.40	0.08	*	*
MOS	1.11	0.21	0.06	na	na

Table 3.22 – TSS LCs and Allocations – West Branch Lac qui Parle River-Lost Creek to Florida Creek (AUID 07020003-516)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	13.21	1.88	0.51	0.16	0.01
Σ WLA					
NPDES Permitted Treatment Facilities	0.06	0.06	0.06	0.06	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.01	<0.01	<0.01	<0.01	*
Industrial Stormwater	0.01	<0.01	<0.01	<0.01	*
Σ LA	11.81	1.63	0.40	0.08	*
MOS	1.32	0.19	0.05	0.02	na

Table 3.27 – TSS LCs and Allocations – Lac qui Parle River, Headwaters to Lazarus Creek (AUID 07020003-505)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	9.35	1.73	0.49	0.16	0.03
Σ WLA					
NPDES Permitted Treatment Facilities	0.40	0.40	0.40	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.01	<0.01	<0.01	*	*
Industrial Stormwater	0.01	<0.01	<0.01	*	*
Σ LA	7.99	1.16	0.04	*	*
MOS	0.94	0.17	0.05	na	na

Table 3.31 – TSS LCs and Allocations – Lac qui Parle River, Lazarus Creek to West Branch Lac qui Parle (AUID 07020003-506)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	27.34	5.06	1.45	0.48	0.07
Σ WLA					
NPDES Permitted Treatment Facilities	0.84	0.84	0.84	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.02	<0.01	<0.01	*	*
Industrial Stormwater	0.02	<0.01	<0.01	*	*
Σ LA	23.73	3.71	0.46	*	*
MOS	2.73	0.51	0.15	na	na

Table 3.36 – TSS LCs and Allocations – Lac qui Parle River, West Branch Lac qui Parle River to Ten Mile Creek (AUID 07020003-501)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	59.61	10.39	3.33	1.48	0.28
Σ WLA					
NPDES Permitted Treatment Facilities	1.54	1.54	1.54	*	*
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.05	0.01	<0.01	<0.01	*
Industrial Stormwater	0.05	0.01	<0.01	<0.01	*
Σ LA	52.02	7.80	1.47	*	*
MOS	5.96	1.04	0.33	na	na

Table 3.40 – TSS LCs and Allocations – Yellow Bank River, North Fork Yellow Bank River to Minnesota River (AUID 07020001-525)

	Flow Regime				
	Very High	High	Mid	Low	Dry
	Metric tons TSS per day				
MN TMDL = Σ WLA + Σ LA + MOS	7.00	0.94	0.37	0.16	0.05
Σ WLA					
NPDES Permitted Treatment Facilities	0.00	0.00	0.00	0.00	0.00
Feedlots Requiring NPDES Permits	0.00	0.00	0.00	0.00	0.00
Noncompliant Septic Systems	0.00	0.00	0.00	0.00	0.00
Construction Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
Industrial Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
Σ LA	6.28	0.85	0.33	0.14	0.04
MOS	0.70	0.09	0.04	0.02	0.01

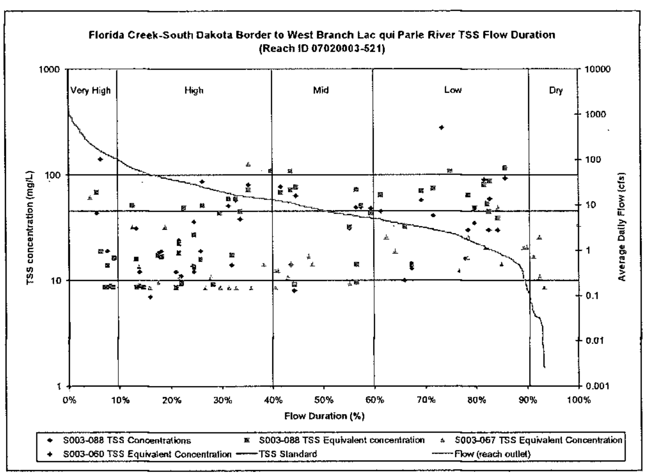
TSS Methodology:

There were many similarities in methodology between the *E. coli* approach and TSS.

- As with the *E. coli* approach, the flow record was acquired for the reaches using a daily flow record of 10 year duration at the bottom of each reach;
- A daily (rather than monthly mean) flow duration curve was developed. The flow duration curve expresses results in five flow regimes, using the full range of hydrological conditions at each monitoring site. The resultant curves show flow values and the frequency that the flow is exceeded. A range of conditions from flood to low flow are represented;
- Load duration curves were developed using the flow duration curve. The average daily flow for the 10-year flow record was multiplied by the TSS surrogate for 25 NTU as previously described, and plotted on a logarithmic curve. The line shows the assimilative capacity at all flow regimes. The TMDL for each flow regime was established by using the median flow condition in each flow regime, multiplied by the concentration target. The resultant plot is similar to Figure 2.2 above.

Figure 3.5 below shows one segment of the seven impaired segments for TSS, at the same monitoring station as the *E. coli* figure above. The solid line represents the TSS standard; note exceedances occur from high to low flow regimes.

Figure 3.5 – Florida Creek (MN/SD border to W. Br. Lac qui Parle River) - TSS Concentrations by Flow Regime (Station S003-088)



Note: Figure presents flow duration information developed at the downstream end of the reach and TSS concentrations from the station(s) noted.

Dissolved Oxygen TMDL:

Table 4.9 – Existing Critical Loads represented in pounds per day.

	2010 Existing CBOD *(pounds O_2 per day)*	2010 Existing NBOD *(pounds O_2 per day)*	2010 Existing SOD *(pounds O_2 per day)*	2010 Existing *Total Oxygen Demand (pounds O_2 per day)*
Existing Load = Σ WLA + Σ LA + MOS	**7,836.0**	**961.3**	**10,417.1**	**19,214.4**
Σ WLA				
NPDES Permitted Treatment Facilities	--	--	--	--
Feedlots Requiring NPDES Permits	--	--	--	--
Noncompliant Septic Systems	--	--	--	--
Construction Stormwater	5.0	1.0	--	6.0
Industrial Stormwater	5.0	1.0	--	6.0
Σ LA				
Sources of Sediment Flux	--	--	9,688.5	9,688.5
Diffuse Sources	6,052.2	144.6	--	6,196.8
Boundary Condition: West Branch Lac qui Parle River (1.50 river miles)	551.5	233.4	728.6	1,513.6
Boundary Condition: South Branch Lac qui Parle River	105.0	131.2	--	236.1
Boundary Condition: County Ditch 27	963.3	250.6	--	1,214.0
Boundary Condition: County Ditch 4	154.0	199.4	--	353.5
MOS	--	--	--	--

Table 4.10 – TMDL allocations represented in pounds per day.

	TMDL CBOD *(pounds O_2 per day)*	TMDL NBOD *(pounds O_2 per day)*	TMDL SOD *(pounds O_2 per day)*	TMDL Total Oxygen Demand *(pounds O_2 per day)*
TMDL Allocation = Σ WLA + Σ LA + MOS	5,322.9	961.3	8,013.9	14,298.1
Σ WLA				
NPDES Permitted Treatment Facilities	--	--	--	--
Feedlots Requiring NPDES Permits	--	--	--	--
Noncompliant Septic Systems	--	--	--	--
Construction Stormwater	5.0	1.0	--	6.0
Industrial Stormwater	5.0	1.0	--	6.0
Σ LA				
Sources of Sediment Flux	--	--	6,998.9	6,998.9
Diffuse Sources	3,267.1	144.7	--	3,411.8
Boundary Condition: West Branch Lac qui Parle River (1.50 river miles)	459.4	233.4	237.4	930.2
Boundary Condition: South Branch Lac qui Parle River	105.0	131.2	--	236.2
Boundary Condition: County Ditch 27	963.3	250.6	--	1,213.9
Boundary Condition: County Ditch 4	154.0	199.4	--	353.4
MOS	364.1	--	777.7	1.141.8

DO methodology: Section 4.2.4.2 of the TMDL document discusses the BOD, comprised of CBOD and NBOD, as related to the DO impairment. NBOD is not a driving force for the DO impairment, and Section 4.2.4.3 states that SOD data were not available, but SOD is considered a likely influence on the low DO. Section 4.2.4.4 determined that periphyton (algae) are significant in DO impairment, and greatly influenced by phosphorus input, resulting in eutrophic conditions and reducing DO. Other influences on DO are impoundments, water temperature, canopy coverage, and in-stream geomorphology. After consideration of all these factors and the dominant influences in the stream reaches, QUAL2K was the water quality model chosen for this

TMDL. QUAL2K simulates the stream and a well mixed channel, applied to steady-state flow conditions.

Section 4.3.1 of the TMDL submittal presents DO data from 2005, 2007, and 2009. The model was calibrated using the August, 2005 data. Since SOD data were not available, prescribed SOD and CBOD (diffuse sources of detritus) were used in calibration. SOD is unknown and the detritus was assumed to be 100% of the CBOD. Data from the fall of 2009 was used to validate the model. Hydraulic data, water quality data (headwaters, point sources, and in-stream sites), environmental process rates (such as denitrification), and meteorological data were used in the analysis. SOD and CBOD were adjusted until the DO increased to meet or exceed the 5mg/l standard in the entire impaired reach of the river.

Critical Conditions:
Section 4 of the final TMDL document states that critical conditions occur in the summer months due to low flow, biomass increases, and excessive algal growth which reduces available oxygen. The TMDL accounts for the critical condition because the load duration curves account for all flow conditions, and the target for BOD and TSS are set to be protective during critical periods. EPA finds that the TMDL document submitted by MPCA 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 Allocations are in Section 3 above and are summarized at the end of this document, with reference tables as found in the TMDL. The LA values are a combination of all the nonpoint sources, and some of the AUs only have nonpoint sources.

EPA finds that the TMDL document submitted by MPCA 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: Wasteload Allocations are in Section 3 above and are summarized at the end of this document, with reference tables as found in the TMDL. Only the wastewater treatment facilities are given wasteload allocations for *E. coli*. There may be CAFOs or permitted feedlots in the watersheds of the various reaches but the allocations are zero so they are not shown in these tables.

EPA finds that the TMDL document submitted by MPCA 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:
This TMDL uses an explicit margin of safety of 10% for each pollutant, and 10 – 15% for the different oxygen demanding parameters. Each MOS is in the Section 3 loading capacity tables above. The explicit MOS was applied by reserving approximately 10% of the total loading capacity, and then allocating the remaining loads to point (WLA) and nonpoint sources. The use of the LDC approach minimized variability associated with the development of the TMDLs because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 10% to account for uncertainty due to field sampling error and basing assumptions on water quality monitoring with low sample sizes. A 10% MOS was considered appropriate, because the target values used in this TMDL had a firm technical basis and the estimated flows are believed to be relatively accurate because they were estimated based on a USGS flow gages located within the Lac qui Parle and Yellow Bank River watersheds.

The MOS for these TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient enough to meet the bacteria water quality standard of 126 cfu/100 mL. Thus, it is more conservative to apply the State's water quality standard for the TMDL, because this standard must be met at all times under all environmental conditions. The use of a geomean for the E. coli standard also adds to the implicit MOS because using the not-to-exceed standard would have yielded a larger loading capacity. EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying all requirements concerning this sixth element.

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:

Seasonal variation was considered as described in Section 2.6 of the final TMDL document. The development of the LDCs utilized flow measurements from a local USGS gages. These flow measurements were collected over a variety of flow conditions observed within both watersheds. LDCs developed from these flow records represented a range of flow conditions within the Lac qui Parle River and Yellow Bank River watersheds and thereby accounted for seasonal variability. The LDC approach captures the variation in flow and concentrations occurring in different reaches. Further, the variation can occur over either a wide or small range of flow regimes.

Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading reduces as agricultural activity slows. Bacterial WQS need to be met during the recreational season, regardless of the flow condition. The methodology captures that the highest bacterial levels are generated in the summer months of June, July, and August by calculating geomeans for the season rather than annually. Overall, the behavior of *E. coli* is also captured in the non-recreational season when standards do not apply; this bacteria variation includes die-off, or hibernation and multiplication.

Given the amount of agricultural land use in the watershed, sediment loadings in the Lac qui Parle River and Yellow Bank River watersheds vary with agricultural activity. Sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of local water bodies to sediments occur in periods of low flow. During low flow periods, sediment can accumulate, there is less assimilative capacity within the waterbody, and sediment is generally not transported through the waterbody at the same rate as under higher flow conditions.

Increased algal growth during low flow periods can deplete dissolved oxygen within the water column. Critical conditions that impact loading, or the rate that nutrients are delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons. MPCA states in Section 4.2.4.3 of the TMDL, and EPA concurs, that : "Reduction/control of watershed activities associated to nutrient rich and organic enriched substances will result in lower SOD and higher DO."

EPA finds that the TMDL document submitted by MPCA 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 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:

Section 6.1 of the final TMDL document states that implementation will be on an iterative basis, and includes reevaluation every five years, with the potential to readjust the strategy. The funding sources include those ear-marked to support TMDL implementation from the Clean Water, Land, and Legacy Act (CWLA). The CWLA is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to achieve the allocations in the TMDL.

The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements and to jointly utilize technical educational, and financial resources. MPCA expects the implementation plans to be developed within a year of TMDL approval.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. The implementation plans are required to contain ranges of cost estimates for both point and nonpoint source load reductions, as well as monitoring efforts to determine effectiveness. MPCA has developed guidance on what is required in the implementation plans (Implementation Plan Review Combined Checklist and Comment, MPCA), which includes cost estimates, general timelines for implementation, and interim milestones and measures. The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY '11 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources, 2011).

Regulatory programs under NDPES will continue to control discharges from industrial, municipal, and construction sources, and large feedlots that meet the CAFO regulatory thresholds. Technical resources include; the Lac qui Parle Yellow Bank Water District (LQPYBWD), County Soil and Water Conservation Districts (SWCDs), Natural Resources Conservation Service (NRCS), County Water Plans, as well as the Minnesota Department of Natural Resources (DNR). Funding may come from;

- Conservation Reserve Program;
- Federal Section 319 program for watershed improvements;
- LQPYBWD program funds;
- Local government cost-share funds;
- CWP (Clean Water Partnership) Grants; and
- CWP (SRF Loan Funds).

There is a record of extensive past work in the watersheds, through the LQPYBWD, SWCDs, and NRCS. There have been a total of 649 BMPS installed in three counties. The following table is taken from Section 6.3 of the TMDL. Extensive stakeholder meetings, planning, goals and implementation is listed later in the Public Participation Section of this document.

Table 6.1 – BMPs within LQPYBWD
Best Management Practices within the Lac qui Parle- Yellow Bank Watershed

Practice	number	Practice	number
Abandoned well sealing	267	Fence	1
Water and sediment control Basin	140	Diversion	10
Roof runoff management	1	Drainage system modification	5
Windbreak/shelterbelt establishment	60	Residue management -mulch	5
Erosion control	2	Cover and green manure crop	1
Terrace	51	Sediment basin	7
Septic system improvement	82	Waste storage facility	1
Grassed waterway	29	Field border	2
Conservation cover easement	1	Septage management	5
Filter strip	13	Underground toilet	3
Streambank and shoreline protection	1	Wildlife habitat management	2
Grade stabilization structure	2	Road construction practices	1
		Total	692

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:
Sections 5.2.1 and 5.2.2 of the final TMDL document state that monitoring will occur in the basins for both contaminant and flow. A long term monitoring station is maintained at the outlet of each watershed by MPCA. MPCA will complete watershed water quality sampling and monitoring events on a 10 year cycle, beginning in 2015. Targeted monitoring for bacteria will occur where high concentrations are observed under low flow conditions, likely due to septic failure or overgrazed pastures with direct access by animals. Flow monitoring will occur with the USGS and U.S. Army Corps of Engineers (USACE) gages. A cooperative effort is beginning for monitoring for bacteria and turbidity in South Dakota for the Yellow Bank watershed and similar actions should be followed for the Lac qui Parle watershed.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the Lac qui Parle River and Yellow Bank River implementation efforts. Water quality information will aid watershed managers in understanding how Best Management Practices (BMPs) removal efforts are impacting water quality within the Lac qui Parle River and Yellow Bank River watersheds. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce bacteria and sediment loading. Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory.

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:
Section 5 of the final TMDL document reviews and plans many implementation strategies for the watersheds. They include all three stressors (bacteria, turbidity, and low DO) and activities, such as:

- BMP guidance based on agroecoregions;
- Nutrient management practices;
- Vegetative management practices (tillage);
- Structural practices (wetland creation, livestock exclusion, liquid manure waste facilities, water and sediment control basins, diversions, terraces);
- Feedlot runoff reduction;
- Manure management planning;
- Stream and channel restoration;
- Reducing source loads from headwater/upstream sources;
- WWTF maintenance and upgrades; and
- Septic system improvements for failing systems.

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:
Section 7 of the final TMDL document discusses the roles of many citizens and entities in the watershed. A watershed team was formed (TEAM – Together Everyone Achieves More) which included representatives from local entities in the Lac qui Parle and Yellow Medicine watersheds. Those members included;

- Lac qui Parle, Yellow Medicine and Lincoln County Soil and Water Conservation Districts;
- Lac qui Parle, Yellow Medicine and Lincoln County Water Plans;
- Lac qui Parle, Yellow Medicine and Lincoln County Natural Resources Conservation Service (NRCS);
- Lac qui Parle County Environmental Office;
- Area II Minnesota River Basin Projects, Inc.;
- Prairie Country Resource Conservation & Development;
- Board of Water and Soil Resources (BWSR);
- Minnesota Department of Natural Resources;
- U.S. Fish & Wildlife Service;
- MPCA; and
- East Dakota Water Development District.

The stakeholder committee included the TEAM members and livestock producers, corn and soybean producers, city employees, residents, lake associations, and environmental groups. Stakeholder and citizen meetings began in 2009 and continued through 2010, for a total of four meetings.

The draft TMDL was public noticed from May 29, 2012, to June 27, 2012. Copies of the draft TMDL were made available upon request, in news releases, and on the Internet web site: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/tmdl-projects/tmdl-projects-and-staff-contacts.html. Five comment letters were received during the public comment period. The comments were adequately addressed by MPCA and are included in the final TMDL submittal. MPCA also adequately addressed EPA comments within the document.

EPA finds that the TMDL document submitted by MPCA 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:
The EPA received the final Lac qui Parle and Yellow Bank TMDL document, submittal letter and accompanying documentation from the MPCA on March 7, 2013. The submittal letter explicitly stated that enclosed was the final Lac qui Parle and Yellow Bank TMDL report for turbidity, fecal coliform, and low dissolved oxygen, which was being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this twelfth element.

13. Conclusion

After a full and complete review, EPA finds that the TMDLs for the Lac qui Parle and Yellow Bank satisfy all of the elements of an approvable TMDL. This approval addresses *E. coli* TMDLs (11), TSS TMDLs (7) and a DO TMDL (1), for a total of 19 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.

***E. coli* Loading Capacity summary in each flow regime (billions cfu/day)**

Table in TMDL	AUID 07020003	Very high	high	mid	low	dry
2.15	-521	279.05	82.94	22.91	4.40	0.03
2.19	-508	314.80	82.88	32.34	8.12	0.93
2.24	-512	883.04	262.45	72.49	13.94	0.10
2.28	-516	343.23	102.01	28.18	5.42	0.04
2.33	-505	265.79	69.98	27.30	6.85	0.78
2.37	-506	777.45	204.68	79.86	20.05	2.28
2.42	-501	1600.68	401.20	152.48	60.29	17.69
2.46	-511	308.51	77.33	29.39	11.62	3.41
	AUID 07020001					
2.49	-510	18.29	4.73	1.06	0.50	0.16
2.52	-526	95.32	24.65	5.51	2.62	0.84
2.56	-525	216.35	55.95	12.50	5.94	1.91

TSS Loading Capacity summary in each flow regime (metric tons TSS per day)

Table in TMDL	AUID 07020003	Very high	high	mid	low	dry
3.14	-521	10.74	1.52	0.41	0.13	0.01
3.18	-508	11.07	2.05	0.58	0.19	0.03
3.22	-516	13.21	1.88	0.51	0.16	0.01
3.27	-505	9.35	1.73	0.49	0.16	0.03
3.31	-506	27.34	5.06	1.45	0.48	0.07
3.36	-501	59.61	10.39	3.33	1.48	0.28
	AUID 07020001					
3.40	-525	7.00	0.94	0.37	0.16	0.05

Dissolved Oxygen Demanding Sources (pounds 0_2 per day)

Table in TMDL	AUID 07020003	TMDL CBOD	TMDL NBOD	TMDL SOD	TMDL Total OD
4.10	-501	5,322.9	961.3	8,013.9	14,298.1

***E. coli* LA summary for each AUID in each flow regime (in billions of cfu/day)**

Table in TMDL	AUID 07020003	Very high	high	mid	low	dry
2.15	-521	251.14	74.65	20.62	3.96	0.03
2.19	-508	270.92	62.19	16.71	*	*
2.24	-512	790.90	232.36	61.40	8.71	*
2.28	-516	307.31	90.21	23.76	3.28	*
2.33	-505	228.00	51.77	13.36	*	*
2.37	-506	676.09	160.60	48.26	*	*
2.42	-501	1399.23	319.70	95.85	12.88	*
2.46	-511	277.66	69.60	26.45	10.46	3.07
	AUID 07020001					
2.49	-510	16.46	4.26	0.95	0.45	0.14
2.52	-526	85.79	22.18	4.96	2.36	0.76
2.56	-525	194.71	50.35	11.25	5.35	1.72

TSS LA summary for each AUID in each flow regime (metric tons TSS per day)

Table in TMDL	AUID 07020003	Very high	high	mid	low	dry
3.14	-521	9.65	1.37	0.37	0.12	0.01
3.18	-508	9.50	1.40	0.08	*	*
3.22	-516	11.81	1.63	0.40	0.08	*
3.27	-505	7.99	1.16	0.04	*	*
3.31	-506	23.73	3.71	0.46	*	*
3.36	-501	52.02	7.80	1.47	*	*
	AUID 07020001					
3.40	-525	6.28	0.85	0.33	0.14	0.04

Dissolved Oxygen Demanding Sources (pounds 0_2 per day) LA summary for each category

Table in TMDL	AUID 07020003	LA CBOD	LA NBOD	LA SOD	LA Total OD
4.10	-501	4,948.8	959.3	7,236.3	13,144.4

E. coli WLA summary for each AUID in each flow regime (billions of cfu/day)

Table in TMDL	AUID 07020003	Category NPDES Permitted Treatment Facilities	Very high	high	mid	low	dry
2.19	-508	Canby WWTP pond MNG580154	12.40	12.40	12.40	*	*
2.24	-512	Dawson WWTP continuous MN0021881 (plus Marietta)	3.84	3.84	3.84	3.84	*
2.28	-516	Marietta WWTP stabilization pond MNG580160	1.60	1.60	1.60	1.60	*
2.33	-505	Hendricks WWTP stabilization pond MN0021121	11.21	11.21	11.21	*	*
2.37	-506	total of Canby and Hendricks upstream (12.40 + 11.21)	23.61	23.61	23.61	*	*
2.42	-501	AMPI pond MN0048968 Madison WWTP continuous MNG550028 (plus total Marietta, Dawson, Canby, Ag Processing, Hendricks)	41.38	41.38	41.38	41.38	*

TSS WLA summary for each AUID, in each flow regime (metric tons TSS per day)

Table in TMDL	AUID 07020003	Category	Very high	high	mid	low	dry
3.14	-521	Construction Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
		Industrial Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
3.18	-508	Canby WWTP pond MNG580154	0.44	0.44	0.44	0.44	*
		Construction Stormwater	0.01	<0.01	<0.01	*	*
		Industrial Stormwater	0.01	<0.01	<0.01	*	*
3.22	-516	Marietta WWTP pond MNG580160	0.06	0.06	0.06	0.06	*
		Construction Stormwater	0.01	<0.01	<0.01	<0.01	*
		Industrial Stormwater	0.01	<0.01	<0.01	<0.01	*
3.27	-505	Hendricks WWTP pond MN0021121	0.40	0.40	0.40	*	*
		Construction Stormwater	0.01	<0.01	<0.01	*	*
		Industrial Stormwater	0.01	<0.01	<0.01	*	*
3.31	-506	Canby and Hendricks WWTPs MNG580154 MN0021121	0.84	0.84	0.84	*	*
		Construction Stormwater	0.02	<0.01	<0.01	*	*
		Industrial Stormwater	0.02	<0.01	<0.01	*	*
3.36	-501	AMPI pond MN0048968 Madison WWTP MNG550028 and MN0061077 (plus Marietta,Dawson, Canby, Ag Processing, Hendricks)	1.54	1.54	1.54	*	*
		Construction Stormwater	0.05	0.01	<0.01	<0.01	*
		Industrial Stormwater	0.05	0.01	<0.01	<0.01	*
	AUID 07020001						
3.40	-525	Construction Stormwater	0.01	<0.01	<0.01	<0.01	<0.01
		Industrial Stormwater	0.01	<0.01	<0.01	<0.01	<0.01

Dissolved Oxygen Demanding Sources (pounds 0_2 per day) WLA summary

Table in TMDL	AUID 07020003	Category	WLA CBOD	WLA NBOD	WLA SOD	WLA Total OD
4.10	-501	Construction Stormwater	5.0	1.0	--	6.0
		Industrial stormwater	5.0	1.0		6.0