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

SEP 20 2012

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 Lake Shaokatan, including supporting documentation and follow up information. Lake Shaokatan is located in southwestern Minnesota, in Lincoln County. The TMDL addresses the Aquatic Recreation Use impairment 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 TMDL for total phosphorus for Lake Shaokatan. 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,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Kelli Nerem, MPCA
David L. Johnson, MPCA

wq-iw7-22g

TMDL: Lake Shaokatan Nutrient TMDL, MN
Date:

DECISION DOCUMENTFOR THE LAKE SHAOKATAN NUTRIENT TMDL, MN

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

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

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

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

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

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and

(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:
Lake Shaokatan is an impaired waterbody within the Yellow Medicine River Basin in southwest Minnesota. The Minnesota Pollution Control Agency (MPCA) placed the lake on the State of Minnesota 303(d) Impaired Waters List in 2002. Lake Shaokatan is listed as impaired due to excess nutrients resulting from high phosphorus concentrations (Table 1 below).

Table 1. Lake Shaokatan Status on Minnesota's 2010 303(d) list

Waterbody Name	County	State ID	Impairments	Pollutant	Designated Use
Lake Shaokatan	Lincoln	41-0089-00	Nutrients/Eutrophication Biological Indicators	Total Phosphorus	Aquatic Recreation

Location Description/Spatial Extent:
Lake Shaokatan (ID 41-0089-00) is located in the Yellow Medicine River watershed in Lincoln County, Minnesota. Lake Shaokatan is 1000 acres in size, and the surrounding watershed is 8900 acres in size. The lake is the headwaters of the Yellow Medicine River, which in turn is a tributary to the Minnesota River (Section 2.2 of the TMDL). Several smaller tributaries drain into Lake Shaokatan. Outflow from Lake Shaokatan (the Yellow Medicine River) flows north approximately 40 miles into the Minnesota River. Lake Shaokatan has a maximum depth of 10 feet, and an average depth of 8 feet. The MPCA classified Lake Shaokatan as a shallow lake based upon the average depth of less than 15 feet. The watershed is located in the Northern Glaciated Plains Ecoregion (NGP).

Population and Future Growth:
Population in the watershed is small; no cities are located in the watershed, and population in the three surrounding townships is approximately 400. MPCA noted that there are 19 permanent residences on the lakeshore, and an additional 33 seasonal residences. The lake has two public boat launches, and a county park is located at one end of the lake. Population growth is not expected, and MPCA did not include a reserve capacity in the TMDL allocations (Section 6.4 of the TMDL).

Land Use:
Land use in the Lake Shaokatan watershed is comprised mainly of cropland (49%) and grassland/pasture (41%), with limited forest and farmsteads. MPCA noted that much of the grassland is enrolled in the Conservation Reserve Program, and could eventually revert to cropland if contracts expire (Section 2.2 of the TMDL).

Problem Identification: Lake Shaokatan was originally listed on the 2002 Minnesota 303(d) list for excessive nutrients (phosphorus). Lake Shaokatan is currently on the draft 2012 Minnesota 303(d) list for impaired aquatic recreation due to excessive nutrients. MPCA assessment of in-lake water quality data from 1999 and 2001 indicated that Lake Shaokatan was impaired by excess nutrients (total phosphorus) and was not attaining its designated uses. Additional monitoring was performed in 2005 and summer total phosphorus (TP) values (June 1 through

September 30) were in the range of 40 µg/L to 430 µg/L and averaged 152 µg/L. Chlorophyll-a (chl-a) concentrations ranged from 0.5 µg/L to 81 µg/L and averaged 48 µg/L. Secchi depth transparencies averaged approximately 1.53 m with a range of 0.38 m to 2.74 m. The NGP ecoregion water quality standards (WQS) for shallow lakes are 90 µg/L for total phosphorus, 30 µg/L for chl-a, and not less than 0.7 m for Secchi depth.

While TP is an essential nutrient for aquatic life, elevated phosphorus levels can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish. Furthermore, depletion of oxygen can cause phosphorus release from bottom sediments (i.e. internal loading).

Lake Shaokatan has been the site of numerous studies over the years, including Phase I and Phase II Clean Water Partnership studies in 1992 and 1993-1995, as well as a study update in 1996. The MPCA Intensive Lake Studies program monitored the lake in 1999 and 2001. The lake was included in a Shallow Lakes Trends Summary in 2003, and a study titled "Interrelationships Among Water Quality, Lake Morphometry, Rooted Plants and Related Factors for Selected Shallow Lakes of West-Central Minnesota – 2004". MPCA noted that all these reports indicate that Lake Shaokatan has been subject to water quality deterioration for many years (Section 2.1 of the TMDL).

Priority Ranking: The Lake Shaokatan watershed was given a priority ranking for TMDL development due to the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data and the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Lake Shaokatan is a popular location for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the Lake Shaokatan watershed, and to the development of a TMDL.

Pollutant of Concern: The pollutant of concern is phosphorus.

Source Identification (point and nonpoint sources):
Point Source Identification: The potential point sources to the Lake Shaokatan watershed are:

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: There are no NPDES-permitted facilities within the Lake Shaokatan watershed.

Municipal Separate Storm Sewer System (MS4) communities: There are no MS4 communities within the Lake Shaokatan watershed.

Stormwater from construction activities: Phosphorus input via stormwater from construction activities may contribute a small amount of phosphorus loading to Lake Shaokatan. The Lake Shaokatan TMDL assumes that there will be phosphorus inputs from construction activities and

therefore a wasteload allocation (WLA) was assigned to construction stormwater. Construction sites may contribute phosphorus via sediment runoff during stormwater events.

Concentrated Animal Feedlot Operations (CAFOs): There are eight animal feedlot operations within the Lake Shaokatan watershed. The MPCA estimates that these facilities have approximately 2,367 total animal units. Of those eight, one facility has greater than 1,000 animal units and is classified as a Concentrated Animal Feeding Operation (CAFO). By rule, CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). Manure from these lots is spread on nearby fields and can be a source of phosphorus found in nonpoint-derived watershed runoff. However, runoff from manure spread onto fields in accordance with federal and state requirements is unregulated, and included in the watershed runoff portion of the load allocation (LA).

Nonpoint Source Identification: The potential nonpoint sources to Lake Shaokatan are:

Internal loading: The release of phosphorus from lake sediments, the release of phosphorus via physical disturbance from benthic fish (rough fish, ex. carp), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweed, may all contribute internal phosphorus loading to Lake Shaokatan.

Atmospheric deposition: Phosphorus may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the Lake Shaokatan watershed. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

Agricultural sources (pasture, cropland, and open lands): Phosphorus may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay and row crops such as corn and soybeans. Stormwater runoff may contribute nutrients to surface waters from livestock manure, fertilizers, vegetation and erodible soils.

Livestock sources (animal feeding operations): Animal feeding operations (AFOs), which fall beneath the animal threshold limits to be given an NPDES permit, may nevertheless transport phosphorus to surface waters during storm events (via stormwater runoff). AFOs may transport phosphorus laden materials from feeding, holding and manure storage areas to surface waters.

Residential sources: Nutrients may be added via runoff from homes near Lake Shaokatan. Runoff from residential properties can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

Inadequate Subsurface Sewage Treatment Systems (SSTS): Phosphorus may be added to Lake Shaokatan from failing septic systems. Age, construction and use of SSTS can vary throughout a watershed and influence the nutrient contribution from these systems. It is likely that those systems sited closer to the lake shore are more likely to contribute nutrients than those systems sited further away from the lake. Failing SSTS can discharge nutrients directly into surface waters by straight pipe connections (considered point sources) or by effluents leaching into

groundwater or ponding at the surface where they can be washed into surface waters via stormwater runoff.

Forest Sources: Phosphorus may be added to surface waters via runoff from forested areas within the watershed. Runoff for forested areas may include debris from decomposing vegetation and organic soil particles. Wildlife can also contribute phosphorus to the lake.

Future Growth: Significant development is not expected in the Lake Shaokatan watershed. The land use within the watershed is primarily agricultural and according to the MPCA is expected to remain as agricultural for the foreseeable future. The WLA and LA for the Lake Shaokatan TMDL were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the Lake Shaokatan TMDL.

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

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

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

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

Comment:

Designated Uses:

Minnesota Rule Chapter 7050 designates uses for waters of the state. Lake Shaokatan is designated as Class 2B water for aquatic recreation use (boating, swimming, fishing, etc.). 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."*

Standards:

Narrative Criteria: Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State:

> *"For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."*

Numeric criteria: Numeric criteria for total phosphorus, chl-a, and Secchi depth are set forth in Minnesota Rules 7050.0222. These three parameters are the eutrophication standards that must be achieved to attain aquatic recreation designated use. The numeric eutrophication standards that are applicable to Lake Shaokatan are those set forth for Class 2B shallow lakes in the NGP Ecoregion (Table 2 of this Decision Document). In developing the lake nutrient standards for Minnesota lakes, the MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-a and Secchi depth. Based on these relationships, TP loadings designed to meet the TP WQS of 90 µg/L were determined to also result in attainment of chl-a and Secchi depth standards.

Table 2: Minnesota Eutrophication Criteria for shallow lakes within the Northern Glaciated Plains ecoregion

Parameter	Eutrophication Standard
Total Phosphorus (µg/L)	TP < 90
Chlorophyll-a (µg/L)	chl-a < 30
Secchi Depth (m)	Secchi depth > 0.7

Target: MPCA selected a target of 90 µg/L of TP to develop the TMDL.

MPCA selected total phosphorus as the appropriate parameter to address eutrophication problems at Lake Shaokatan because of the interrelationships between TP and chl-a, as well as Secchi depth. Algal abundance is measured by chl-a, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by Secchi depth.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment:
The TP Loading Capacity for Lake Shaokatan is **4.21 kg/d**.

The approach utilized by the MPCA to calculate the loading capacity for Lake Shaokatan is described in Section 6.0 of the final TMDL document. The MPCA first determined estimated phosphorus for each source type and then utilized the BATHTUB model to determine the TP concentration in the lake as a result of these loads.

To estimate nutrient loading within the Lake Shaokatan watershed, the MPCA calculated a hydrologic budget for the lake and then assigned nutrient inputs to different land use types within the Lake Shaokatan watershed via the estimated loading coefficients. Nutrient loading was investigated by individual subwatershed within the Lake Shaokatan watershed. MPCA also utilized previous watershed assessments from 1996 and 2001 and developed loads based upon an average year. MPCA estimated the TP contributions from various land uses and from internal loading, but noted that these are estimates only, and are not allocations.

The BATHTUB model was utilized to link phosphorus loads with in-lake water quality and to calculate a TP loading capacity value for Lake Shaokatan. BATHTUB has previously been used successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 – September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

BATHTUB has built-in statistical calculations which account for data variability and provide a means for estimating confidence in model predictions. BATHTUB employs a mass-balance TP model that accounts for water and TP inputs from tributaries, direct watershed runoff, the atmosphere, and sources internal to the lake; and outputs through the lake outlet, water loss via evaporation, and TP sedimentation and retention in the lake sediments. BATHTUB provides flexibility to tailor model inputs to specific lake morphometry, watershed characteristics and watershed inputs. The BATHTUB model also allows the MPCA to assess different impacts of changes in nutrient loading. BATHTUB allows choice among several different mass-balance TP models.

The pollutant sources were identified and estimated based on water quality monitoring data, flow data and modeling efforts. The loading capacity of the lake was determined through the use of BATHTUB and then allocated to the WLA and LA (Table 3 below). To determine the TP loading necessary to attain WQS, MPCA compared lake responses over multiple years to the corresponding TP loading to develop a response curve between in-lake TP concentrations and TP loads (Figure 17 of the TMDL). To account for Margin of Safety (MOS), MPCA lowered the target from the 90 µg/L criteria to 81 µg/L (a reduction of 10%). Based upon this response graph, MPCA determined the loading capacity needed to attain the TP target of 81 µg/L as 1537 kg/yr (4.21 kg/d). The BATHTUB model was not used to determine the chl-a and Secchi depth; rather, MPCA relied upon the work done in determining the lake nutrient standards in Minnesota. As discussed in Section 2 of this Decision document, the MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions in developing the lake nutrient standards for Minnesota lakes. Clear relationships were established between the causal factor (TP) and the response variables (chl-a and Secchi depth). Based on these relationships, TP loadings designed to meet the TP WQS of 90 µg/L (81 µg/L with MOS) were determined to also result in attainment of chl-a and Secchi depth standards.

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety. Additionally, EPA concurs with the loading capacity calculated by the MPCA in the Lake Shaokatan TMDL. Model selection and development are consistent with EPA guidance (Protocol for Developing Nutrient TMDLs, EPA, 1999; and Compendium of Tools for Watershed Assessment and TMDL Development, EPA, 1997) and the State has submitted sufficient documentation in the TMDL Report as discussed above, to demonstrate that the model is capable of reasonably simulating conditions in the watershed.

Critical condition: These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in the lake is degraded and phosphorus loading impacts are the greatest. The MPCA believes that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Table 3 Lake Shaokatan TMDL Summary

	TMDL	WLA	LA
Annual (kg/yr)	1537	15.37	1521.63
Daily (kg/d)	**4.21**	**0.04**	**4.17**

EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance. The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the third element.

4. Load Allocations (LA)

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:
The TP Load Allocation for Lake Shaokatan is **4.17 kg/d.**

Load allocations are addressed in Section 6 of the final TMDL document. MPCA recognized the LA for the Lake Shaokatan TMDL as originating from a variety of nonpoint sources including atmospheric deposition, nonpoint source inputs from the Lake Shaokatan watershed, and internal loading sources (ex. lake sediments). The watershed nonpoint sources include TP inputs from agricultural nonpoint source runoff, and septic inputs. MPCA did not subdivide the LA into LAs for these source types. EPA finds the MPCA's approach for calculating the LA to be reasonable.

EPA finds MPCA's approach for calculating the load allocation to be reasonable and consistent with EPA guidance. The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the fourth element.

5. Wasteload Allocations (WLAs)

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

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to

reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
The TP Wasteload Allocation for Lake Shaokatan is **0.04 kg/d.**

The only point sources in the Lake Shaokatan watershed are covered under general NPDES permits for construction sites. The WLA assigned to construction stormwater was 15.37 kg/yr of TP (0.04 kg/day). This estimate was calculated based on the percentage of land under construction within the Lake Shaokatan watershed. MPCA reviewed active construction stormwater permits within the Lake Shaokatan watershed and determined that less than 1% of the watershed area was covered under a construction stormwater permit. To generate the WLA assigned to construction stormwater, the MPCA rounded the construction stormwater estimate up to 1% of the land area and applied this 1% estimate to the loading capacity (1537 kg/yr), which was approximately 15.37 kg/yr (0.04 kg/d). The rounding up to 1% also provided a small amount of reserve capacity for potential additional future development activities within the Lake Shaokatan watershed.

As part of this decision, EPA is clarifying a statement from Section 6.1 of the TMDL that states that construction stormwater activities are considered "in compliance" with the TMDL if they obtain a General Permit under the NPDES program, and remain in compliance with the permit. This decision does not address compliance with any NPDES permit or WLA. Compliance with any WLA or NPDES permit is a function of the appropriate NPDES program, and is not part of any TMDL approval.

MPCA found no MS4 permits within the Lake Shaokatan watershed. MPCA identified one CAFO in the watershed, Christensen Farms Site FO68, ID #081-103230. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0).

EPA finds MPCA's approach for calculating the wasteload allocation to be reasonable and consistent with EPA guidance. The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the fifth element.

6. Margin of Safety (MOS)

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

Comment:
Section 6.3 of the final TMDL outlines the Margin of Safety used in the Lake Shaokatan TMDL. An explicit MOS was utilized in the Lake Shaokatan TMDL to account for uncertainty in the model outputs. The MOS was based upon using a target (81 μg/L) lower than the criteria (90 μg/L) to calculate the loading capacity necessary to attain the designated uses. MPCA believes this MOS is appropriate based upon the numerous studies of Lake Shaokatan over the last 20 years, which include loading estimates, model predictions, and water quality studies. As a result of these efforts, MPCA believes the MOS properly accounts for uncertainty in the TMDL effort.

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

7. Seasonal Variation

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

Comment:
Seasonal variation was considered in this TMDL as described in Section 7.0 of the final TMDL document. The nutrient targets employed in the Lake Shaokatan TMDL were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the NGP eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. In the Lake Shaokatan phosphorus TMDL, the LA and WLA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid-late summer time period is typically when eutrophication standards are exceeded and water quality in Lake Shaokatan is deficient. By calibrating the modeling efforts to protect these waterbodies during the worst water quality conditions of the year, it is assumed that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

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

8. Reasonable Assurance

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:
The Lake Shaokatan phosphorus TMDL outlines reasonable assurance activities in Section 10.0 of the final TMDL document. There are several groups which will have a role in ensuring that phosphorus reductions in the Lake Shaokatan watershed move forward in the coming years. These groups include the Yellow Medicine River Watershed District (YMRWD), Lincoln County Soil and Water Conservation District, Lincoln County, and MPCA. The YMRWD is expected to be highly involved in the development of implementation efforts in the watershed, and will have a Project Manager and Project Technician hired to assist in these efforts.

The YMRWD has had a long history in developing and implementing projects in the Lake Shaokatan watershed. The Lake Shaokatan Clean Water Partnership Phase I (1990-1993) and Phase II (2003-2005) projects were completed. Numerous nutrient control measures were installed as a result of these projects, and water quality improvements in Lake Shaokatan were documented in subsequent sampling efforts.

The Lincoln County Soil and Water Conservation District (LCSWCD) was given a $90,000 grant in 2010 by Minnesota to implement conservation practices designed to reduce nutrient and sediment loads in high-priority waterbodies in the Yellow Medicine River Watershed. Because of the recreational potential, Lake Shaokatan was specifically targeted as part of this effort. This grant is on-going through 2012 (LCSWCD Yellow Medicine Major Watershed Project). LCSWCD also has developed an Annual Plan for 2012 that includes implementation activities in the Lake Shaokatan watershed (LCSWCD Annual Plan 2012). This plan includes costs and staffing needs for various activities in the Yellow Medicine River watershed.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. An implementation plan based on the recommendations from the Lake Shaokatan TMDL will be finalized within one year of the approval of the Lake Shaokatan TMDL. Funding for these efforts will be a mixture of local, state and federal funding vehicles. Local funding may be through SWCD cost-share funds, Natural Resources Conservation Service (NRCS) cost-share funds, and LCSWCD cost-share funds.

Federal funding, via the Section 319 grants program, may provide money to implement voluntary nonpoint source programs within the Lake Shaokatan watershed. State efforts may be via Clean Water Legacy Act (CWLA) grant money and the Minnesota Clean Water Partnership program.

Clean Water Legacy Act: 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).

Reasonable assurance that the WLA set forth 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's stormwater program is the implementing program for ensuring construction stormwater general permits are consistent with the TMDL. The NPDES program requires construction and industrial sites to create a Stormwater Pollution Prevention Plan (SWPPP) that summarizes how stormwater will be minimized from the site.

Under the MPCA's Stormwater General Permit, managers of sites under construction must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the Lake Shaokatan TMDL. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the U.S. EPA. This applies to sites under the MPCA's general construction stormwater permit (*General Permit for Construction (MN R100001)*). Additionally, the YMRWD, under Minnesota Statue 103D, maintains a set of rules meant to govern land development and redevelopment for urban use. These rules require developers and municipalities to provide water quality treatment for any new impervious surfaces, and in some cases, for alterations to existing impervious surfaces.

The EPA finds that this element 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:
The final TMDL document outlines the water monitoring efforts in the Lake Shaokatan watershed. Water quality monitoring is a critical component of the adaptive management strategy employed as part of the Lake Shaokatan implementation plan. Water quality information will aid watershed managers in understanding how BMP phosphorus removal efforts are impacting water quality within the direct Lake Shaokatan watershed. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce nutrient loading into Lake Shaokatan. Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory.

The EPA finds that this element 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:
Implementation ideas are outlined in Section 9.0 of the final TMDL document. The MPCA presented a variety of possible implementation activities which could be undertaken within the Lake Shaokatan watershed. The Lake Shaokatan TMDL estimated that nonpoint source inputs from the Lake Shaokatan watershed will require a 65% phosphorus reduction in order for Lake Shaokatan to meet WQS.

MPCA has already begun several implementation activities in the Lake Shaokatan watershed, as discussed in Section 8 of this Document. MPCA will be developing a detailed implementation plan within the next year. This plan will contain specific activities and related costs to reduce TP loads into Lake Shaokatan. Some of these activities include grass waterways, sediment control structures, improved tillage practices, manure management, wetland restoration, and erosion

controls. The model subdivided the watershed into 24 subbasins, to better understand where priority reductions are needed.

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

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:
The public participation section of the TMDL submittal is found in Section 11.0 of the final TMDL document. Through the development of the Lake Shaokatan TMDL the public was given various opportunities to participate in the TMDL process. The MPCA encouraged public participation through public meetings and small group discussions. The MPCA worked with members of the YMRWD and LCSWCD to solicit their input for potential implementation strategies. The MPCA met with the public several times from 2005 to 2010 in order to share information about the TMDL development efforts, to share Lake Shaokatan monitoring data, and to present the public notice draft of the Lake Shaokatan TMDL.

The first public notice period for this TMDL was provided from July 6, 2009 to August 5, 2009. Numerous comments were received, including requests for changes to the TMDL. Based upon these requests, MPCA revised the TMDL and a second public comment was provided from February 8, 2010 to March 10, 2010. Notice was sent to 150 interested citizens and posted in the Minnesota State Register, and a press release was circulated. The draft TMDL was posted online by the MPCA at (http://www.pca.state.mn.us/water/tmdl).

The MPCA received a total of 9 comment letters on the draft TMDL, including one request for a contested case hearing under Minnesota Rule Chapter 7001. The MPCA submitted all of the public comments and responses in the final TMDL submittal packet received by the EPA on August 27, 2012. The comments focused mainly on the phosphorus contributions from agricultural land in the Lake Shaokatan watershed, the role of proposed implementation activities, and on the role of internal loading of TP on water quality in the lake.

MPCA explained in further detail how the phosphorus run-off coefficients were calculated and used in the BATHTUB model. Due to the lack of data, MPCA noted that several assumptions had to be made regarding land use, particularly regarding land use in the future. MPCA revised the TMDL to add updated information on land use, based on information provided in the comment letters and in discussions with local landowners. MPCA agreed to consider land in the Conservation Reserve Program (CRP) as grassland (which has a lower run-off coefficient), rather than cropland. MPCA noted, however, that land enrolled in the CRP program is not permanently converted to grassland, and may become cropland in the future.

Several commentors expressed concerns over how implementation activities would affect their lands. MPCA explained that a detailed implementation plan will be developed that will be much more precise on identifying specific locations and practices that need to be implemented, as well as funding options, particularly under the Minnesota Clean Water Legacy Act.

The other major issue raised concerned the TP internal loading problem in the lake. MPCA noted in the TMDL that internal loading contributes as much as 40-50% of the TP load to the lake. Several commentors expressed concerns that even after watershed controls were implemented completely, the internal loadings of TP would still result in the lake exceeding WQSs. MPCA explained that internal loading varies based upon precipitation patterns, watershed land use, and internal lake dynamics. MPCA believes that as watershed practices continue to be implemented, TP loading will be reduced, and internal loading will subsequently be reduced. MPCA noted that the ultimate source of the internal loading is watershed run-off, and therefore must be controlled before reductions in internal loading will occur.

The contested case request was resolved by MPCA and the requestor in a Settlement Agreement dated July 27, 2012.

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

12. Submittal Letter

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

Comment:
The EPA received the final Lake Shaokatan phosphorus TMDL document, submittal letter and accompanying documentation from the MPCA on August 27, 2012. The transmittal letter explicitly stated that the final Lake Shaokatan TMDL for excess nutrients was being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for 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 Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

The EPA finds that the TMDL transmittal letter submitted for Lake Shaokatan by the MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the TMDL for Lake Shaokatan satisfies all of the elements of an approvable TMDL. This approval is for one TMDL, addressing one waterbody for aquatic recreational use impairments, for Lake Shaokatan (ID 41-0089-00).

The EPA's approval of this TMDL extends to the water body which is identified as Lake Shaokatan (ID 41-0089-00), with the exception of any portions of the waterbody that is within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.