



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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CHICAGO, IL 60604-3590

OCT 26 2010

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Mr. Eger:

The U.S. Environmental Protection Agency (EPA) has conducted a complete review of the final Total Maximum Daily Load (TMDL) for Lake Margaret (ID 11-0222), including support documentation and follow up information. Lake Margaret is located in central Minnesota in Cass County. The TMDL addresses the Aquatic Recreation Use impairment due to excessive nutrients.

EPA has determined that the Lake Margaret TMDL meets the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's phosphorus TMDL, addressing excess nutrients. 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 efforts 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,


Tinka G. Hyde
Director, Water Division

Enclosure

cc: Dave Johnson, MPCA
Greg VanEckhout, MPCA

wq-iw8-11g

TMDL: Lake Margaret, Cass County, Minnesota
Date: October 26, 2010

DECISION DOCUMENT
LAKE MARGARET PHOSPHORUS TMDL, CASS COUNTY, MN

Section 303(d) of the Clean Water Act (CWA) and U.S. 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 U.S. EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and U.S. 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 U.S. 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 U.S. 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 non-point 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 non-point sources, the TMDL should include a description of the natural background. This information is necessary for U.S. 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.

Comments:

Location Description/Spatial Extent:

Lake Margaret (DNR # 11-0222-00) is a 242-acre lake located near the City of Lake Shore, in Cass County, Minnesota. Lake Margaret lies within the Upper Mississippi River basin (see Figure 3.1, page 3-2 of the final TMDL submitted report) and is used by the public for boating, fishing, swimming and other recreational activities. Lake Margaret is located within the boundaries of the Northern Lakes and Forests (NLF) ecoregion.

Lake Margaret was originally listed on the 2006 Minnesota 303(d) list for excessive nutrients (phosphorus). Excess nutrients can lead to frequent algal overgrowth in lakes and hinder aquatic recreation activities. The Lake Margaret TMDL had a target start date of 2008 and was projected to be completed by 2015. It is currently on the draft 2010 303(d) list for excessive nutrients and impaired aquatic recreation use. This TMDL addresses the aquatic recreation use impairment.

Land Use:

The Lake Margaret watershed (approximately 45,206 acres) is a rural forested and agricultural watershed. Land use in the Lake Margaret watershed is composed of: forested/woodlands areas (59% of the land area), wetland areas (25% of the land area), agricultural areas and pastures (13% of the land area), and other smaller land use areas (ex. developed land, shrub land, etc.) (see Table 3.2, page 3-5 of the final TMDL report). There are seven feed lots in the Lake Margaret watershed associated with agricultural/pasture land use areas. None of the feed lots are large enough to be considered as a Concentrated Animal Feeding Operation (CAFO).

The City of Lake Shore lies just to the east of Lake Margaret and occupies approximately seven percent (approximately 3,164 acres) of the total area within the Lake Margaret watershed. The City of Lake Shore is on an isthmus between Lake Margaret (to the west of the city) and Gull Lake (to the east of the city). Land use within the City of Lake Shore is primarily deciduous forest with rural residential homes, mainly on the shores of Gull Lake and Lake Margaret. Only 1.8 % of the land use in the Lake Margaret watershed is classified as developed (see Table 3.2, page 3-5 of the final TMDL report).

Problem Identification:

Lake Margaret was originally listed on the 2006 Minnesota 303(d) list for excessive nutrients (phosphorus). Excess nutrients can lead to frequent algal overgrowth in lakes and hinder aquatic recreation activities (swimming, fishing, etc.).

Priority Ranking:

The Lake Margaret watershed was given a priority ranking by MPCA for TMDL development based upon a variety of factors. Minnesota's priority rankings for TMDL waters are reflected by the target dates for start and completion of TMDL studies.

Pollutant of Concern:

The pollutant of concern is phosphorus.

Source Identification (point and nonpoint sources):

Point Source Identification: The potential point sources to Lake Margaret as identified by the Minnesota Pollution Control Agency (MPCA) are:

Construction activities - Stormwater activities covered under Minnesota state construction general permit (permit #MNR040000).

Nonpoint Source Identification: The potential nonpoint sources to Lake Margaret as identified by MPCA are:

Agricultural runoff – Runoff from agricultural lands can contain significant amounts of phosphorus, either as dissolved phosphorus or attached to soil particles. Animal manure contains significant amounts of phosphorus, and is often spread on fields as fertilizer. Run-off from these fields can add large amounts of phosphorus to a water body, and can be exacerbated by tile drainage lines which channelize the flow to surface water bodies. Phosphorus can also attach to soil particles and as the soil is washed into streams, the phosphorus can enter the water column.

Small livestock operations - Smaller animal facilities may add phosphorus to surface waters via wastewater from the facilities, run-off from near-stream pastures and manure spreading onto fields, and from livestock with access to stream environments.

Urban runoff – Urban stormwater can contain phosphorus from construction activities (eroded soils), pet wastes, and organic material (leaves, grass clippings) that can wash into the lake.

Runoff from forested areas – Forested areas can contribute nutrient loads to surface water bodies. Sediment erosion, exacerbated by changes in land use within the forest ecosystem, can mobilize nutrients. During storm events, these nutrients can be transported to surface waters by runoff.

Septic systems - Septic systems do not discharge directly into a waterbody, but their effluents can leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Failing septic systems are a potential source of phosphorus in the watershed.

Atmospheric deposition – The addition of phosphorus from particulates in the atmosphere. Phosphorus can be bound to these particles which are deposited directly to the lake surface as they settle out of the atmosphere.

Internal sources – The release of phosphorus from sediment, macrophytes and/or benthic fish may enter the water column and increase the phosphorus load in the lake. Phosphorus accumulates near the lake bottom sediment and can be resuspended into the water column when the thermocline decreases and deeper lake water mixes with surface water.

Future Growth:

MPCA did not provide information regarding future growth in the Lake Margaret watershed. Therefore, the MPCA did not assign any portion of the loading capacity for future growth in the watershed.

U.S. 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)). U.S. 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.

Comments:

Designated Uses:

The designated uses for Lake Margaret are for aquatic recreation (swimming, fishing, canoeing/kayaking, etc.). Lake Margaret is designated as a Class 2B water (MN Rule 7050.0222 Subpart 4, Class 2B). The quality of Class 2B waters, relative to aquatic life and recreation, “*shall be as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable.*”

Standards/Water Quality Targets:

The goal for the Lake Margaret TMDL is to achieve the total phosphorus (TP) criteria and either the chlorophyll-a (chl-a) or Secchi Disc (SD) depth criteria. The TP, chl-a and SD numeric targets for the Lake Margaret TMDL were based on the NLF ecoregion eutrophication standards. According to Minnesota Rules 7050.0222, the eutrophication standards for class 2B lakes, shallow lakes, and reservoirs in NLF ecoregion are:

- Total phosphorus ($\mu\text{g/L}$) = 30 $\mu\text{g/L}$
- Chlorophyll-a ($\mu\text{g/L}$) = less than 9 $\mu\text{g/L}$
- Secchi disk transparency (m) = not less than 2.0 m

The phosphorus target is calculated as an average phosphorus concentration (30 $\mu\text{g/L}$) over the summer season (June 1 through September 30) as the primary criteria, and the Secchi disc transparency (2.0 m) as the secondary target.

U.S. 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. U.S. 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. U.S. 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 non-point source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate non-point source loadings, e.g., meteorological conditions and land use distribution.

Comments:

Formulation of the wasteload allocation (WLA) and the load allocation (LA) required a historical review of phosphorus, chlorophyll-a and Secchi disc transparency data. Water quality in Lake

Margaret has been periodically monitored over the past 15 years. The most intensive monitoring in Lake Margaret occurred from 1996-1999. During this period, TP, chl-a and SD transparency data were collected during the summer months. The TP, chl-a and SD transparency all exceeded the NLF eutrophication standards over this time period.

Phosphorus loading estimates were developed by MPCA from the 1997, 1998, and 1999 water quality data sets. The loading estimates were used to summarize the sources of nutrients to the southern and northern basin of Lake Margaret. The estimates were developed separately because the MPCA determined that the southern and northern basins respond differently to nutrient loading inputs. The MPCA concluded that the nutrient loading to the southern basin of Lake Margaret was dominated by watershed runoff (approximately 88% of the total phosphorus load), while internal loading (11% of the total phosphorus load), and atmospheric loading (0.4% of the total phosphorus load) comprised other sources of phosphorus to the southern basin of Lake Margaret (Table 4.7, page 4-9 of the final TMDL report). Loading to the northern basin of Lake Margaret was dominated by loading from the south basin (approximately 74% of the total phosphorus load), internal loading (20% of the total phosphorus load), watershed runoff from the area draining to the northern basin (approximately 5.0%), and atmospheric loading (0.7%). The phosphorus loading information for the northern basin of Lake Margaret can be found in Table 4.8, page 4-9 of the final TMDL report.

A series of models (FLUX, SWAT, and BATHTUB) were used to determine the final target phosphorus load reductions. FLUX is a model that allows estimation of tributary mass discharges (loadings) from sample concentration data and continuous flow records. The Soil Water Assessment Tool (SWAT) model is a watershed model that is partially physically-based and partially empirically-based. The SWAT model simulates the hydrologic cycle within the modeled watershed accounting for: precipitation, overland runoff, infiltration, percolation through one or more soil layers, evaporation, plant transpiration, interaction with the shallow aquifer, and water loss to a deep aquifer. BATHUB is a model that performs steady-state water and nutrient balance calculations in a spatially segmented hydraulic network. BATHTUB accounts for advective and diffusive transport and nutrient sedimentation within the hydraulic network.

In the development of the Lake Margaret TMDL, atmospheric inputs from wet and dry deposition were estimated using rates set forth in the MPCA report (Section 4.2, page 4-2 of final TMDL report). The atmospheric load (pounds/year) of phosphorus for Lake Margaret was calculated by multiplying the lake area (acres) by the atmospheric deposition rate (pounds/acre-year).

Flow and water quality data were collected by the MPCA at five monitoring locations within the Lake Margaret watershed (Figure 3.4, page 3-7 and Appendix C of final TMDL report). These measurements were used to estimate nutrient loading values to the Lake Margaret basin. FLUX modeling efforts were applied to the data collected from the Home Brook (Site #1 on Figure 3.4, page 3-7) because the Home Brook site contained the most complete data set and encompassed more than 80% of the watershed (Figure 4.1, page 4-2 and Table 4.2, page 4-3 of final TMDL report).

A unit runoff estimate was developed for the area contributing to the Home Brook site in order to develop an estimate of the total watershed loading to Lake Margaret. The unit runoff for the Home Brook site was then applied to the entire watershed to develop an annual runoff estimate. The runoff estimate was multiplied by the flow weighted average total phosphorus concentration to calculate the total watershed nutrient loads.

A Unit Area Load (UAL) approach was employed to estimate phosphorus loading from various sources within the watershed. The SWAT interface was used to develop Hydrologic Response Units (HRU) in the watershed. HRUs are individual land area units with a unique land cover (based on land use, soil, and slope). The SWAT interface combined soil types from the county soil survey (STATSGO), slope (30 meter resolution Digital Elevation Model), and land use into the calculation of the HRUs. Soil erodibility and saturated infiltration were used to develop a soil delivery potential.

A BATHTUB lake response model was developed using the nutrient budget presented in Section 4 (page 4-1) of the final TMDL report. Data from 1997, 1998, and 1999 were modeled to validate the assumptions of the model. The Canfield-Bachmann natural lake model was chosen by the MPCA as the appropriate phosphorus model. The chlorophyll-a response modeling efforts were run through “*model 1*” from the BATHTUB package. Model 1 incorporated nitrogen, phosphorus, light, and flushing rate data into its computation of chlorophyll-a response. Secchi depth was predicted in BATHTUB by employing the “*VS. CHLA & TURBIDITY*” equation. Model coefficients were adjusted during the calibration process.

The critical environmental conditions for the phosphorus impairments in Lake Margaret correspond to the summer period (June 1 to September 30), when observed phosphorus concentrations in the lake are highest. Surface runoff, during the summer months, can contain nutrients which are transported into the lake during rain events. Nutrients can also be mobilized internally via in-lake processes (ex. aquatic plant senescence or turnover of phosphorus-rich bottom sediments or hypolimnetic water during summer mixing events).

The total loading capacity of total phosphorus, determined by MPCA, is included in Tables 1 and 2 below, and Table 6.1 (page 6-2) and Table 6.2 (page 6-3) of the final TMDL report.

Table 1: TMDL TP daily loads divided amongst the major sources for the South Basin of Lake Margaret

Allocation	Sources	Existing TP Load	TP Allocations (WLA & LA)	Load Reduction
		(lbs/day)	(lbs/day)	(lbs/day)
Wasteload Allocation	Construction Stormwater	0.11	0.06	0.05
Load Allocation	Stormwater Runoff	10.93	6.08	4.85
	Registered Animal Units		0.00	
	Septic Systems	1.39	0.14	1.25
	Internal Load	0.05	0.05	0.00
	Atmospheric Load			
	Total Load	12.48	6.33	6.15

Table 2: TMDL TP daily loads divided amongst the major sources for the North Basin of Lake Margaret

Allocation	Sources	Existing TP Load	TP Allocations (WLA & LA)	Load Reduction
		(lbs/day)	(lbs/day)	(lbs/day)
Wasteload Allocation	Construction Stormwater	0.01	0.00	0.00
Load Allocation	Upstream Basin (South Basin)	8.13	5.52	2.61
	Stormwater Runoff	0.53	0.31	0.21
	Registered Animal Units			
	Septic Systems	0.00		
	Internal Load	2.17	0.22	1.96
	Atmospheric Load	0.08	0.08	0.00
	Total Load	10.92	6.14	4.78

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

4. Load Allocations (LAs)

U.S. EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future non-point 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 non-point sources.

Comments:

LA values are included in Tables 1 and 2 of this Decision Document, and Table 6.1 (for the southern basin of Lake Margaret) and Table 6.2 (for the northern basin of Lake Margaret) of the final TMDL report. LA were recognized as originating from: agricultural runoff from pasture and livestock (represented as “Registered Animal Units” in the adjusted Tables and Tables in the final TMDL document), urban stormwater runoff (represented as “Stormwater Runoff”), runoff from failing septic systems (represented as “Septic Systems”), atmospheric deposition (represented as “Atmospheric Load”), and internal nutrient loading from lake bottom sediments (represented as “Internal Load”).

The calculated LA values for stormwater runoff, registered animal units (livestock inputs), septic system inputs, atmospheric inputs, and internal loading inputs were determined from the modeling efforts and the phosphorus target of 30 µg/L. The MPCA determined that a 60% reduction in nutrient contributions from nonpoint sources would meet the required load reductions and attain the phosphorus and Secchi disc transparency targets. Nutrient reductions to the agricultural runoff and urban stormwater runoff components of the LA will comprise the 60% reduction in phosphorus concentration.

Nutrient reductions were attributed solely to the agricultural runoff and urban stormwater sources because the MPCA determined that these sources were the most likely to be reduced given the potential reductions and the efficacy of meeting the required loading reductions. The MPCA set

septic system inputs to '0' in the TMDL calculation because the MPCA concluded that the septic systems would not contribute phosphorus to surface waters in the Lake Margaret watershed. Additionally, the MPCA did not reduce the LA contributions for atmospheric deposition (20 lbs/year) because the MPCA determined that atmospheric deposition was a natural process and could not be reduced.

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

5. Wasteload Allocations (WLAs)

U.S. 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. U.S. 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.

Comments:

The wasteload allocations (WLA) section is found on page 6-1 of the final TMDL document. WLA values are included in Tables 1 and 2 of this Decision Document, and Table 6.1 (for the southern basin of Lake Margaret) and Table 6.2 (for the northern basin of Lake Margaret) of the final TMDL report. Existing point sources contributing to the WLA for the Lake Margaret TMDL include construction stormwater activities covered under Minnesota's construction general permit (permit #MNR040000). This general permit covers construction activities in the northern and southern basins of Lake Margaret.

The WLA for construction activities in the Lake Margaret TMDL was calculated from the average acreage permitted for construction activity. The MPCA averaged construction land use data (area) within the Lake Margaret watershed from the previous five years to aid in the calculation of the WLA attributed to construction activities. The construction area was set at 0.1% of the total area of the Lake Margaret watershed (49 acres). This percentage was then

multiplied by the stormwater load to determine the percentage of the stormwater load attributed to construction stormwater. The MPCA calculated that the southern basin requires a 45% reduction in the WLA (existing TP of 0.11 lbs/day reduced to 0.06 lbs/day). The MPCA calculated that the northern basin requires a 50% reduction in the WLA (existing TP of 0.010 lbs/day reduced to 0.005 lbs/day).

U.S. 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)). U.S. 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.

Comments:

The "Margin of Safety" section 6.1.3 (page 6-2 of the TMDL submittal) outlines how the margin of safety (MOS) was determined. During the development of the Lake Margaret TMDL, the MPCA incorporated an implicit MOS by using the following conservative assumptions:

- Applying sedimentation rates, from the Canfield-Bachmann model, that under predicted the sedimentation rate for shallow lakes. This under prediction ultimately over-predicted the in-lake phosphorus concentrations.
- The rate of zooplankton grazing in shallow lakes was under represented in the Canfield-Bachmann modeling scenario. Zooplankton grazing plays a large role in algal and phosphorus sedimentation rates in shallow lakes. In healthy lake systems, the Canfield-Bachmann equation does not account for the expected higher sedimentation rates due to zooplankton activity.
- The Canfield-Bachmann modeling scenarios, which compared the results between the observed phosphorus data and the modeled phosphorus data, were conservative. The modeling efforts, which utilized the Canfield-Bachmann model, matched data by adjusting the loads without applying calibration factors. The MPCA believes that the sedimentation rates used in the Canfield-Bachmann modeling scenarios were conservatively low for Minnesota lakes systems.

U.S. 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)).

Comments:

The Lake Margaret phosphorus TMDL incorporated seasonal variation in the calculation of the nutrient loads. Annual loads and targets were calculated for the summer period (June 1 to September 30), when the frequency and severity nuisance algal growth was recognized to be the greatest in the Lake Margaret watershed. The TMDL also averaged modeled values across several years to address annual variability in in-lake loading. By setting the TMDL to meet targets established for the most critical period (summer), the TMDL was inherently protective of water quality during the rest of the water year (October 1 to May 30).

U.S. 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 National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with “the assumptions and requirements of any available wasteload allocation” in an approved TMDL.

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

U.S. EPA’s August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by non-point sources. However, U.S. EPA cannot disapprove a TMDL for non-point 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.

Comments:

The Lake Margaret TMDL outlines reasonable assurance activities in Section 9.0 (page 9-1) of the final TMDL document. The reasonable assurance practices will be implemented over the next several years. Water quality monitoring by officials from the City of Lake Shore and the

MPCA will ascertain the success or failure of Best Management Practice (BMP) systems designed to reduce nutrient loading into the Lake Margaret watershed. Watershed managers will have the opportunity to reflect on the progress (positive progress, negative progress, or status quo) and will have the opportunity to change course if the progress is unsatisfactory. A summary of the reasonable assurance activities is provided below.

Cass County Comprehensive Local Water Management Plan (CCCLWMP):

The CCLWMP outlines approaches designed to protect water resources within Cass County. This plan includes strategies for the following water resource related issues: sound management of water resources, monitoring programs that track water quality, use and availability, resource protection strategies, restoration efforts to improve degraded resource areas, and coordination amongst stakeholders to assure long term sustainability. Cass County will incorporate the implementation efforts of the Lake Margaret TMDL into CCCLWMP and monitor the efficiency of BMP strategies and other phosphorus reduction measures.

City of Lake Shore Comprehensive Plan (CLSCP):

The CLSCP was developed to identify policies, objectives and strategies for future land use development decisions in the City of Lake Shore. The CLSCP outlined the communities' values and priorities for future development projects near the Lake Margaret watershed, focusing on the protection of natural resources (i.e. lakes) within the city boundaries. The CLSCP outlines strategies to: protect, enhance and restore the City of Lake Shore's natural resources, protect environmentally sensitive areas, improve surface and groundwater resources, and promote environmental stewardship initiatives. The Lake Margaret TMDL implementation plan will merge with the efforts of the CLSCP.

Lake Margaret Overlay District (LMOD):

The LMOD outlines acceptable standards and practices for development, redevelopment and land use in the Lake Margaret watershed. The LMOD was designed to preserve and improve the quality of water resources within the Lake Margaret basin without preventing reasonable land use and development. The LMOD will protect water quality from poorly sited development projects and or other land disturbance activities that could adversely impact water quality in the Lake Margaret watershed.

Lake Margaret Conservation Association (LMCA):

The LMCA is a local stakeholder group whose duty is to protect and preserve water quality in the Lake Margaret basin. The LMCA is tasked with working with various local, state, and federal agencies to restore the water quality in Lake Margaret to the highest achievable ecological standard. The LMCA uses the following strategies to improve water quality in the Lake Margaret basin: lake restoration public outreach efforts, encourage BMP installation by local property owners, fundraising efforts to generate monetary support for lake restoration programs, and the involvement of the LMCA in the formulation of implementation planning to restore water quality in Lake Margaret.

The U.S. EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

U.S. EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (U.S. EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur. Such a TMDL should provide assurances that non-point 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.

Comments:

Section 9.5 (page 9-4) of the TMDL submittal outlines the planned water quality monitoring efforts in the Lake Margaret watershed. The Lake Margaret TMDL efforts will be monitored by tracking the implementation of BMPs, and through water quality monitoring efforts within Lake Margaret and the surrounding watershed. Appropriate officials from the City of Lake Shore and from Cass County will assess the efficiency of implementation efforts of the Lake Margaret TMDL. BMPs and capital projects will be used in the watershed to reduce nutrient inputs to surface waters.

Water quality monitoring programs will measure whether sufficient progress is being made toward attaining water quality targets for TP, chl-a and SD transparency. The City of Lake Shore will test the water quality in Lake Margaret every three years. Additionally, the MPCA will maintain the water quality monitoring site on Home Brook in order to track nutrient loads and discharges into Lake Margaret.

There is also discussion, in the Implementation section (section 8.0) of the final TMDL document, of periodic biological monitoring efforts conducted by the Minnesota Department of Natural Resources (MN-DNR) in the Lake Margaret watershed. The MPCA suggests that these efforts should be continued, especially after the installation of BMPs and nutrient reduction strategies in the Lake Margaret watershed. Aquatic plant and fish surveys are mentioned on pages 8-4 to 8-5. These surveys would provide biological information to watershed managers and would aid the understanding how BMP efforts are impacting the ecological community in Lake Margaret. The biologic monitoring efforts may eventually be included in the MPCA's Implementation Plan for Lake Margaret.

The U.S. EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comments:

Implementation strategies are outlined in Section 8.0 (pages 8-1 to 8-5) of final TMDL report. The MPCA suggested several BMP strategies to reduce phosphorus inputs to Lake Margaret watershed.

Implementation strategies for nonpoint sources:

- *Feedlot management and pasture management plans:* Manure has been identified as a source of nutrients. Nutrients can be transported to surface water bodies via stormwater and runoff, they can also leach into groundwater resources. Improved strategies in the collection, storage and management of manure can ensure that minimal impacts of nutrients enter the surface and groundwater system. Soil testing can also be utilized to determine the appropriate amount of manure that can be applied to fields within a specific watershed.
- *Riparian area management practices:* Protection of stream and river banks, and lake shorelines within the watershed through the planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will stabilize these areas and reduce the nutrient inputs to the Lake Margaret watershed. Vegetated buffer areas will filter stormwater and runoff before the runoff enters the surface waters of the watershed. Additionally, fencing can be added to the riparian areas to prevent access to livestock.
- *Implementing the LMOD:* The LMOD will promote the protection of surface water resources in the Lake Margaret watershed. The LMOD will protect water quality within the basin from poorly sited development projects or other land disturbance activities that could adversely impact the water quality in the Lake Margaret watershed.
- *Improving nutrient loading from stormwater inputs:* Stormwater derived nutrient inputs will decrease if the following strategies are implemented: increased stormwater infiltration, shoreline rehabilitation and restoration projects (similar to riparian management), and wetland protection and restoration.
- *Septic system inspection and improvements:* Local septic management programs and educational opportunities can aid in the reduction of septic pollution. Educating the public on proper septic maintenance and finding and eliminating nonconforming dischargers will lessen the impact of septic derived nutrient inputs.
- *Internal nutrient loading reductions:* A feasibility study to evaluate different lake management techniques to reduce or eliminate internal loading should be completed. Watershed managers should review the recommendations of the study and implement BMPs to reduce internal phosphorus loads to Lake Margaret.
- *Conduct education and outreach awareness programs:* Conduct local educational programs to inform the public on phosphorus reduction efforts (i.e. proper fertilizer usage, low-impact

lawn care practices, the adoption of responsible property management practices) and discuss the impacts of phosphorus pollution on recreational activities in the Lake Margaret watershed.

- *Biological monitoring efforts:* Conduct aquatic plant and fish surveys within the watershed. If applicable, implement an aquatic vegetation management plan.

Implementation strategies for point sources:

- Construction activities within the Lake Margaret watershed must obtain general permits and properly install and maintain all BMPs required under the permit. The construction activities should not discharge construction stormwater to surface waters and must meet local construction stormwater requirements if they are more restrictive than requirements of the state general permit.

The U.S. EPA finds that this criterion has been adequately addressed. The U.S. EPA reviews but does not approve implementation plans.

11. Public Participation

U.S. 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, U.S. EPA has explained that final TMDLs submitted to U.S. 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 U.S. EPA establishes a TMDL, U.S. EPA regulations require U.S. 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 U.S. EPA determines that a State/Tribe has not provided adequate public participation, U.S. EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by U.S. EPA.

Comments:

A technical advisory committee was established so that interested stakeholders could be involved in decision making process in the development of the Lake Margaret TMDL. The Technical Advisory Committee (TAC) included representatives from: the City of Lake Shore, Minnesota DNR, Cass County, the Lake Margaret Conservation Association, and the MPCA. All TAC meetings were open to interested individuals and organizations. The TAC meetings to review this and other lake TMDLs in the watershed were held on March 26, 2008, July 15, 2008, August 20th, 2008, and August 23, 2008. All TAC meetings were open to the public and advertised through mailings by the City of Lake Shore. Consequently, public input was sought throughout the entire TMDL process. Several of the meetings included presentations designed to: provide an overview of the TMDL formulation process, discuss key assumptions used in the modeling process, and present the results of the analyses.

The Lake Margaret TMDL was placed on public notice from July 19 to August 18, 2010. The public was made aware of the public notice and subsequent TMDL public meetings through local press releases to local media outlets and by letters of invitation to interested parties. Copies of the draft Lake Margaret TMDL Report were available to the public upon request and the document was posted on the MPCA website at <http://www.pca.state.mn.us/water/tmdl>. As part of the final TMDL submittal, the state provided to U.S. EPA copies of the press releases of public notice, the mailing list of interested parties, and copies of the written public comment letters received during public comment period and the state responses to these comments (Enclosure 5 of the TMDL final submittal package). The MPCA received four (4) written public comments during Lake Margaret TMDL public comment period, and all of these comments were adequately addressed by the MPCA.

U.S. 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 U.S. 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 U.S. EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and U.S. 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.

Comments:

A transmittal letter submitting the final TMDL to U.S. EPA was dated September 27, 2010 and received by the Watersheds & Wetlands Branch, Water Division, U.S. EPA, Region 5 on October 4, 2010. The transmittal letter explicitly stated that the final Lake Margaret Total Maximum Daily Load for excess nutrients was being submitted to U.S. EPA pursuant to Section 303(d) of the Clean Water Act for U.S. EPA review and approval. The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on the Minnesota's 303(d) list, and the causes/pollutants of concern.

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

13. Conclusion

After a full and complete review, the U.S. EPA finds that the TMDL for Lake Margaret (Segment ID #11-0222) satisfies the elements of an approvable TMDL. This approval addresses one (1) segment for one (1) pollutant, for a total of one (1) TMDL addressing one (1) impairment.

Impaired Reach Name	Assessment Unit ID	Pollutant	Impairment (s) Addressed by TMDL
Lake Margaret	11-0222-00	Total phosphorus	excess nutrients/ eutrophication

The U.S. EPA's approval of the Lake Margaret TMDL extends to the waterbodies which are identified in this decision document and the TMDL study with the exception of any portions of the waterbodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The U.S. EPA is taking no action to approve or disapprove the State's TMDL with respect to those portions of the waters at this time. The U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for those waters.