



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

MAY 17 2013

REPLY TO THE ATTENTION OF:

WW-16J

Rebecca Flood, Assistant Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Load (TMDL) for Benton Lake (10-0069), including supporting documentation and follow up information. Benton Lake is located in south-central Minnesota in Carver County. The TMDL addresses Aquatic Recreation Use impairments due to excess nutrients (total phosphorus).

The TMDL meets 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 one (1) TMDL for total phosphorus. 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 this TMDL 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,

A handwritten signature in black ink, appearing to read "Tinka G. Hyde".

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Chris Zadak, MPCA
Jeff Risberg, MPCA

TMDL: Benton Lake (ID #10-0069), Total Phosphorus, Carver County, MN

Date:

**DECISION DOCUMENT
FOR BENTON LAKE, MINNESOTA TOTAL PHOSPHORUS 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 National Pollutant Discharge Elimination System (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 (chl-a) and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

A. Location and description: The Minnesota Pollution Control Agency (MPCA) has developed a TMDL for Benton Lake (DNR ID#10-0069) located in Carver County in south-central Minnesota. The Benton Lake subwatershed is a 2,194 acre area within the 55,076 acre Carver Creek Watershed. Benton Lake discharges to Carver Creek which ultimately discharges to the Minnesota River (Executive Summary of the TMDL). The Benton Lake subwatershed includes 436 acres of direct drainage to the lake, and 1,757 acre upstream watershed that drains to Meuwissen Lake and into Benton Lake through inlet ‘B2’ (Section 2.1 of the TMDL).

Land uses in the Benton Lake and Carver Creek watersheds are predominantly agriculture, development, wetlands, and natural land areas (Figure 2.3. of the TMDL). The City of Cologne surrounds Benton Lake and comprises about a third of the land in the direct drainage area. The population of Cologne was estimated at 1,519 by the U.S. census in 2010 and is not currently within an urban land area as defined by the Census Bureau (Section 2.1, Section 2.2, and Section 6.2.2.1 of the TMDL). Homes in the direct drainage area are connected to the public sewer system of the City of Cologne, while approximately 30 homes near Meuwissen Lake are serviced by septic systems (Section 2.1 and Section 2.2 of the TMDL).

Table 1. Benton Lake (#10-0069) characteristics (Table 2.2 in the TMDL).

Lake Characteristics	
Surface Area (ac)	49
Average Depth (ft)	2 (est.)
Maximum Depth (ft)	7 (est.)
Volume (ac-ft)	95
Residence Time (days)	40 – 73
Littoral Area (%)	100
Direct Watershed (excluding lake)(ac)	436

In 2003 the Minnesota Department of Natural Resources (MDNR) found a high population of black bullhead and carp in the lake. Winter fish kills have been observed during ice-cover and are likely due to high sediment oxygen demand (Section 2.3 of the TMDL). According to studies by Carver County in 2005, most of the lake bottom was unconsolidated mud with sparse aquatic vegetation. Yet, approximately 94% of the shoreline was vegetated with cattails and some sago pondweed (Section 2.4 and Section 2.5 of the TMDL).

B. Problem Identification: Carver County monitored Benton Lake following techniques used by the Citizens Assisted Monitoring Program (CAMP). From April to October, in-lake total

phosphorus, chl-a, Secchi disc depth, and total Kjeldahl Nitrogen (TKN) were sampled bi-weekly. Mean total phosphorus levels were four times greater than the North Central Hardwood Forest (NCHF) criteria, indicating that Benton Lake was hypereutrophic. Furthermore, user perception surveys and nuisance algal blooms indicated the lake was unsuitable for swimming (Section 3.2 and Table 3.1 of the TMDL).

C. Pollutant of Concern: Total phosphorus is the pollutant of concern for Benton Lake (Section 1.0 of the TMDL). While total phosphorus is an essential nutrient for aquatic life, elevated phosphorus levels can lead to nuisance algal blooms that negatively impact aquatic life and recreation. When algae decomposes it depletes the necessary oxygen levels for aquatic life. Also excess algae can limit aquatic vegetation establishment which, if present, helps stabilize bottom sediments and provides habitat for aquatic life. Excess algae and low clarity limit grazing and feeding ability for sight-feeding organisms (i.e. zooplankton, and some fish species) (Section 1.3 and Section 6.1.3 of the TMDL).

D. Priority Ranking: The priority ranking of Minnesota waterbodies is implicit in MPCA's schedule to complete TMDLs. MPCA prioritized Benton Lake TMDL to begin in 2005 and be completed by 2010. Minnesota prioritizes project start and completion dates based on the impacts to public health and aquatic life, the likelihood that a TMDL can be completed expediently, data availability, and technical capacity and local willingness to develop a TMDL (Section 1.2 of the TMDL).

E. Source Identification (point and nonpoint sources):

i. Point sources- The City of Cologne has an individual NPDES permitted wastewater treatment plant (WWTP) (MPCA permit number MN0023108) that discharges 0.2 miles upstream of Benton Lake to a ditch between Meuwissen and Benton Lake. The current permitted daily load for total phosphorus is 1.2 kg/day or 438 kg/yr. Annual and daily total phosphorus loads are below the current permit limit (Table 4.1, Section 4.2 of the TMDL).

MPCA did not identify Municipal Separate Storm Sewer System (MS4) discharges to Benton Lake or in its subwatershed. MPCA indicated that the project area was not within a U.S. Census Bureau defined urban area. If the area is later defined as an urban area and thus subject to an NPDES MS4 permit, a portion of the load allocation set forth in the TMDL would be transferred to wasteload allocation (Section 6.2.2.1 of the TMDL).

MPCA did not identify any current construction and industrial stormwater permitted discharges (NPDES general permit no. MNR100001). There were no Concentrated Animal Feeding Operations (CAFOs) or known illicit septic discharges (i.e., 'straight pipe') in the Benton Lake watershed (Section 2.2 and Section 4.3 of the TMDL).

ii. Nonpoint sources- Nonpoint loads to Benton Lake include internal loading, atmospheric deposition, runoff from developed areas, agricultural runoff, failing septic systems in the indirect watershed, and wetlands (Section 3.2 and Section 4.3 of the TMDL). Model calculations and water quality monitoring results suggest that internal loading is a dominant source of total phosphorus. Internal loading occurs in shallow lakes from mixing events and carp activity that re-suspend sediments back into the water column, as well as phosphorus releases from sediments

during anoxic conditions (Section 3.2 and Section 4.3.1 of the TMDL). There are 30 septic systems in the indirect watershed, but none in the direct drainage to Benton Lake. While MPCA did not explicitly measure total phosphorus loads from septic systems and wetlands that exist upstream in the indirect watershed, contributions from those sources drain to Meuwissen Lake and then to Benton Lake through the B2 inlet and therefore phosphorus monitoring data in B2 inlet represent these upstream sources (Section 2.2 and Section 4.3.4 of the TMDL).

F. Future Growth: By 2020, comprehensive plans, as cited by MPCA in the TMDL, indicate that developed areas are expected to increase from 38 to 60% in the Benton Lake direct watershed, while little growth is expected in the Meuwissen Lake indirect watershed. No explicit allocation was set aside for future growth, with the exception of a small amount of WLA assigned to general stormwater permits. Future sources will have to comply with the existing allocations set in the TMDL (Section 2.2 and 6.1.4 of the TMDL).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the first criterion.

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

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

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

Comment:

A. Designated Uses: Minnesota Rule Chapter 7050 designates uses for waters of the state. Benton Lake is designated as Class 2B waters for aquatic recreation use (Section 1.2 of the TMDL). 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.”

B. Criteria:

i. Narrative Criteria- Minnesota Rule 7050.0150 (3) contains the 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.”

ii. Numeric criteria- The eutrophication standards applicable to Benton Lake are for a Class 2B shallow lake in the NCHF ecoregion and are contained in Minnesota Rule 7050.0222 and listed in Table 2 in this document (Section 1.3 in the TMDL).

Table 2. Numeric Water Quality Standards applicable to Benton Lake (#10-0069)

Class 2B eutrophication standards for shallow lakes in the NCHF ecoregion	
Total Phosphorus	60 µg/L
Chlorophyll-a	20 µg/L
Secchi disc depth	not less than 1.0 m

C. Target: MPCA selected 60 µg/L total phosphorus as the TMDL target (Section 3.5.2 of the TMDL). MPCA’s lake eutrophication criteria were developed with regression relationships between total phosphorus and the response variables chl-a and Secchi disc depth. The regressions were based on data from both deep and shallow Minnesota lakes across different ecoregions. Based on these relationships used to derive MPCA’s eutrophication criteria, a TMDL set to meet total phosphorus of 60 µg/L is predicted to attain chl-a, and Secchi disc depth criteria of 20 µg/L and 1.0 m, respectively (Section 1.2 of the TMDL).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the second criterion.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment: In equation form, the TMDL for Benton Lake may be expressed as follows:

$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS};$$

Where the WLA is the allowable discharge given to point sources in the TMDLs, Load Allocation (LA) represents allowable loads from nonpoint sources, and Margin of Safety (MOS) represents implicit assumptions that account for uncertainty inherent in the TMDL. Current estimated loads, TMDL allocations, and reductions required to meet the TMDL are summarized in Table 3 in this decision document (Table 5.11 and Table 6.1 of the TMDL).

Table 3. Current load estimates, TMDL allocations, and the percent reductions required from phosphorus sources to Benton Lake.

Source	Current Conditions		TMDL	
	Current Load kg/yr	Current Load %	LA or WLA kg/yr (kg/day)	Percent reduction
LA: Meuwissen Lake subwatershed	334	53	68.8 (0.19)	79
LA: Benton Lake subwatershed	47	7	11 (0.03)	76
LA: Atmospheric Deposition	4	0.6	4 (0.011)	0
LA: Internal	237	37	7.1 (0.02)	97
WLA: Cologne WWTP (MN0023108)	13	2	46.4 (0.13)	0
WLA: General NPDES construction (MNR100001) and industrial stormwater permits (MNR050000 and MNG490000)	N/A	N/A	0.01(0.00003)	N/A
Total	635	100	137.3 (0.38)	78

A. Modeling Summary:

The TMDLs were determined in a multi-step process. First, current phosphorus loads to the lake were estimated from watershed runoff, groundwater, atmospheric, and internal loads using monitoring data, and the Reckhow-Simpson and BATHTUB models. Second, the TMDL was determined by reducing the loads in the BATHTUB model until the model predicted conditions that could exist and the lake would meet water quality standards. Finally, the reductions required to meet standards were determined as the difference between current loading and the loading capacity, and phosphorus loads were allocated to the various sources.

The TMDL was based on runoff estimates and point source inputs during 2001 and 2005. MPCA examined runoff estimates and point source data from a longer time period and found that these years represented average annual rainfall and point source loads (Table 4.3 and Table 5.3 in the TMDL).

a. Current Load estimates-

i. Watershed runoff: Watershed loads from the upstream Meuwissen Lake subwatershed were estimated at 654 kg/year in 2005 and 334 kg/yr in 2001. These estimates were derived from monitoring data and model estimates respectively. The 2005 estimate was derived from seven sampling events at the B2 inlet (i.e., Meuwissen outflow to Benton Lake) collected by Metropolitan Council Environmental Services (MCES) from April to October. The 2001 estimate was modeled with Reckhow-Simpson export coefficients and watershed runoff estimates completed by the Rational Method (Section 5.3 and Section A.1 of the TMDL).

Watershed loads in runoff from direct drainage area to Benton Lake were estimated at 47 kg/year (Table 5.11 of the TMDL). The direct drainage area was an unmonitored area and thus loads were modeled, also with the Reckhow-Simpson and Rational Method (Section 5.3 of the TMDL).

The Reckhow-Simpson model is a set of thoroughly researched phosphorus export coefficients based on land use. MPCA selected coefficients to best represent land uses surrounding Benton Lake. The rational method is a common watershed runoff estimation tool that assumes different runoff given land uses and topography characteristics (Section 5.3.1 and 5.3.2 of the TMDL). Monitored runoff data were collected by MCES in the larger Carver Creek watershed from 1998 to 2005 and were used to compare with modeled estimates. MPCA found that monitored and modeled estimates of runoff were within 15-20% of each other in 2001 and 2005.

ii. Internal load: BATHTUB was used to back-calculate internal loading. In-lake phosphorus concentrations estimated by BATHTUB should approximate monitored data if the model is accounting for all sources and is otherwise accurate. Thus, MPCA ran an initial BATHTUB model with no internal load included and compared the results to monitored data. MPCA iteratively added internal load to BATHTUB until the model predicted phosphorus concentrations within 10% of monitored concentrations and this estimated the current internal load. Internal loads were estimated between 2.3 and 3.23 mg/m²/day, which were converted to a current annual load of 237 kg/yr (Section 5.4.1 and Table 5.11 of the TMDL). By comparison to another shallow NCHF lake, MPCA estimated internal loading at McMahon Lake in Scott

County, MN to be 132 to 226 kg/yr in years with similar rainfall (Cedar and McMahon Lake, MN Final TMDL).

The back-calculation approach may introduce some uncertainty into the TMDL. However, MPCA indicated that the internal loading mechanisms in Benton Lake are due to re-suspension of the lake bottom sediments from lack of vegetation and rough fish activity. These mechanisms are more dynamic and harder to quantify as compared to internal loading due to anoxia. Thus using BATHTUB to back-calculate an internal load in Benton Lake provides a reasonable estimate based on the available data (Section 2.3 and 5.3.3 of the TMDL).

iii. Atmospheric load: MPCA assumed the atmospheric deposition rate was 20 mg/m²/yr based on communication with MPCA staff and available literature. This rate was converted to an annual load of 4 kg/yr and was input to the BATHTUB model (Section 5.4.2 and Table 5.11 of the TMDL).

iv. WWTP: Loads from the Cologne WWTP were calculated from mean flow and concentrations observed from 2000 to 2006, as reported to MPCA in discharge monitoring reports (DMR) for the facility. During 2000 to 2006 the annual phosphorus load ranged from 4.1 to 50 kg/yr and the average load was 30.3 kg/year. The TMDL was based on DMR data from 2005, which had an annual load of 31 kg/yr, which is similar to the average observed from 2000 to 2006 and well below the current permitted load of 438 kg/yr (Section 5.4.4, Table 4.1, and Table 5.11 of the TMDL).

b. Estimating Benton Lake response to phosphorus loads-

MPCA used BATHTUB to identify the link between source loads and water quality, then used the model to determine the load capacity. BATHTUB predicts current total phosphorus concentration using a mass-balance equation informed by lake size, residence time, sediment settling rates, and phosphorus inputs to the lake (e.g., runoff from SWAT, atmospheric, etc.). MPCA selected the Canfield-Bachmann mass-balance equation in BATHTUB, which uses data from Minnesota lakes. The Canfield-Bachmann equation improves model accuracy as these data are more geographically relevant to Benton Lake than the defaults in BATHTUB. The difference between modeled and observed in-lake phosphorus concentration represents unaccounted loads (e.g., internal load) and implicit model error.

MPCA input the current load estimates (e.g., internal load, Meuwissen Lake, etc) into the BATHTUB model and iteratively reduced loads until the model predicted that the in-lake total phosphorus concentration met the 60 µg/L target. By this approach, MPCA estimated an annual loading capacity of 137.3 kg/ year, which was divided by 365 to convert to 0.38 kg/day (Section 6.2 and 6.3 of the TMDL).

B. Critical Conditions: MPCA determined that critical conditions occurred during the growing season (June to September). MPCA identifies the growing season as the critical condition due to reduced inflow and flushing rates that cause nutrients to accumulate. Accumulated nutrients coupled with warmer temperatures enhance algal growth and impacts to aquatic life (Section 6.1.2 of the TMDL). Among the two years observed for the TMDL study 2001 and 2005

reflected these growing season conditions. Total phosphorus measurements taken in Benton Lake in the growing season ranged from approximately 100 to 350 µg/l (Section 5.3 of the TMDL).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the third criterion.

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: Reductions are needed from Benton Lake and Meuwissen Lake watershed runoff and internal loading. No reductions were assigned to atmospheric loading or to the Cologne WWTP. MPCA cannot control the former, and the WWTP is estimated to contribute only 2% of the current load. A majority of the load to the lake is from Meuwissen Lake indirect watershed and internal loading. The largest reductions are sought from internal loading followed by watershed runoff. MPCA examined scenarios to reduce reliance on internal load reductions but found that disproportionate reductions from other sources would be required. Specifically, if internal load reductions were decreased to 94% from 97%, the corresponding reductions needed from the watershed increased to 94% from 76-79% (Section 5.3 and 6.0 of the TMDL, Appendix Item No. 6-4). Table 3 in this decision document lists the load allocations and reductions needed from nonpoint sources to meet the TMDL.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the fourth criterion.

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: A WLA for total phosphorus was given to the Cologne WWTP and to general NPDES construction and industrial permits (Section 6.2.2.2 of the TMDL).

- Cologne WWTP (MN0023108) WLA = 0.13 kg/day
- General NPDES construction (MNR100001) and industrial stormwater permits (MNR050000 and MNG490000) WLA = 0.00003 kg/day

The WLA to Cologne WWTP was assigned as the remaining load capacity after the allocations to nonpoint sources were assigned. According to available data, phosphorus loads are below the allocation and do not need to be reduced to meet the WLA. Based on the assumption that 0.1% of the watershed land area may be subject to construction and industrial activity, the WLA for general stormwater for construction and industrial sources was calculated as 0.1% of the loading capacity. MPCA states there are no MS4s in the watershed. If areas become applicable for MS4 permit coverage in the future, a WLA will be assigned in proportion to the spatial extent of the MS4 area (Section 6.1 and Section 6.2 of the TMDL).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the fifth criterion.

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: MPCA states an implicit margin of safety is provided through conservative assumptions. Modeled and observed in-lake total phosphorus concentrations were calibrated to be within 10% of each other. Model estimates of runoff concentrations were corroborated with field data and were within 15-20% of observed runoff data (Table 5.3 of the TMDL). MPCA states that uncertainty is mitigated because the BATHTUB model estimates water quality based on a turbid water state, which does not consider the increased clarity and sedimentation rates that would occur from increased zooplankton grazing. Thus MPCA indicates that the allocated loads are greater than needed in order to obtain the 60 µg/L total phosphorus target and to achieve its

clear water state (Section 6.1.3 of the TMDL). Also, according to effluent data used in this study, the Cologne WWTP discharges well below its allocation, providing a margin of safety that the WLA for the WWTP facility will be met (Section 5.4 of the TMDL).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the sixth criterion.

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: Phosphorus loads can vary by season, and the source loads vary with precipitation. For example in a dry year with little precipitation, less flushing of lake volume concentrates nutrients, and increases stratification, which are conditions that support internal loading from anoxic bottom sediments. By contrast, in a wet precipitation year, water and nutrients in shallow lakes can be flushed through at a greater rate, which limits nutrient accumulation and algal growth.

Seasonal variation was accounted for in the Benton Lake TMDL calculations by monitoring runoff from April to October in 2005. The MCES monitoring data captured high total phosphorus values during April due to spring runoff conditions in 2005. In the same year, bi-weekly sampling of in-lake total phosphorus, chl-a, and Secchi depth captured a range of concentrations. For example, the approximate range of total phosphorus in 2005 was 100 to 350 µg/L (Section 3.2 and Figure 3.3 of the TMDL).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the seventh criterion.

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:

A. Clean Water 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 to jointly use 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 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).

B. Point Sources: Reasonable assurance that the WLAs will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA implements its storm water and NPDES permit programs, and is responsible for making the effluent limits consistent with the WLAs in this TMDL.

C. Nonpoint Sources: The Benton Lake TMDL was one of several TMDLs recently developed by Carver County Land and Water Services, in coordination with local agencies and MPCA, to address nutrient and turbidity issues in the Carver County Watershed. The TMDL studies were completed as part of a 319(h) grant (CFMS Contract No. 85727) and address several lakes (e.g. Goose, Hyde, Winkler, and Miller) and Carver Creek. Since 1999, Benton Lake has been a high priority for volunteer and county monitoring, and these data informed the TMDL process. A technical advisory committee that is comprised of representatives from the county board, SWCD agencies, citizens, and municipalities was informed since the beginning of the TMDL study in 2004 and throughout the project. The above demonstrates that local agencies have capacity and

are willing to address nutrient issues in the watershed (Section 7.2 of the TMDL, Administrative Record No. 7).

MPCA identified the following implementing agencies: Carver County Watershed Management Organization (WMO), Carver County Soil and Water Conservation District (SWCD), Carver County Land and Water Services Division, and Carver County Extension. The roles among these agencies include outreach, BMP implementation, and administration. The Carver County WMO administers a 2010-2020 Watershed Management Plan (WMP) that identifies actions to address issues described in the TMDL, providing assurance that the TMDL goals align with those of local implementing agencies. Some of these goals include urban stormwater management, wetland management, and agricultural practices. Also, regulatory processes exist to help reduce impacts from urban and agricultural land uses. The Carver County Code Section 153 contains rules for stormwater management and infiltration standards that provide assurance loads from urban runoff to Benton Lake may be reduced. Feedlot ordinances adopted by Carver County in 1996 may be used to reduce nutrient loads from agricultural runoff (Section 9.3 of the TMDL).

The Carver County Board of Commissioners acts as water management authority within Carver County and established the Carver County Water Resource Management Area (CCWRMA) to fulfill Minnesota statutory responsibilities related to water resources. The CCWRMA is a taxing district which established a stable source of funding through a watershed levy in 2001. The funds can be used to fund staff, monitoring, and implementation project costs. The Carver County SWCD administers incentive programs that can be used to implement watershed practices. These include state cost-share programs, conservation grants, easement services grants, and low interest loans for addressing nutrient runoff and upgrading septic systems (Section 9.3 and 9.4 of the TMDL).

The 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: Carver County will continue monitoring water quality in Benton Lake on a bi-weekly basis from April to October, as outlined in the Carver County WMP. The results can assess changes in water quality before and after TMDL implementation and may be used to assess TMDL effectiveness. In addition, Carver County will monitor BMPs that are implemented, which can be used to track which practices may be associated with water quality

improvements. MPCA suggests other monitoring that would improve local area knowledge about sources impacting water quality (Section 10 of the TMDL).

The 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: In accordance with MPCA policy, an implementation plan will be completed within one year of TMDL approval. MPCA identified Carver County as the primary implementing agency to address the TMDL. The Carver County Watershed Management Plan identifies high priorities that, if addressed, would also reduce nutrient loads to Benton Lake. Examples include addressing septic systems, feedlots, and stormwater management (Section 8.2 of the TMDL).

The MCES completed a Soil and Water Assessment Tool (SWAT) model for the larger Carver County Watershed as part of a 319(h) funded grant to complete nutrient and turbidity TMDLs throughout the Carver County watershed. The SWAT model can further specify distribution and relative loads of phosphorus to target implementation (Section 8.4 of the TMDL).

MPCA outlined best management practices (BMPs) to address phosphorus sources in the TMDL. Total estimated implementation costs ranged from \$550,000 to \$1,475,000. MPCA categorized BMPs in the TMDL by sources they address. MPCA further specified the costs by BMP type. Example BMPs provided include: eliminate and repair failing septic systems, implement cropland BMPs specifically near Meuwissen Lake, and use drawdown to manage aquatic plants and rough fish (Section 8.6 of the TMDL).

The 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: MPCA's public participation process included stakeholder meetings with local residents, farmers, and relevant agencies. A public open house was held January 22, 2008 to discuss Benton Lake's history and lake water quality. Members of the public expressed their concerns about the lake at this meeting and also through a mail survey (Section 7.3 of the TMDL).

The TMDL was posted for public comment from February 25 to March 27, 2013. The public comment period was published in the Minnesota State Register on February 25, 2013, and announced in a MPCA news release. Electronic copies of the draft TMDL were published on the MPCA website along with a notification of the public comment period (Section 7.0 of the TMDL and Administrative Record No. 6-4 through 6-7).

MPCA received one comment letter from Minnesota Agricultural Water Resource Center (MAWRC) dated March 26, 2013. The MAWRC commented that the source assessment did not clearly prioritize sources within the watershed. The letter also questioned the realistic nature of the internal load targets, and expressed support for adaptive management where pollutant sources are not a certainty. The MPCA responded to MAWRC to address and clarify their concerns either directly in the letter, or within the TMDL document. Specifically, MPCA demonstrated that internal loading is a high percent of the current phosphorus budget and although reductions needed from this source are high, decreasing the reduction, even by a small amount, would have required a disproportionately larger reduction from the watershed (Administrative Record No. 6-4).

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of 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: On April 22, 2013, EPA received a submittal letter dated April 18, 2013 signed by Rebecca J. Flood, MPCA Assistant Commissioner, addressed to Tinka Hyde, EPA Region 5, Water Division Director. The submittal letter identified the waterbody for which the TMDL was developed. The location of the waterbody was provided in the supporting documentation. The letter explicitly states that the Benton Lake TMDL was being submitted for final approval by EPA under Section 303(d) of the Clean Water Act.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the US EPA finds that the Benton Lake TMDL (ID#10-0069) for excess nutrients (total phosphorus) meets all of the required elements of an approvable TMDL. This decision document addresses one **(1) TMDL** for Benton Lake as identified on Minnesota's 2002 303(d) list.

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.