

# Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges

January 3, 2012

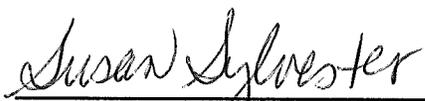
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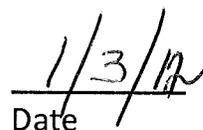
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APPROVED:



Susan Sylvester, Director  
WDNR Bureau of Water Quality



Date

## Summary:

Revisions to Wisconsin's Phosphorus Water Quality Standards became effective on December 1, 2010. These revisions are reflected in two separate chapters of the Wisconsin Administrative Code. Chapter NR 102 (Wis. Adm. Code) includes water quality criteria for the protection of fish and aquatic life as well as human health. Chapter NR 217 (Wis. Adm. Code) includes regulations on how the water quality criteria for phosphorus will be used to establish water quality based effluent limitations for point source discharges subject to permits under the Wisconsin Pollution Discharge Elimination System (WPDES).

Revisions to Chapter NR 151, Wis. Adm. Code- Wisconsin's agricultural performance standards and prohibitions- were also derived in order to affirm the need to minimize phosphorus sources from nonpoint sources. These revisions became effective on January 1, 2011 and will not be discussed in detail in this document as they do not directly relate to WPDES permits. For specific rule content for chs. NR 102, NR 151, and NR 217, Wis. Adm. Code, please visit <http://dnr.wi.gov/org/water/wm/wqs/phosphorus/>.

The intent of this document is to provide guidance primarily to Wisconsin Department of Natural Resources (WDNR) staff. This guidance document may also be useful to WPDES permittees and their associates on how to implement the procedures in chs. NR 102 and NR 217, Wis. Adm. Code, to ensure the protection of surface waters receiving effluent discharges containing phosphorus. As guidance, this document may evolve with time as more experience is gained in phosphorus implementation.

Phosphorus implementation questions that are not addressed by this document can be directed to WDNR staff assigned to work on a particular WPDES permit. Any remaining unanswered questions can be directed to Jim Baumann ([james.baumann@wisconsin.gov](mailto:james.baumann@wisconsin.gov)) or Amanda Minks ([amanda.minks@wisconsin.gov](mailto:amanda.minks@wisconsin.gov)).

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## **Chapter 1- Introduction to Phosphorus Standards**

Chapter 1 is designed to provide the reader with basic information about content in the phosphorus rules. In conjunction with Chapter 1, a Frequently Asked Questions page is also being generated as a reference to help staff, permittees, and others receive automatic answers to common phosphorus-related questions.

### **Frequently Asked Questions**

Staff, permittees, consultants, and others interested in the implementation of phosphorus water quality standards in Wisconsin are encouraged to submit questions to the following e-mail box:

[DNRPhosphorus@wisconsin.gov](mailto:DNRPhosphorus@wisconsin.gov)

Department staff will review the questions and attempt to keep a current listing of the questions and responses in a "Frequently Asked Questions" segment of the Phosphorus Standards Website which can be viewed at:

<http://dnr.wi.gov/org/water/wm/wqs/phosphorus/index.htm>

This webpage will be updated regularly with updates to this Guidance Document as well as the Frequently Asked Questions.

### **Abbreviations**

Throughout the guidance document, the following abbreviations may be used:

<b>AM</b>	Adaptive Management
<b>AMP</b>	Adaptive Management Plan
<b>LAL</b>	Limited Aquatic Life
<b>MZ</b>	Mixing Zone
<b>POTW</b>	Publicly Owned Treatment Works
<b>TBL</b>	Technology Based Limit
<b>TMDL</b>	Total Maximum Daily Load
<b>µg/L</b>	Microgram per liter. Common metric measurement used in measuring amount of phosphorus in liquid, 1000µg/L equals 1 mg/L
<b>WQBEL</b>	Water Quality Based Effluent Limits
<b>WQC</b>	Water Quality Criteria
<b>WQT</b>	Water Quality Trading

# **Chapter 1**

## ***Section 1.01: Rule Summary***

**Author: Amanda Minks**

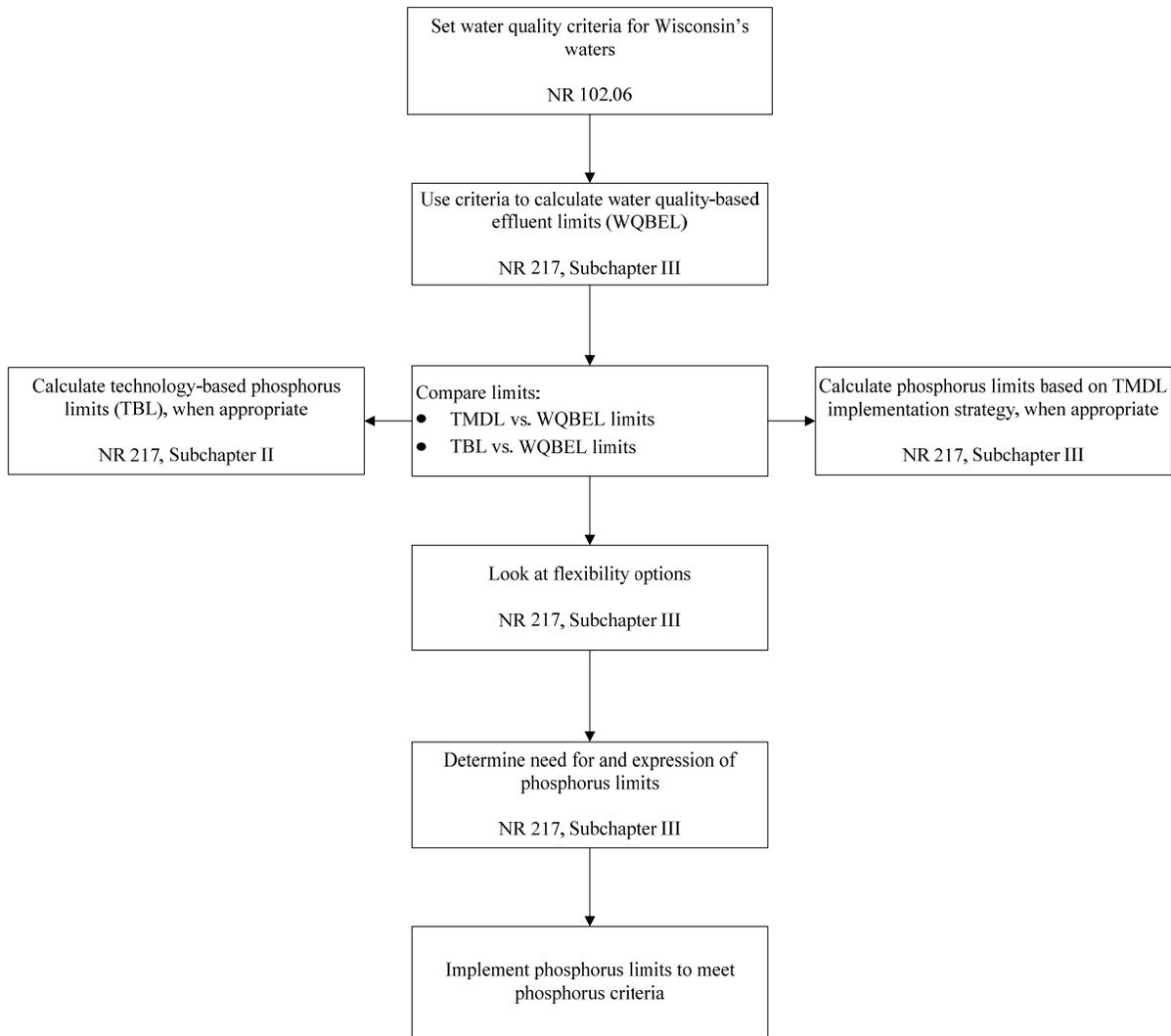
**Last Revised: November 22, 2011**

The following content is meant to provide a general overview of the phosphorus rules, as described in chs. NR 102, NR 151, and NR 217, Wis. Adm. Code. For more detail, see the rule content:

- Chapter NR 102, Wis. Adm. Code -  
<http://legis.wisconsin.gov/rsb/code/nr/nr102.pdf>
- Chapter NR 151, Wis. Adm. Code -  
<http://legis.wisconsin.gov/rsb/code/nr/nr151.pdf>
- Chapter NR 217, Wis. Adm. Code -  
<http://legis.wisconsin.gov/rsb/code/nr/nr217.pdf>

**General Structure of chs. NR 102 and NR 217, Wis. Adm. Code:**

*Implementation Guidance for Wisconsin's Phosphorus Water Quality Standards*



## **Applicable Water Quality Criteria**

Sections NR 102.06(3) and 102.06(4), Wis. Adm. Code, describe the applicable phosphorus criteria for rivers, streams, lakes and reservoirs. The following is meant to provide a general summary of the range of phosphorus criteria and the waterbody types they apply to. Tools are available to help Department staff to make these determinations including:

- Register of waterbodies (ROW)-  
[http://dnr.wi.gov/org/water/watersheds/planning/internet\\_gisdata.htm](http://dnr.wi.gov/org/water/watersheds/planning/internet_gisdata.htm)
- Surface Water Integrated Monitoring System (SWIMS)-  
<http://dnr.wi.gov/org/water/swims/>

It may also be advantageous to contact Water Evaluation and Lake Staff if uncertainty exists:

Water Evaluation Contact:

Amanda Minks  
[Amanda.Minks@wisconsin.gov](mailto:Amanda.Minks@wisconsin.gov)  
608-264-9223

Lake Contact:

Tim Asplund  
[Tim.Asplund@wisconsin.gov](mailto:Tim.Asplund@wisconsin.gov)  
608-267-7602

Specific rivers codified in s. NR 102.06(3)(a), Wis. Adm. Code, receive a phosphorus water quality criterion of 100 µg/L (below). All other unidirectional flowing waterbodies are generally treated as streams, pursuant to s. NR 102.06(3)(b), Wis. Adm. Code, and have an applicable criteria of 75 µg/L.



There are two SWDV layers that are important to identify wetlands: Wisconsin Wetland Inventory and the Wetland Indicator Soils. If the Wisconsin Wetland Inventory indicates that an area is a wetland, it can be presumed correct. If the Wetland Indicator Soils layer indicates that wetland soils are present but is not shown as a wetland polygon in the Wisconsin Wetland Inventory, a case-by-case determination is required and regional biologists should be conferred. Wetland staff may also be contacted if there are any wetland delineation questions such as if channelized flow occurs within the wetland. Regional wetland staff should be contacted with wetland delineation questions: <http://dnr.wi.gov/wetlands/assessment.html>.

Pursuant to s. NR 102.06(2)(b), Wis. Ad. Code, an ephemeral stream is a channel or stream that only carries water for a few days during and after a rainfall or snowmelt event and does not exhibit a flow during other periods, and includes, but is not limited to, grassed waterways, grassed swales, and areas of channelized flow as defined in s. NR 243.03 (7), Wis. Adm. Code. Ephemeral streams may be identified in the surface water data viewer or SWIMS; however, there is no compiled list of ephemeral streams in the state. Permit staff can use professional discretion to make a case-by-case determination for ephemeral streams. Staff should consider the natural flow condition in addition to the effluent flow when making this determination. Regional biologists should be contacted with determination questions: <http://dnr.wi.gov/org/water/monitoring/>.

### **Other Applicable Criteria**

Section NR 102.06(7), Wis. Adm. Code, also allows Department staff and external parties to derive phosphorus site-specific criteria. Department staff are currently developing guidance on phosphorus site-specific criteria. In the interim, interested parties should contact the Water Evaluation Section for details. Site-specific criteria will require rule modification and U.S. EPA approval. For more information see Section 1.04.

### **New Implementation Procedures**

Many implementation procedures for toxic substances are still available for phosphorus. Additionally, flexible and novel phosphorus-specific implementation procedures have been established that a permittee may wish to pursue. These options will likely be of particular interest for permittees that are subject to a fairly stringent phosphorus water quality based effluent limit. Specifically, a permittee may want to pursue one or more of the following:

1. Variance (Section 3.03)
2. Adaptive Management (Section 4.01)
3. Water quality trading as a means to meet a limit (Section 4.03)

Of these options, adaptive management and water quality trading gives dischargers flexibility to achieve a phosphorus water quality based effluent limit (WQBEL) by controlling point and nonpoint phosphorus sources, while variances provide an

alternative phosphorus limit. The rules also allow compliance schedules of up to 7 or 9 years in cases where a significant upgrade is needed to meet a restrictive limit (must be determined necessary and appropriate by the permit drafter consistent with s. NR 217.17, Wis. Adm. Code).

As specified in s. NR 217.17, Wis. Adm. Code, timing is an important factor when considering these options. A variance application must be submitted before the permit is public noticed or within the time period specified in s. 283.15, Wis. Stats; adaptive management must be applied for by the permittee at the time of permit application for reissuance. If the Department determines that a compliance schedule less than five years is appropriate pursuant to s. NR 217.17, Wis. Adm. Code, then a permittee would have to apply for either of these options prior to the first permit term with a phosphorus WQBEL. If an application has already been submitted before this guidance was completed, then the permittee should be given an opportunity to submit a complete application. In situations where the compliance schedule for the phosphorus WQBEL exceeds 5 years, a permittee will not have to submit an application for either adaptive management or a variance until the second permit reissuance after the limit is initially included in a permit. See Sections 4.01 and 3.03 of the Guidance for details. If a permittee is interested in water quality trading to comply with a WPDES permit, the permittee can pursue trading at any time and the Department can modify the WPDES permit to reflect the trade. See Section 4.03 of the Guidance for details.

## **Questions and Answers on Rule Content**

The following is meant to provide general answers to basic phosphorus questions. If you have additional questions, please email [DNRphosphorus@wisconsin.gov](mailto:DNRphosphorus@wisconsin.gov).

### ***Phosphorus Limits***

#### **1. Are All Waters of the State Covered Under the Phosphorus Revisions?**

Phosphorus criteria apply to surface waters of the state including streams, rivers, lakes, reservoirs, and the Great Lakes. However, s. NR 102.06(6) , Wis. Adm. Code, defines some waters that do not have specific phosphorus criteria including ephemeral streams, lakes and reservoirs of less than 5 acres in surface area, wetlands (including bogs), and waters identified as limited aquatic life waters pursuant to ch. NR 104, Wis. Adm. Code. Although these waters do not have specific phosphorus criteria, phosphorus limits may be imposed on point sources that discharge to these waterbodies in order to protect downstream waters that have phosphorus criteria.

#### **2. What is the Difference between Technology Based Limits and Water Quality Based Effluent Limits?**

The intent of Technology Based Limits (TBLs) is to require a minimum level of treatment of pollutants for point source discharges based on available treatment technologies, while allowing the discharger to use any available control technique to meet the limits.

Water Quality Based Effluent Limits (WQBELs) are based on the quality of the receiving water, rather than available treatment technologies. In order to ensure the protection of water quality and the designated uses of the receiving water, WQBELs may be more or less stringent than TBLs.

#### **3. In what Cases are Phosphorus Limits Required?**

TBLs are required for any point source discharge that exceeds the thresholds as described in s. NR 217.04(a)(1-6), Wis. Adm. Code. Point sources have been evaluated for phosphorus TBLs since 1993, so many of facilities that exceed these thresholds already have TBLs in their permit. Phosphorus WQBELs are required as of December 1, 2010, and are required if a point source discharge has the potential to cause phosphorus criteria exceedance in either the receiving water or downstream waters (s. NR 217.12(1)(a), Wis. Adm. Code).

It is possible that a discharge may be subject to technology based limits and WQBELs. In these cases, the limit that is most protective of the water quality will be used in the WPDES permit- ss. NR 217.12(1)(b) and NR 217.12(2), Wis. Adm. Code. When water quality trading is utilized to meet WQBELs, however, both TBLs and WQBELs may be included in the permit.

**Flexibility in Limit Calculations and ch. NR 217, Wis. Adm. Code**

**4. How are Nonpoint Sources Evaluated in Determining a WQBEL for a Point Source?**

The phosphorus contribution from nonpoint sources needs to be evaluated to successfully implement U.S. EPA approved total maximum daily loads (TMDLs), watershed adaptive management, and water quality trading. In these cases, reductions in nonpoint sources can be used to help achieve the overall phosphorus goal of the water. By accounting for the contributions from nonpoint sources, it is possible that the applicable WQBEL may be relaxed, which may lower the total cost for meeting water quality standards.

**5. Is there Flexibility in ch. NR 217, Wis. Adm. Code?**

There is some flexibility built into ch. NR 217, Wis. Adm. Code, to help develop and implement phosphorus criteria. Some of these options include:

- WQBELs in TMDLs: As described above (question 4), phosphorus limits can be calculated based on a TMDL implementation strategy for waters with U.S. EPA approved TMDLs. These TMDL derived phosphorus limits are based on wasteload allocations and assumptions of the TMDL. Specific information about the relationship of WQBEL and TMDL based phosphorus limits can be found in s. NR 217.16, Wis. Adm. Code. General TMDL information can also be found at <http://dnr.wi.gov/org/water/wm/wqs/303d/TMDL.html>.
- WQBEL Limits in Adaptive Management: Phosphorus WQBELs may be adjusted based on the implementation of a watershed adaptive management plan- s. NR 217.18, Wis. Adm. Code.
- Phosphorus Water Quality Trading: Permittees may choose to engage in water quality trading as a means to achieve compliance with interim limitations or final water quality based effluent limitations. Section 283.84, WI Stats., establishes requirements for pollutant trades.
- Compliance Schedule: The Department may approve, where appropriate, additional time in a compliance schedule beyond the 5 year permit term in order to achieve compliance- ss. NR 217.16(2) and NR 217.17, Wis. Adm. Code.

# **Chapter 1**

## ***Section 1.02: Applicability***

**Author: Amanda Minks**

**Last Revised: January 10, 2011**

### **Technology Based Limits for Phosphorus:**

As stated in s. NR 217.02 of Subchapter II, Wis. Adm. Code, any point source that discharges phosphorus to a surface water of the state must be evaluated for technology based phosphorus limits. However, some exemptions exist for small publicly owned treatment works (POTWs) and wastewater discharges, as defined in ss. NR 217.04(1)(a)(1) and NR 217.04(1)(a)(2), Wis. Adm. Code. In these cases, discharges do not need to be evaluated for technology based phosphorus limits. Chapter NR 217 Subchapter II, Wis. Adm. Code, which has been in place since 1993, procedurally describes technology based phosphorus limits.

### **Water Quality Based Effluent Limits for Phosphorus:**

As of December 1, 2010 under ch. NR 217 Subchapter III, Wis. Adm. Code, some point sources also need to be evaluated for water quality based effluent limits (WQBELs). Discharges that need to be evaluated for phosphorus WQBELs include industrial and municipal wastewater discharges, and, in some cases, animal feeding operations. Chapter NR 217 Subchapter III, Wis. Adm. Code, procedurally describes phosphorus WQBELs. This guidance document is intended to provide details on the process to evaluate discharges for phosphorus WQBELs.

Note: In some cases other discharge types may be subject to phosphorus WQBELs, if the discharge is causing or contributing to a violation of the applicable phosphorus criteria.

# Chapter 1

## **Section 1.03: Flow Diagrams and Implementation Matrix**

**Author: Amanda Minks, Mike Hammers, & Tom Mugan**

**Last Revised: November 17, 2011**

The flow diagrams (i.e. logic diagrams) provided in this chapter are intended to help the reader follow the decision order of the Administrative Rules:

**Flow Diagram 1 and 1B:** Determining applicable total phosphorus water quality criteria

**Flow Diagram 2 and 2B:** Selecting effluent limits for existing discharges

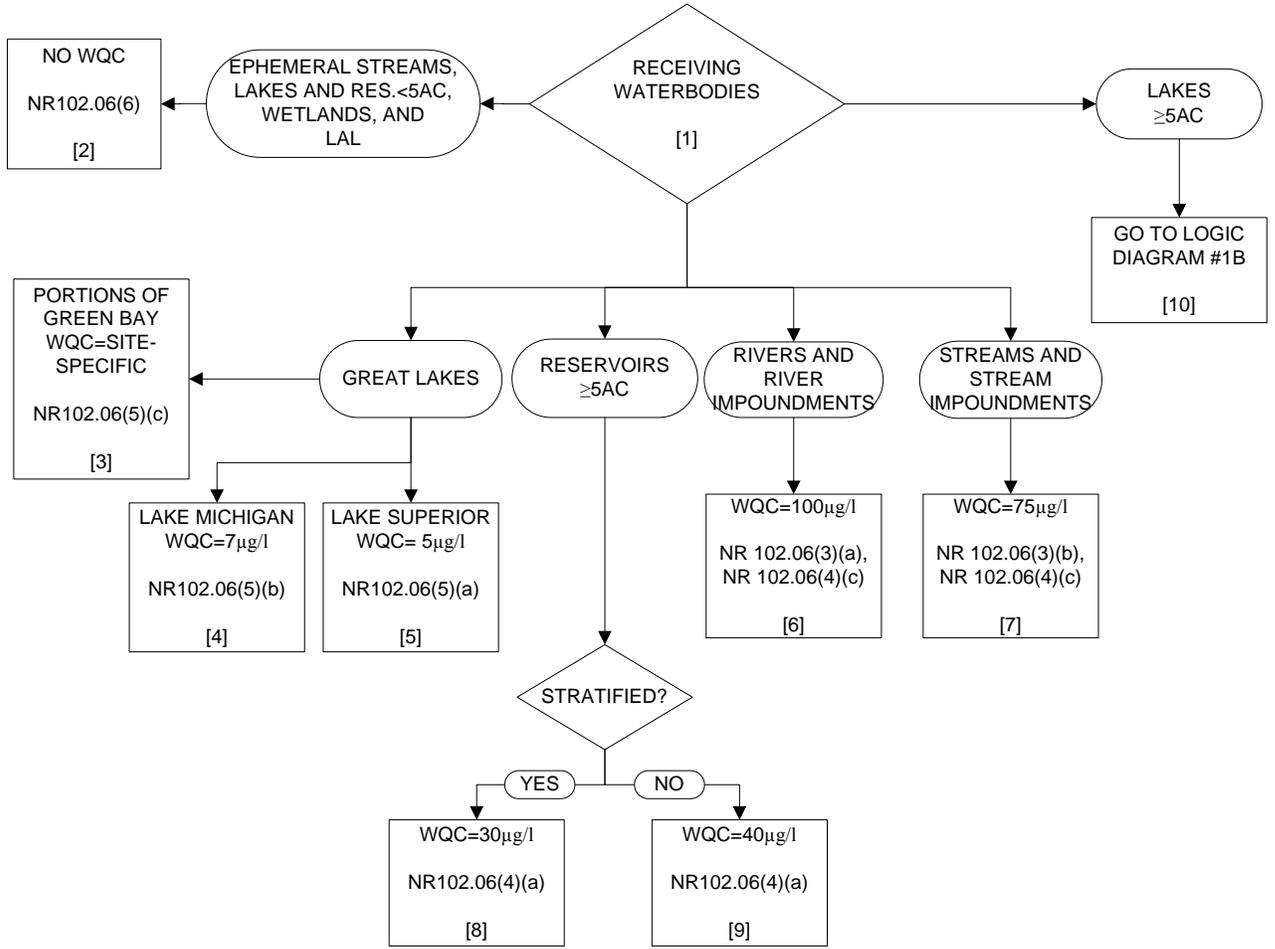
**Flow Diagram 3:** Permit process for applicant and potential outcomes for compliance schedules

### **Implementation Matrix**

Throughout the flow diagrams, the following abbreviations are used:

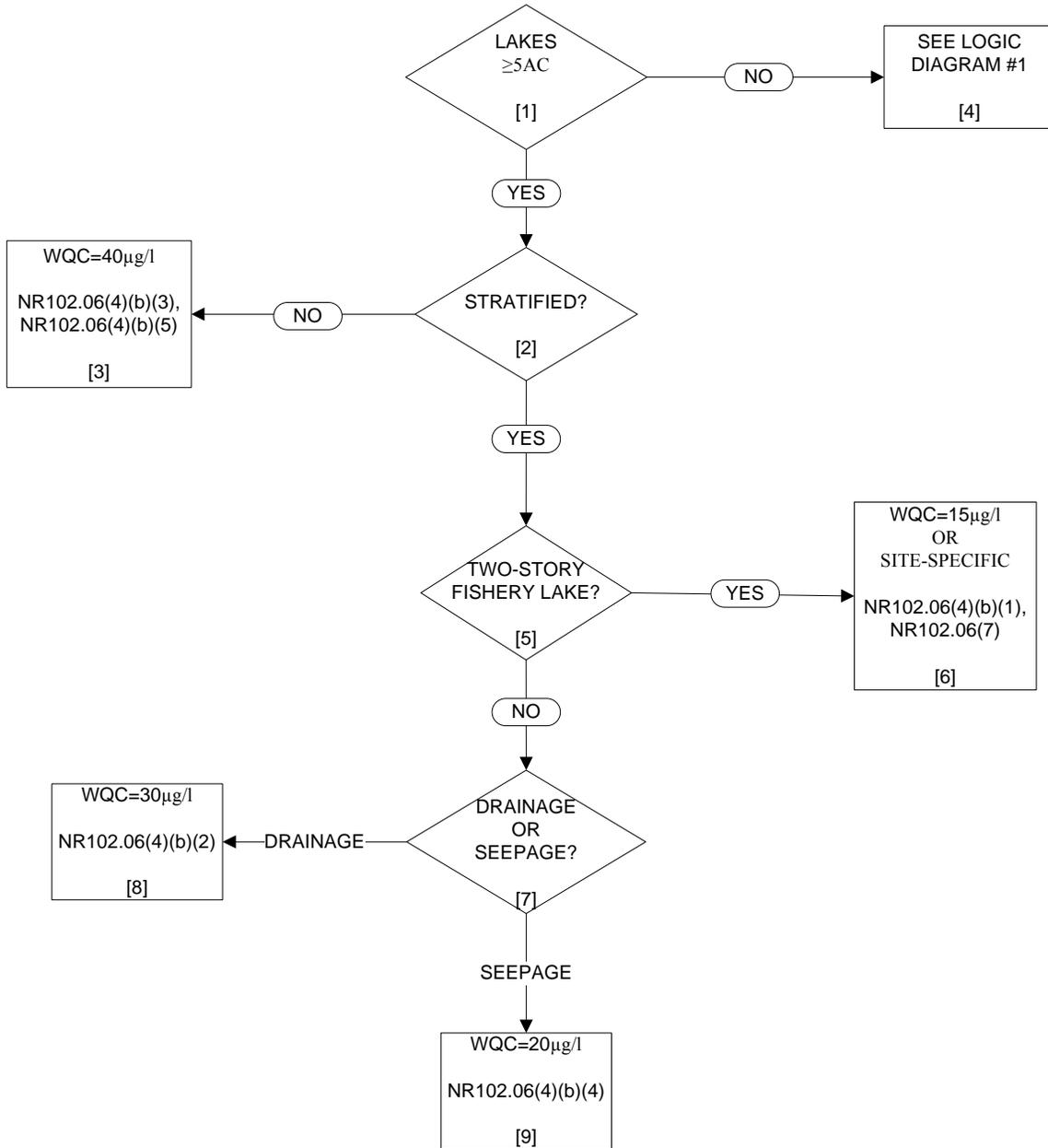
<b>LAL</b>	Limited Aquatic Life
<b>POTW</b>	Publicly Owned Treatment Works
<b>TBL</b>	Technology Based Limit
<b>TMDL</b>	Total Maximum Daily Load
<b>WLA</b>	Wasteload Allocation
<b>WQBEL</b>	Water Quality Based Effluent Limits
<b>WQC</b>	Water Quality Criteria

**LOGIC DIAGRAM 1**  
 DETERMINING APPLICABLE TOTAL PHOSPHORUS WATER QUALITY  
 CRITERIA (WQC)



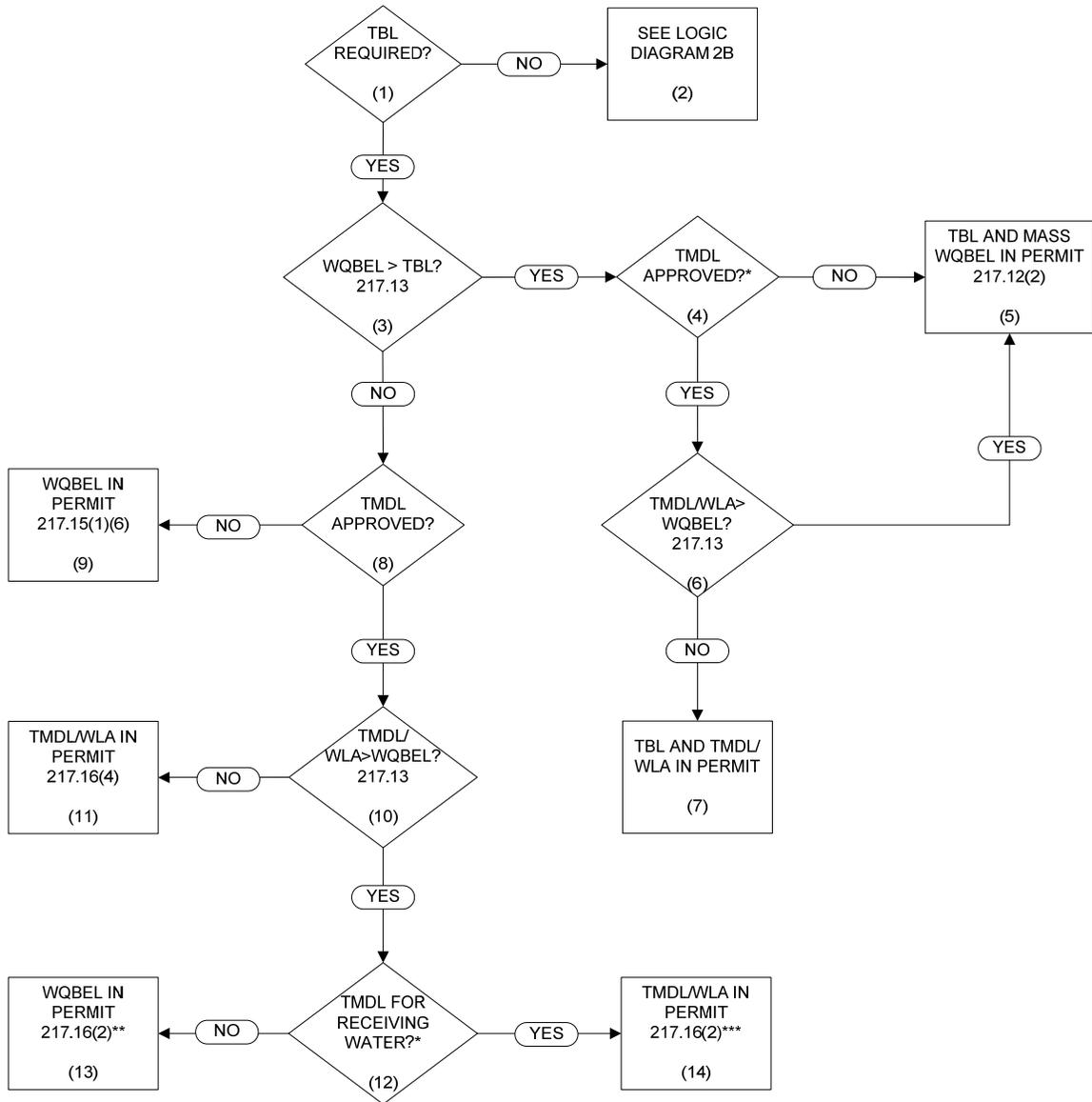
### LOGIC DIAGRAM 1B

DETERMINING APPLICABLE TOTAL PHOSPHORUS WATER QUALITY CRITERIA (WQC) FOR LAKES ≥ 5 ACRES



## LOGIC DIAGRAM 2

Selecting Effluent Limits for Existing Dischargers



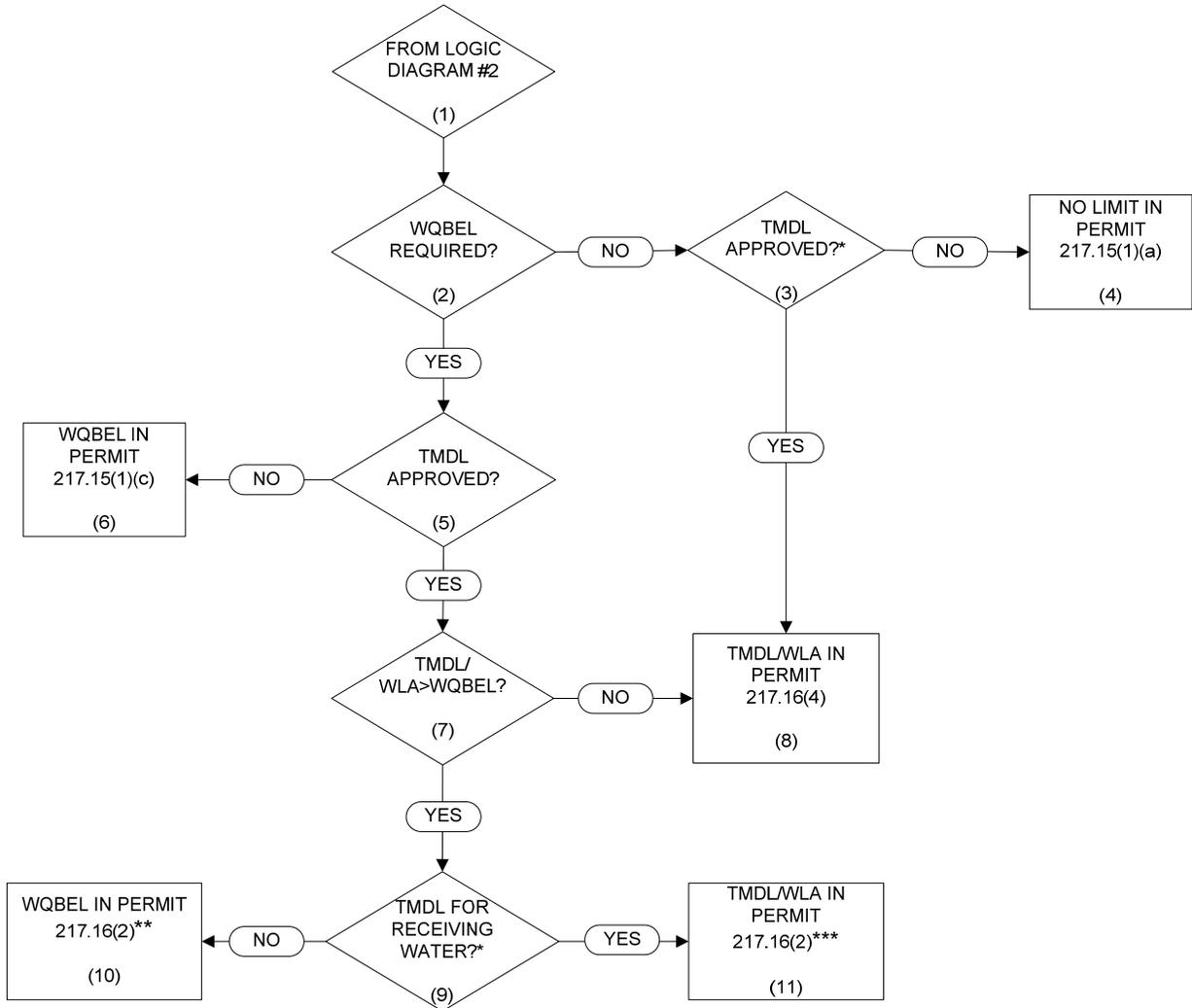
\*- When a point source discharges to a surface water that is not impaired, it still may have a WLA from a TMDL for a downstream reach that is impaired.

\*\*- If the surface water to which the point source discharges is not impaired, the WQBEL should be included in the permit in lieu of the TMDL/WLA to assure the applicable water quality criteria continues to be met in the immediate receiving water..

\*\*\*- If WQBEL has already taken effect in a permit, TMDL/WLA may replace WQBEL pursuant to antidegradation procedures in NR 217.16(3)

## LOGIC DIAGRAM 2B

### Selecting Effluent Limits for Existing Dischargers



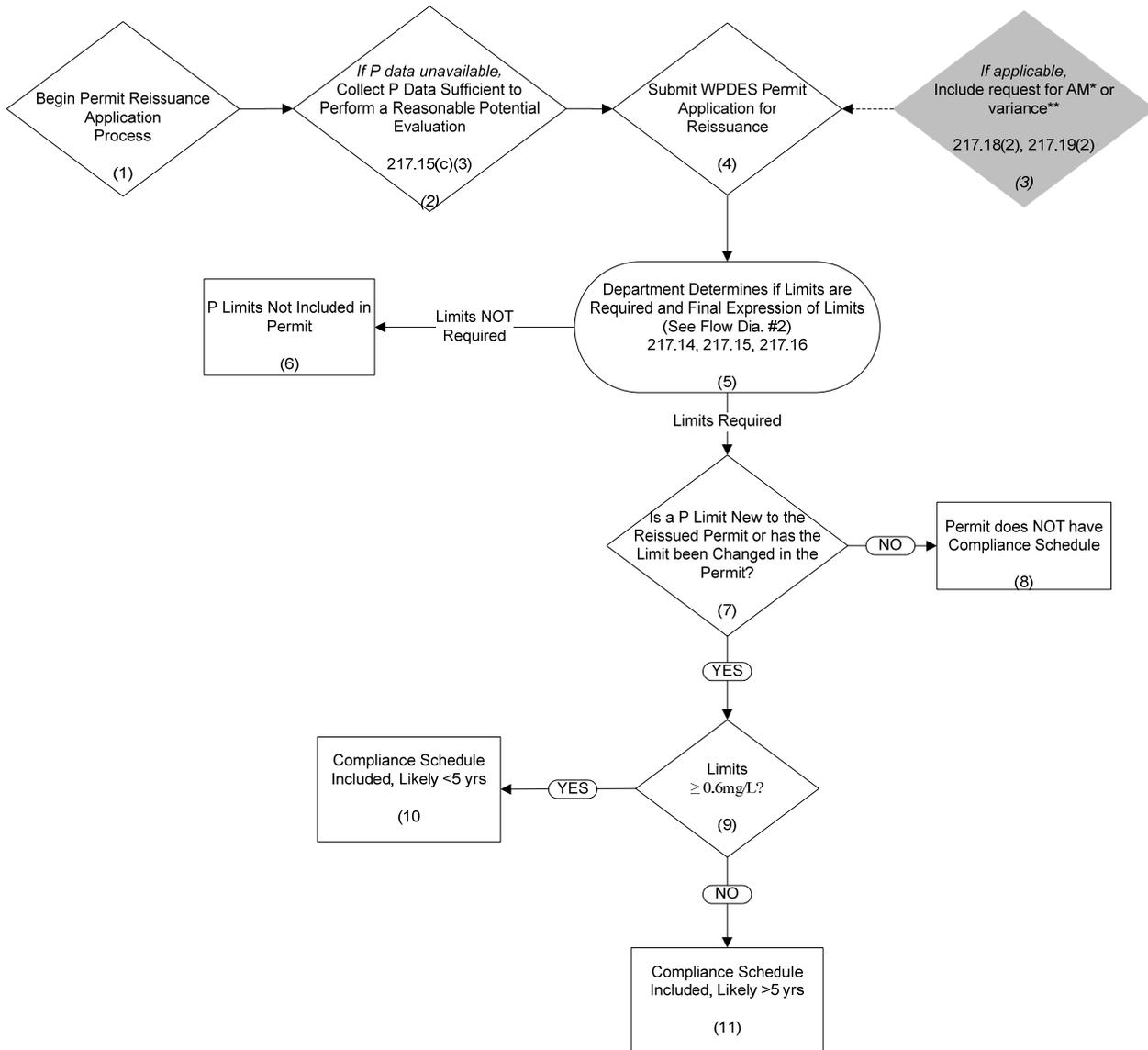
\*- When a point source discharges to a surface water that is not impaired, it still may have a WLA from a TMDL for a downstream reach that is impaired.

\*\*- If the surface water to which the point source discharges is not impaired, the WQBEL should be included in the permit in lieu of the TMDL/WLA.

\*\*\*- If WQBEL has already taken effect in a permit, TMDL/WLA may replace WQBEL pursuant to antidegradation procedures in NR 217.16(3)

**LOGIC DIAGRAM 3**

Permit Process for Applicant and Potential Outcomes for Compliance Schedules



\*- AM requests must be submitted with the WPDES permit application for reissuance pursuant to 217.18(2). However, the Department may allow time for facility planning in a compliance schedule. If during the facility planning process the AM option is selected, the permittee may include the AM request in the next WPDES permit application.

\*\*- Variance applications for lagoon systems may be submitted with the WPDES permit application for reissuance, or within 30 days after the permittee receives written notification of the proposed P limits pursuant to 217.19(2); all other variance applications must fulfill timeline set for in s. 283.15(4)(a).

**Phosphorus Rule Limits Implementation Matrix**

WQ Evaluation Cases	How to Set Limits	Limit Type	Implementation Option		Expression of WQBELs (see separate section of guidance)
			Adaptive Management?	Trade?	
1) Waterbody with a U.S. EPA approved TMDL	TMDL (see Section 2.03)	- TMDL limit w/comp. schedule (if needed) - WQBEL w/comp. schedule (if needed)	√	√	As set by the TMDL
2) Impaired waterbody on 303(d) list without an approved TMDL	WQBEL = WQC	- WQBEL w/comp. schedule	√	√	Concentration and mass If > 0.3 - Monthly avg. If < 0.3 - Annual avg. with monthly avg. = 3 X annual avg.
3) Background > WQC but not on 303(d) impaired water listed	Same as 2)	Same as 2)	√	√	Monthly avg. conc. and maybe mass limits if increase in load is likely to result in adverse affects in the receiving or downstream water (s. NR 217.14(1)(b).
4) Background (assumed or measured) < WQC  Note: Background P data is available on the P Data Layer at <a href="http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer">http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer</a>	Mass balance formula a) WQBEL >1  b) WQBEL <1  c) R.P. indicates permittee is meeting WQBEL	a) Technology based limit w/comp. schedule (if needed) b) WQBEL w/comp. schedule (if needed) c) Monitoring only in permit	√	√	a) Monthly avg. conc. and maybe mass limits based on the WQBEL *  b and c) • If > 0.3 - Monthly avg. conc.; maybe mass * • If < 0.3 - Annual avg. with monthly avg. = 3 X annual avg.; maybe mass *

\* Mass limits must be imposed in a permit for a discharge to a receiving or downstream water if the receiving or downstream water is a lake or reservoir, an outstanding or exceptional water (as designated in ss. NR 102.10 or 102.11, Wis. Adm. Code) and a phosphorus-impaired water whether or not it has an approved TMDL.

# Chapter 1

## **Section 1.04: Site-Specific Criteria**

**Author: Amanda Minks**

**Last Revised: November 19, 2011**

Wisconsin's phosphorus criteria are meant to be reflective of water quality across the state and are derived from water quality reference conditions. Although this methodology provides the most protection on a statewide basis, some waterbodies may have unique physical and/or biological characteristics that a state criterion cannot account for. These site-specific conditions may cause Wisconsin's phosphorus criteria to be over or under-protective than necessary to maintain a balanced indigenous biological community, particularly when:

1. High phosphorus concentrations naturally occur due to geography and soil type, or
2. The physical and/or chemical characteristics of the site alter the biological availability of phosphorus.

The Federal water quality standards regulation at section 131.11(b)(1)(ii) and s. NR 102.06(7), Wis. Adm. Code, gives Wisconsin the opportunity to adopt site-specific water quality criteria for phosphorus to account for these unique characteristics.

Site-specific criteria, as with all water quality criteria, must be based on a sound scientific rationale in order to protect the designated use(s) of the site. In the case of phosphorus the primary designated uses of concern are recreational uses, human health, and fish and aquatic life. Site-specific criteria may be derived by the Department or other parties in partnership with the Department, and are subject to review and approval by the U.S. EPA. The primary audience to consider site-specific criteria for phosphorus will likely be dischargers seeking less stringent limits or the Department right-sizing existing criteria. The Department is currently working to develop additional guidance to help these audiences derive site-specific criteria for phosphorus. For more information contact the Water Evaluation Section, Water Quality Standards Specialist.

## **Chapter 2- Calculating Water Quality Based Effluent Limits for Phosphorus**

Chapter 2 is designed to provide guidance on various elements of water quality based effluent limits (WQBELs) and calculating WQBELs. Department staff are responsible for calculating WQBELs in permits and are, therefore, the primary audience in this Chapter.

The regulated community is responsible to collect sufficient information to calculate WQBELs. For details on monitoring and data collection see Chapter 5 of the Guidance. The regulated community and other groups may also be interested in calculating WQBELs, particularly for facility planning. Flow diagram 2 and 2B in Chapter 1 Section 1.03 of the Guidance are designed to provide the regulated community with a general understanding of limit expression.

## Chapter 2

### Section 2.01: Calculation of Phosphorus Limits

Author: Mike Hammers and Diane Figiel

Last Revised: December 1, 2011

#### Water Quality Based Effluent Limits for Phosphorus for Rivers and Streams

For discharges of phosphorus to flowing streams and rivers, water quality based effluent limitations are calculated using the formula from s. NR 217.13(2), Wis. Adm. Code. This is the same conservation of mass equation from s. NR 106.06(4)(b), Wis. Adm. Code.

$$\text{Limitation} = [(WQC) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)] / Q_e$$

Where:

Limitation = Water quality based effluent limitation (in units of mass per unit of volume),

WQC = The water quality criterion concentration (in units of mass per unit volume) from s. NR 102.06,

$Q_s$  = Receiving water design flow (in units of volume per unit time)

$Q_e$  = Effluent flow (in units of volume per unit time)

$f$  = Fraction of the effluent flow that is withdrawn from the receiving water, and

$C_s$  = Upstream concentration (in units of mass per unit volume)

#### Water Quality Criteria

Applicable water quality criteria are found in s. NR 102.06, Wis. Adm. Code, and discussed in section 1.01 of this Guidance.

#### Receiving Water Flow ( $Q_s$ )

The receiving water flow ( $Q_s$ ) used in calculating phosphorus effluent limitations for discharges to flowing waters should be either:

1. The average minimum 7-day flow that occurs once every 2 years (7-day  $Q_2$ ),  
or
2. The average low 30-day flow that occurs once every 3 years (30-day  $Q_3$ ).  
The full 7-day  $Q_2$  or 30-day  $Q_3$  is used because phosphorus impacts are due to long term exposure after full mixing has occurred.

The 7-day  $Q_2$  will likely be the available low flow as this is used in the calculation of other limits. If not and a 30-day  $Q_3$  is available, the 7-day  $Q_2$  can be estimated as the 30-day  $Q_3$  divided by 85%. As another option the facility may contact the United States Geological Survey (USGS) to obtain low flows. Seasonal or monthly low flows can be used to calculate seasonal or monthly limits in lieu of year-round values.

#### Effluent Flow ( $Q_e$ ) (s. NR 217.13(2)(c))

For municipal discharges subject to ch. NR 210, Wis. Adm. Code,  $Q_e$  is the annual average design flow. For discharges that are not subject to ch. NR 210, Wis. Adm. Code, the maximum demonstrated annual average flow or a monthly average flow may be used.

For non-continuous discharge situations such as seasonal discharges and discharges proportional to stream flow,  $Q_e$  is determined on a case-by-case basis. This includes fill-and-draw discharges from municipalities even though they are subject to ch. NR 210, Wis. Adm. Code. There is a need to evaluate the variability of the effluent flow over time to determine if an annual value or some alternative value should be used. Chapter 4 of the "Implementation Guidance for Wisconsin's Thermal Water Quality Standards" gives examples of how to evaluate  $Q_e$  in these cases.

Upstream Concentrations (s. NR 217.14(1)(d), Wis. Adm. Code)

Representative upstream background data is needed to calculate water quality based effluent limits for phosphorus. Existing phosphorus data has been included and summarized on the watershed viewer. The data and a summary of how the ch. NR 217, Wis. Adm. Code, total phosphorus concentrations were calculated can be found at [http://dnr.wi.gov/org/water/swims/datasets/river\\_phos\\_stations.htm](http://dnr.wi.gov/org/water/swims/datasets/river_phos_stations.htm)

When data for the actual receiving water is not available a similar, comparable stream based on size, drainage basin, topography and land use may be used. The facility may also want to consider collecting additional background data. Guidance on ambient phosphorus monitoring is included in Section 5.01 of this document. While existing data, which may not meet the strict definition of the code, can be used, future monitoring should be consistent with this guidance and the determination of upstream concentrations will be evaluated at each permit reissuance.

If the upstream concentration is greater than the phosphorus criterion specified in s. NR 102.06 for the water body the calculated water quality based effluent limitation will be less than the criterion and should be set equal to the criterion per s. NR 217.13(7), Wis. Adm. Code. If not the calculation procedures in s. NR 217.13, Wis. Adm. Code, are used.

**Water Quality Based Effluent Limits for Phosphorus for Reservoirs and Lakes**

For discharges of phosphorus directly to inland lakes, reservoirs, and other receiving waters, which do not exhibit a unidirectional flow at the point of discharge, the effluent limit is set equal to the criterion for the receiving water or the downstream water.

For reservoirs and lakes the total phosphorus criterion from s. NR 102.06(4), Wis. Adm. Code, are:

- For stratified reservoirs, total phosphorus criterion is 30 µg/L.
- For reservoirs that are not stratified, total phosphorus criterion is 40 µg/L.
- For lakes that do not exhibit unidirectional flow:
  1. For stratified, two-story fishery lakes, 15 µg/L.
  2. For lakes that are both drainage and stratified lakes, 30 µg/L.
  3. For lakes that are drainage lakes, but are not stratified lakes, 40 µg/L.
  4. For lakes that are both seepage and stratified lakes, 20 µg/L.
  5. For lakes that are seepage lakes, but are not stratified lakes, 40 µg/L.

These water bodies are defined in s. NR 102.06(2), Wis. Adm. Code. Waters impounded on rivers or streams that don't meet the definition of reservoir are required to meet the river and stream criterion (either 100 µg/L or 75 µg/L) that applies to the primary stream or river entering the impounded water.

The total phosphorus criteria for the great lakes are as follows:

(a) 5 µg/L For both open and nearshore waters of Lake Superior.

(b) 7 µg/L For both open and nearshore waters of Lake Michigan, excluding the portion of Green Bay from the mouth of the Fox River to a line from Long Tail Point to Point au Sable. Section NR 102.06(5)(c), Wis. Adm. Code, provides a narrative requiring that the water clarity and other phosphorus-related conditions are suitable for support of a diverse biological community, including a robust and sustainable area of submersed aquatic vegetation in shallow water areas.

Tools are available to help Department staff to make waterbody classification determinations including the Register of Waterbodies (ROW) and Surface Water Integrated Monitoring System (SWIMS). It may also be advantageous to contact lead staff from the Water Evaluation and Lake Sections if uncertainty exists.

#### **Exclusions from Phosphorus Water Quality Criteria**

Pursuant to s. NR 102.06(6), Wis. Adm. Code, water quality criteria are not provided for (a) Ephemeral streams (b) Lakes and reservoirs of less than 5 acres in surface area (c) Wetlands, including bogs and (d) Waters identified as limited aquatic life waters in ch. NR 104. However downstream impacts should be considered as described in Section 2.05 of this Guidance.

If a discharge has previously been treated as a wetland, LAL, or ephemeral stream discharge, it should continue to be treated as such. For discharges where a determination has not yet been made, ch. NR 104, Wis. Adm. Code, and/or the wetland inventory in the Surface Water Data Viewer (SWDV) should be consulted. There are two layers that are important to identify wetlands in the SWDV Wetland Inventory and the Wetland Indicator Soils. If the Wisconsin Wetland Inventory indicates that an area is a wetland, it is presumed correct. If the Wetland Indicator Soils layer indicates that wetland soils are present but not shown as a wetland polygon in the Wisconsin Wetland Inventory, a case-by-case determination is required and regional biologists should be conferred. Wetland staff may also be contacted if there are any wetland delineation questions.

#### **Site-Specific Criteria**

Section NR 217.13(5), Wis. Adm. Code, allows for a site-specific criterion in place of the generally applicable criteria as long as it is protective of the designated use of the specific surface water segment or waterbody, and does not interfere with designated use attainment in downstream waters. This requires site-specific data and analysis using scientifically defensible methods and sound scientific rationale. Guidance is being

developed to derive site-specific criteria for phosphorus. Contact the Water Evaluation Section, Water Quality Standards Specialist for further detail.

**Other Considerations**

Factors such as reasonable potential, TMDL based limits, downstream waters, multiple and new dischargers need to be considered and are addressed in other chapters of the guidance.

## Chapter 2

### **Section 2.02: Reasonable Potential**

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Consistent with U.S. EPA regulations, s. NR 217.15, Wis. Adm. Code, contains requirements for making a “reasonable potential” determination. That is, for all point sources that discharge phosphorus and are subject to ch. NR 217 subchapter III, Wis. Adm. Code, the Department must make a determination whether the discharge (or discharges) from the point source has a reasonable potential to cause or contribute to a water quality impairment by exceeding the calculated water quality based effluent limit (WQBEL). See Section 1.02 of the Guidance for details on the applicability of ch. NR 217 subchapter III, Wis. Adm. Code. A phosphorus limitation is required to be included in a WPDES permit if there is the reasonable potential for that limit to be exceeded in the discharge covered under that permit.

#### **Section NR 217.15 (1) (b), Wis. Adm. Code, Permits with Phosphorus Technology Based Limits**

Pursuant to s. NR 217.15 (1) (b), Wis. Adm. Code, a permittee is deemed to have reasonable potential to cause or contribute to an exceedance of a phosphorus WQBEL if the permittee already has a technology based phosphorus limit (TBL) in its permit and that TBL is less restrictive than the WQBEL expressed as a concentration. In cases where the facility is subject to ch. NR 210, Wis. Adm. Code, the comparison is straightforward as both the WQBEL and the TBL are expressed as monthly averages. The phosphorus WQBEL will be included in the WPDES permit and no further reasonable potential analysis is required, such as the P<sub>99</sub> calculation.

In the case of industries, the comparison is slightly more complicated as the TBL is expressed as a 12-month rolling average. In these instances, the guidance in U.S. EPA's Technical Support Document for Water Quality-Based Toxics Control<sup>1</sup> can be used to statistically convert the 12-month rolling average limit into a monthly equivalent limit, which then can be directly compared with the WQBEL:

$$MTBL = TBL * e^{[2.326\sigma_n - 0.5\sigma_n^2]}$$

Where:

MTBL = monthly equivalent limit

TBL = 12-month rolling average technology based limit

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<sup>1</sup> United States Environmental Protection Agency (USEPA). 1991b. Technical Support Document for Water Quality-based Toxics Control. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

$$\sigma_n^2 = \ln(\text{CV}^2/n + 1)$$

By knowing the CV (coefficient of variation which equals the standard deviation divided by the mean of representative effluent data) of the effluent phosphorus data and sampling frequency, the following look-up table can be used to simplify the procedure:

CV	TBL Multipliers						
	$e^{\left[2.326\sigma_n - 0.5\sigma_n^2\right]}$						
	Sample Frequency						
	1/Month	2/Month	Weekly	2xWeek	3xWeek	5xWeek	Daily
0.1	1.25	1.18	1.12	1.09	1.07	1.05	1.04
0.2	1.55	1.37	1.25	1.18	1.14	1.11	1.09
0.3	1.90	1.59	1.40	1.27	1.22	1.16	1.13
0.4	2.27	1.83	1.55	1.37	1.30	1.22	1.18
0.5	2.68	2.09	1.72	1.48	1.38	1.28	1.23
0.6	3.11	2.37	1.90	1.59	1.47	1.34	1.28
0.7	3.56	2.66	2.08	1.71	1.56	1.41	1.33
0.8	4.01	2.96	2.27	1.83	1.66	1.47	1.39
0.9	4.46	3.28	2.48	1.96	1.75	1.54	1.44
1	4.90	3.59	2.68	2.09	1.86	1.61	1.50

Example 1:

Facility FF has a 12-month rolling average TBL of 1.2 mg/L and the calculated WQBEL is 2.0 mg/L. The CV of the effluent data is 0.6 and the effluent is sample once per week, which results in a TBL multiplier of 1.90. The monthly equivalent limit is then calculated as 1.90 x 1.2 mg/L = 2.28 mg/L. As this is greater than the WQBEL of 2.0 mg/L, the TBL is less restrictive, and the WQBEL would be included in the WPDES permit.

Example 2:

This example is the same as Example 1, except the CV of the effluent data is 0.4 and the effluent is sample three times per week, which results in a TBL multiplier of 1.30. The monthly equivalent limit is then calculated as 1.30 x 1.2 mg/L = 1.56 mg/L. As this is less than the WQBEL of 2.0 mg/L, the TBL is more restrictive, and the TBL would be included in the WPDES permit.

As specified in s. NR 217.12 (2), Wis. Adm. Code, a TBL will be included in the WPDES permit if the TBL is more stringent than the WQBEL expressed as a concentration. Any water quality based mass limits calculated pursuant to s. NR 217.14 (1) and (3), Wis. Adm. Code, will also be included in the WPDES permit to accompany the technology based phosphorus limit. Mass limits shall be required for phosphorus discharges to a lake or reservoir, outstanding or exceptional resource waters (O/ERWs), phosphorus

impaired waters on the 303(d) impaired waters list, or a surface water with an approved TMDL. Mass limits may also be required to protect downstream waters. For additional information on mass limits, see Section 2.01 of the Guidance.

### **Section NR 217.15 (1) (c), Wis. Adm. Code, Permits without Phosphorus Technology Based Limits**

A reasonable potential determination is required and the procedures in s. NR 217.15 (1) (c), Wis. Adm. Code, are to be used for dischargers subject to phosphorus WQBELs that do not have TBLs. Generally, dischargers that fall under s. NR 217.15 (1) (c), Wis. Adm. Code, tend to be smaller in size and don't meet the phosphorus mass thresholds in Subchapter II of ch. NR 217, Wis. Adm. Code.

To make a reasonable potential determination, a  $P_{99}$  calculation will be performed pursuant to s. NR 217.15(1)(c)1, Wis. Adm. Code, provided there are at least 11 representative daily discharge concentrations that are greater than the appropriate level of detection.

#### Representative data means:

In general, discharge data should be less than five years old at the time of the permit application. If the data is more than five years old, additional samples should be collected and analyzed by the permittee, to determine whether or not the older data is representative. At least two additional samples per month should be collected to validate data collected more than five years ago. If collected data does not represent normal operating conditions it may be censored from the dataset. Unrepresentative operating conditions may include significant fluctuations in the size of the wasteload being treated, changes in manufacturing processes, short-term treatment failure, or emergency conditions.

#### Less than 11 representative data points

According to s. NR 217.15 (c) 2, Wis. Adm. Code, if fewer than 11 representative samples are available, the determination of reasonable potential may be based on the arithmetic mean of available and representative effluent concentrations being greater than one-fifth of the calculated water quality-based effluent limit.

#### No representative data

Where no representative data exists, s. NR 217.15 (1) (c) 3, Wis. Adm. Code, gives the Department two options: require collection of discharge concentration samples or extrapolate information from similar point source dischargers. If no representative data is available, the Department strongly recommends that permittees collect sufficient data to perform an upper 99<sup>th</sup> percentile ( $P_{99}$ ) calculation prior to permit application.

Pursuant to s. NR 217.15 (1) (d), Wis. Adm. Code, the Department may require collection of the samples as part of the permit application for reissuance. See Section 5.01 for details on effluent monitoring.

If the permittee does not submit sufficient data, extrapolation can be used to perform a P<sub>99</sub> calculation. To extrapolate data, information should be obtained from dischargers of similar size, manufacturing processes, and treatment process. The Department must then use conservative assumptions about the facilities. To avoid overly conservative limits being generated, it is recommended that permittees collect sufficient data rather than relying on extrapolation.

Reasonable Potential P<sub>99</sub> Analysis - s. NR 217.15(1)c 1, Wis. Adm. Code.

If there are at least 11 daily discharge concentrations considered representative of current discharges, an upper 99<sup>th</sup> percentile (P<sub>99</sub>) of a 30-day average discharge is calculated using the procedures in s. NR 106.05 (5), Wis. Adm. Code. This is the same equation that is used for reasonable potential determination for many toxic substances. The equation in s. NR 106.05 (5) (a), Wis. Adm. Code, is as follows:

$$P_{99} = \exp (\mu_{dn} + Z_p * \sigma_{dn})$$

P <sub>99</sub>	= Upper 99th percentile of n-day average discharge concentrations.
d	= Ratio of the number of daily discharge concentrations less than the limit of detection to the total number of discharge concentrations. Generally, all sample results should exceed the limit of detection.
n	= Number of discharge concentrations used to calculate an average over a specified monitoring period (n=1 for daily concentrations, 4 for 4-day averages and 30 for 30-day averages). The 30-day average should be used.
exp	= Base e (or approximately 2.718) raised to the power shown between the parentheses in the original equation.
Z <sub>p</sub>	= Z value corresponding to the upper pth percentile of the standard normal distribution.
P	= (0.99-dn)/(1-dn).

$\mu_{dn}$	$\mu_d + \frac{(\sigma_d)^2 - (\sigma_{dn})^2}{2} + \ln\left[\frac{(1-d)}{(1-dn)}\right]$ = estimated log mean of n-day average discharge concentrations greater than the limit of detection. (Note: $\mu_{dn} = \mu_d$ , if $n = 1$ ).
$(\sigma_{dn})^2$	$\ln\left[\frac{(1-dn) \left(1 + \frac{s}{m}\right)^2}{[n(1-d)] + (n-1)/n}\right]$ = estimated log variance of n-day average discharge concentrations greater than the limit of detection. [Note: $(\sigma_{dn})^2 = (\sigma_d)^2$ , if $n = 1$ .]
$\mu_d$	$\ln m - 0.5 (\sigma_d)^2$ = estimated log mean of discharge concentrations greater than the limit of detection.
$(\sigma_d)^2$	$\ln\left[1 + \left(\frac{s}{m}\right)^2\right]$ = estimated log from variance of discharge concentrations greater than the limit of detection.
$\ln$	= Natural logarithm.
$m$	= Mean of discharge concentrations greater than the limit of detection.
$s$	= Standard deviation of discharge concentrations greater than the limit of detection.

*Note: Department limit calculator staff do not need to modify the reasonable potential excel spreadsheets for the phosphorus reasonable potential determination. The same general procedure to calculate the reasonable potential for toxic substances can be used for phosphorus.*

Example 1:

Facility FF discharges phosphorus on a daily basis to a river listed in s. NR 102.06, Wis. Adm. Code, with a phosphorus criterion of 100 µg/L and the river exceeds the criteria. As such, there is no assimilative capacity and the WQBEL assigned is equal to the criterion. The discharge was monitored on a monthly basis with the following results:

Date	Concentration (µg/L)
1/11/2010	50
2/4/2010	50
3/7/2010	90
4/5/2010	70

5/2/2010	50
6/7/2010	80
7/13/2010	110
8/9/2010	80
9/7/2010	150
10/5/2010	80
11/7/2010	100
12/5/2010	90

The 30-day  $P_{99}$  result is 96  $\mu\text{g/L}$ . This is less than the 100  $\mu\text{g/L}$  (0.1 mg/L) WQBEL. Therefore, it is deemed that the discharge does not have the reasonable potential to cause an exceedance of the criterion. No phosphorus WQBEL is required.

Example 2:

This example is the same as Example 1, except the discharge is to a stream with a phosphorus criterion of 75  $\mu\text{g/L}$ , and the stream exceeds the criteria. As such, there is no assimilative capacity and the WQBEL is set equal to the criterion. The discharge was monitored on a monthly basis using the same data as in Example 1. Again, the 30-day  $P_{99}$  result is 96  $\mu\text{g/L}$ . In this case, however, the 30-day  $P_{99}$  exceeds the applicable criteria of 75  $\mu\text{g/L}$  (0.075 mg/L). Therefore, it is deemed that the discharge does have the potential to cause an exceedance of the criterion and a WQBEL should be included in the WPDES permit.

**Reasonable Potential for Limited Aquatic Life (LAL) Systems**

As described in Section 1.01 of the Guidance, LAL systems, ephemeral streams, and wetlands do not have applicable criteria. Discharges to these waters may be subject to phosphorus WQBELs if they can cause or contribute to an exceedance of the downstream criteria. If a discharge to a LAL, ephemeral stream, or wetland system has no potential to cause or contribute to an exceedance of the applicable water quality criteria in the downstream segment, phosphorus limits may not be required at this time.

*Note: In the future, criteria may be derived for these waterbody types and a reasonable potential analysis would need to be performed based on the new criteria.*

A discharger may submit in-stream phosphorus monitoring data and/or data analyses to the Department to illustrate that the effluent does not cause an exceedance in the downstream water. If insufficient data has been submitted to the Department, or the data suggests that the discharge has an impact to the downstream water, limits will be included in the WPDES permit based on the criteria and flow conditions for the next

stream segment downstream. All monitoring must be conducted consistent with the Department guidance on stream monitoring (see chapter 5.01 of the Guidance for details).

There are several monitoring and data analyses strategies that can be used to make this determination. The Department and regulated community have flexibility in selecting any of the following options or developing new strategies to best represent specific site conditions. The following strategies focus on LAL discharges for ease of description; however, the same logic can be applied to wetland and ephemeral stream discharges:

*Note: Ambient and downstream monitoring for all in-stream monitoring scenarios should only be conducted during periods of active discharge.*

**Option 1: Downstream monitoring**

In this scenario, monitoring is conducted in the stream or river segment with applicable water quality criteria. This scenario assumes that the LAL system flows into a larger waterbody with an applicable criterion. In this case, monitoring should occur upstream and downstream of the LAL tributary. The downstream monitoring site should be selected where the LAL tributary is completely mixed with the larger waterbody. At least monthly in-stream samples should be collected and submitted to the Department. For details on in-stream monitoring see Section 5.01 of the Guidance. If previous data has been collected using appropriate methods within the past five years, that data can be used without additional monitoring. If historical data is available, supplementary data collection will be required to validate that this historical data is representative.

Once sufficient data is available, upstream and downstream monitoring data can be compared to determine the phosphorus change due to the LAL tributary flow, primarily comprised of the discharge:

$$\% \text{ change} = [Cr - Cs] / Cs * 100$$

Where:

Cr	=	Concentration in receiving water downstream of LAL tributary
Cs	=	Concentration in receiving water upstream from LAL tributary

*Note: In cases where the LAL tributary does not flow into a larger waterbody, but becomes large enough to have an applicable criterion, the equation above can still be used. In this case, the Cs would be set equal to the phosphorus concentration in the effluent.*

Department limit calculator staff will use professional discretion to evaluate these results and determine if discharge limits are required to protect the downstream “receiving water”.

*Note: if the discharge increases its phosphorus load in-stream monitoring would need to be performed to ensure that the downstream water is still being protected and the applicable water quality criteria is still being attained. If new monitoring data is not submitted to the Department, phosphorus WQBELs will be included in the WPDES permit.*

**Option 2: Change in concentration analysis for LAL tributary with one phosphorus discharge**

A “change in concentration” analysis quantifies the potential for a phosphorus load (mass) to change receiving water concentrations. In this case, the phosphorus load is the discharge to the LAL tributary and the “receiving water” of interest is the stream or river segment downstream with applicable water quality criteria. For this calculation, the design capacity of the facility, the phosphorus effluent concentration, and ambient conditions of the downstream segment with the applicable criterion must be know.

Using this data, it is possible to calculate the projected phosphorus concentration (Cr) of the downstream stream or river segment:

$$Cr = [Cs * Qs + Ce * Qe] / [Qs + Qe]$$

Where:

Cr	=	Concentration in “receiving water” downstream of LAL tributary
Cs	=	Concentration in “receiving water” upstream of the LAL tributary
Ce	=	Concentration in effluent discharged
Qs	=	7Q2 or 30Q3 of “receiving water” upstream of the LAL tributary
Qe	=	Design average annual flow for facility

*Note: the equation may use concentrations in either mg/L or µg/L as long as they are used consistently. Flows should be expressed as cubic feet per second.*

Once the projected Cr has been quantified, the percent change equation in example one can be used. Again, Department limit calculator staff will use professional discretion to evaluate these results and determine if discharge limits are required to

protect the downstream “receiving water”. In-stream monitoring for data verification purposes may be beneficial in addition to this analysis.

**Option 3: Water Quality Modeling**

The Department will consider and review modeling and/or other data analyses submitted to the Department to illustrate that an LAL discharge will not cause or contribute to an exceedance of the applicable downstream water quality criteria.

**Multiple discharges**

For LAL waters that have multiple discharges, the phosphorus contributions from each discharge will be added to determine the cumulative impacts of the discharges to the downstream stream or river segment with applicable water quality criteria. In the case of multiple discharges, Option 1 could be applied. If upstream and downstream monitoring in the waterbody with the applicable criteria determines that the cumulative discharges are not causing, or have the potential to cause, an exceedance of the applicable water quality criteria, phosphorus WQBELs may not be required.

Another option to account for multiple discharges is to use the change in concentration equation provided in Option 2. In this case, however,  $C_e$  would represent the combined concentration in the effluent discharges and the  $Q_e$  would represent the combined design average annual flows for the discharges.

## Chapter 2

### **Section 2.03: Expression of Phosphorus Limits**

Author: Mike Hammers and Diane Figiel

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#### **Expression of limit**

##### **Technology Based Limits (TBLs)**

TBLs for phosphorus are expressed in WPDES permits as monthly average concentrations (ss. NR 217.04 (1)(a) 1 and 2, Wis. Adm. Code). For permittees other than publicly owned treatment works and privately owned domestic sewage works (i.e., industrial permittees), compliance must be determined on the basis of a 12-month rolling average (s. NR 217.04 (1)(a) 2, Wis. Adm. Code). Permit drafters should continue to specify "Rolling 12-Month Average" as the limit type in the System for Wastewater Applications Monitoring and Permits (SWAMP) for industrial permittees.

##### **Water Quality Based Effluent Limits (WQBELs)**

WQBELs for phosphorus derived and determined necessary pursuant to ss. NR 217.13 and NR 217.15, Wis. Adm. Code, shall be expressed in WPDES permits as a concentration. A mass limit shall also be included in the permit for a discharge directly to, or upstream from, a lake or reservoir, outstanding or exceptional resource water, 303(d) listed phosphorus-impaired water, or surface water with an approved TMDL for phosphorus [s. NR 217.14 (1), Wis. Adm. Code]. For receiving or downstream waters other than those just listed, a mass limit may be included in the permit in addition to the concentration limit when an increase in the phosphorus load is likely to result in adverse effects on water quality in the receiving or downstream water [s. NR 217.14 (1)(b), Wis. Adm. Code]. Mass limits shall be calculated from the concentration limit and the effluent flow ( $Q_e$ ) used to derive the concentration limit [s. NR 217.14 (3), Wis. Adm. Code].

Example: The conservation of mass equation from s. NR 217.13 (2), Wis. Adm. Code, is used to calculate a monthly average limit of 0.45 mg/L. Assuming the effluent flow used in the equation equals 1.5 MGD, and the receiving water is impaired for phosphorus and a TMDL has not been developed, a monthly average mass limit of 5.6 lbs/day (i.e.,  $0.45 \text{ mg/L} \times 1.5 \text{ MGD} \times 8.34$ , a conversion factor) would be included in the permit along with the concentration limit of 0.45 mg/L.

Water quality based effluent limits derived pursuant to s. NR 217.13, Wis. Adm. Code, both concentration and mass, shall be expressed in permits as monthly average limits with the following exceptions [ss. NR 217.14 (2) and (3), Wis. Adm. Code]. If the concentration limit is less than or equal to 0.3 mg/L, the concentration and mass limits should be expressed as annual average limits and an additional limit equal to three

times the concentration limit should also be included in the permit as a monthly average concentration limit.

Example: If the WQBEL derived pursuant to s. NR 217.13, Wis. Adm. Code, equals 0.25 mg/L,  $Q_e$  equals 1 MGD, and the receiving water is upstream of a reservoir, the following effluent limits would be included in the permit: a monthly average concentration limit of 0.75 mg/L and annual average limits of 0.25 mg/L and 2.1 lbs/day (i.e.,  $0.25 \text{ mg/L} \times 1 \text{ MGD} \times 8.34$ ).

For discharges to lakes, an annual mass limit is always required [s. NR 217.14 (1)(c), Wis. Adm. Code]. If the concentration limit derived pursuant to s. NR 217.13, Wis. Adm. Code, is less than or equal to 0.3 mg/L, the method specified in the previous paragraphs may be used to establish the annual mass limit. If the concentration limit is greater than 0.3 mg/L, the annual mass limit should also be calculated from the monthly average concentration limit.

### **Technology based effluent limit (TBL) versus water quality based effluent limit (WQBEL)**

When the TBL for phosphorus is more restrictive than the WQBEL, s. NR 217.12 (2), requires the TBL be included in the permit in lieu of the WQBEL. In addition, any water quality based mass limits specified by ss. NR 217.14 (1) and (3), as explained above, must also be included in the permit.

For example, if technology and water quality based phosphorus limits equal 1 mg/L and 2.2 mg/L, respectively, the discharge is upstream of a phosphorus-impaired segment that lacks an approved TMDL, and the effluent flow rate ( $Q_e$ ) equals 0.75 MGD, permit phosphorus limits would equal 1 mg/L and 14 lbs/day (i.e.,  $2.2 \text{ mg/L} \times 0.75 \text{ MGD} \times 8.34$ ) both expressed as monthly average limits. An industrial permittee would still be able to demonstrate compliance with the concentration limit using a 12-month rolling average concentration, but the average mass of phosphorus discharged each month must be less than or equal to the monthly average mass limit.

### **TMDL/WLA Limits**

When a TMDL has been approved by EPA for the receiving water and a limit based on the TMDL wasteload allocation is included in the permit pursuant to s. NR 217.16, Wis. Adm. Code, the limit shall be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. This limit may be used in place of or along with the WQBEL. See Section 2.04 of the Guidance and TMDL guidance for details.

### **Expression of Interim limit**

#### **Adaptive Management Limits**

Adaptive management requires interim limits of 0.6 mg/L for the first permit term and 0.5 mg/L for the second permit term. These limits shall be expressed as six-month

averages as specified by s. NR 217.18(3)(e) 2 and 3, Wis. Adm. Code. Since the rule does not specify the use of a rolling average to demonstrate compliance, as it does in Subchapter II for industrial point source technology based limits, the interim limit should not be expressed as a rolling average limit. Further, since the rule fails to specify which six-month periods should be used to demonstrate compliance, as it does for upstream phosphorus concentrations ( $C_s$ ), the most common interpretation of a six-month average should be used. That is, the average of effluent samples collected during the periods of January through June and July through December should be used to demonstrate compliance with the six-month average interim limits. Permit drafters should code the six-month average limits in SWAMP just for the months of June and December. Section NR 217.18(3)(e), Wis. Adm. Code, states that compliance schedules of up to 5 years may be allowed for permittees to meet adaptive management interim limits. The determination of compliance schedules, if any, to meet interim limits shall be made on a case-by-case basis.

**Interim limits required when a compliance schedule for phosphorus WQBELs is included in the permit [s. NR 217.17 (3)(c), Wis. Adm. Code]**

Section NR 217.17(3)(c), Wis. Adm. Code, requires that, when granting a schedule of compliance, the department shall include in permit interim effluent limitations representing good management and operation for similar treatment processes based on performance of other wastewater treatment facilities that will lead to compliance with WQBELs. The department should use sound reasoning to set limits that are achievable and that make progress toward phosphorus reductions. However, the need to meet interim limits should not require permittees to invest in “temporary” treatment that will eventually need replacement to achieve stricter effluent quality at a later date, unless there is the reasonable expectation that temporary treatment will be cost-effective in the long run. If the department sets interim limits based on existing capabilities, there is no need to allow compliance schedules to meet interim limits.

Interim Limits Options Table for Facilities with Compliance Schedules to Meet WQBELs

Fac. Type	Existing Limit Basis	Current Limit	Proposed Interim Limit	Reasoning
Muni mechanical > 150 lbs	1.0	1.0 mg/L	1.0 mg/L	Optimization plan required will push plants to perform
	BioP APL w/polishing	1 + mg/L	1.0 mg/L	Bio P plants with chemical polishing can meet 1.0 mg/L
	BioP APL w/o polishing	1 + mg/L	Retain current limit	
Muni mechanical > 150 lbs; lagoon	APL w/chem addition	1 – 2 mg/L	Retain current limit	
	APL w/o chem addition	Existing EQ	Develop APL based on chem. addtn. to pond	We are currently requiring this regularly to achieve technology-based limits
Muni < 150 lbs	None	None	Existing effluent quality	Cannot justify “temporary” upgrade to add chem. trmt. for these small facilities
Industrial > 60 lbs	1.0	1.0	1.0	Optimization plan required will push plants to perform
	APL	1.0 +	Retain current limit	
Industrial <60 lbs but with Reas. potential	None	None	Existing effluent quality	Cannot justify “temporary” upgrade to add chem. trmt. for these small facilities

Note: The table above provides options to calculate interim limits. Limit calculator staff can, and should, use best professional judgment when selecting a method, and when calculating interim limits. Not all statistical methods of evaluation are appropriate for all data sets of phosphorus. The procedures above can be modified as appropriate to better reflect the site-specific conditions of the facility in question. Limit calculator staff should consider similar facility types when determining appropriate interim limits. Anticipated phosphorus ranges for given facility types are being compiled and will be made available to staff to help make this determination.

Permits with a compliance schedule to meet a WQBEL should commonly have language something to the effect: *Starting on the effective date of this permit, the permittee shall develop and implement a phosphorus discharge optimization plan.* The purpose of the optimization plan is to reduce as much of the discharged phosphorus as possible through slight operational changes to the facility. For example, more chemical addition could be used to capture additional phosphorus.

Note: The purpose of the Optimization plan is not the same as the purpose of the Operation and Needs Review (ONR). The purpose of the ONR is to find out if final limits can be met by simply making operational or other minor facility changes; whereas the optimization is just to reduce as much as possible the levels going out.

If a final WQBEL can be achieved by chemical treatment alone, generally the compliance schedule will require compliance within the first permit term. In that case, interim effluent limits may not be needed. However, if a technology based limit is already in effect, it should be retained in the permit and remain in effect until the effective date of the WQBEL.

When a technology based limit is retained in the permit as an interim limit, the averaging period of the limit should not be changed. That is, monthly average limits should continue to be expressed as monthly averages, and 12-month rolling average limits should continue to be expressed as 12-month rolling averages. Since the most restrictive technology based limit of 1 mg/L monthly average will almost always be less restrictive than a 0.6 mg/L six-month average limit, antidegradation will not be an issue if the adaptive management interim limits become effective at a later date.

The following is a list of options on how to determine existing effluent quality, as used in the table above. Each of these options may be considered and a case-by-case determination should be made:

- **P99 where sufficient historical data is available**
  - If sufficient data are available, a 1 day P99 should be calculated. This P99 should be included in the permit as the interim limit. In this case the interim limit should be expressed as a monthly average, if the limit is 1 mg/L or above or a longer term average, if the limit is below 1 mg/L. Oftentimes the difficulty in establishing limitations in this fashion is the limited data for facilities that were exempt from technology based phosphorus limits. Again, facilities with technology based limits should retain these limits as interim limits until the WQBEL becomes effective.
- **Numeric result of P99 calculation done after first 12 months following reissuance**
  - Often times the only phosphorus data available from these facilities are the 4 sample results collected through the permit application process or limited sampling during the permit. If little or no data are available at the time of permit reissuance, generic language may be included in the permit to set the interim limit equal to the P99 once calculated after year 1 of the permit. If this approach is chosen, the preferred method is to base the interim limitation on the 99th percentile of the monthly averages. With this approach, the monthly averages are used in the equations s. NR 106.05(5)(a), Wis. Adm. Code, rather than the individual effluent results. Due to this significant change from the methodology included in the rule, it recommended that rather than incorporating the

equations by rule reference, the equations be directly incorporated into the permit as a footnote to the Monitoring Requirements and Effluent Limitations table.

The s. NR 106.05(5)(a), Wis. Adm. Code, can be significantly simplified, due to a few factors:

- In the equations “n” would always equal one, therefore “Z<sub>p</sub>” is a constant at 2.327
- As the monthly mean effluent concentration will not be below the limit of detection, “d’ is a constant at 0.
- “mu<sub>dn</sub>” equals “mu<sub>d</sub>” since “n” equals one.
- “(sigma<sub>dn</sub>)<sup>2</sup>” equals “(sigma<sub>d</sub>)<sup>2</sup>” since “n” equals one.

Using these simplifications the equations in s. NR 106.05(5)(a), Wis. Adm. Code, can be simplified to:

$$P99 = \exp(a + 2.327 * b)$$

Where:

- P99 = Upper 99<sup>th</sup> percentile of monthly averages (mg/L)
- exp = Base e (or ~2.718) raised to the power shown between the parentheses
- a =  $\ln(m) - 0.5b^2$  (equivalent to “mu<sub>d</sub>” in s. NR 106.05(5)(a))
- b<sup>2</sup> =  $1n [1 + (s/m)^2]$  [equivalent to “(sigma<sub>d</sub>)<sup>2</sup>” in s. NR 106.05(5)(a), Wis. Adm. Code]
- ln = Natural logarithm
- m = Mean of monthly average discharge concentrations (mg/L)
- s = Standard deviation of monthly average discharge concentrations (mg/L)

This methodology will most often result in a higher value than the reported maximum monthly average, and represents a value that could be met immediately. Therefore use of this methodology requires only minimal time to implement after the data has been collected and analyzed.

- **Maximum value of small data set**
  - If considerable data are available, but not sufficient to calculate a P99, the maximum value of the dataset can be used to set the interim limit. In this case the interim limit should be expressed as a monthly average.
- **Using historical data and best professional judgment (BPJ)**
  - Historical data can be used in conjunction with knowledge of the discharge and similar discharge types in the State to make a BPJ determination to set the interim limit. Permit drafters and limit calculators should work collaboratively to set the appropriate interim limit using BPJ.
- **Adaptive Management-based interim limit**

- If a facility is eligible for adaptive management and can easily meet a 0.6 mg/L six month average limit, this limit could be included as the interim limit in the first permit term.
- **Interim limits based on similar facilities**
  - If no data are available but data from similar discharges are, the maximum value from these similar datasets may be used as the interim limit. In this case the interim limit should be expressed as an annual average.
- **Non-numeric limit based on phosphorus discharge optimization plan**
  - An optimization plan should commonly be required for facilities with a compliance schedule. The optimization plan will require a discharge to attain the highest amount of phosphorus removal achievable given the current operational situation. For facilities already operating at optimum levels, an optimization plan would not be required. If facility optimization is required, a narrative interim limit may be included in the permit based on the plan.

### **Interim Limits for Great Lake Discharges**

For Great Lake discharges, an “interim” limit of 0.6 mg/L will be included in the WPDES permit until a nearshore or whole lake model is available [s. NR 217.13(4), Wis. Adm. Code]. U.S. EPA is developing this model. For reasons of simplicity and consistency, interim limits for a Great Lakes discharger [s. NR 217.13 (4), Wis. Adm. Code] should be expressed as six-month averages similar to adaptive management interim limits unless technology based limits are being retained in the permit as interim limits. If a 0.6 mg/L interim limit is not reasonable, a calculated P99 value may be used. Additional phosphorus interim limits are not required to be included in a WPDES permit for a Great Lake’s discharge. However, facility optimization will still be required.

Note: An antidegradation evaluation will be necessary should the permittee select the adaptive management option after an interim limit less than 0.6 mg/L has become effective. For example, if Great Lakes and compliance schedule interim limits are expressed as monthly averages instead of six-month averages, limits less than approximately 0.77 mg/L are more restrictive than a six-month average limit of 0.6 mg/L.

### **Interim Limits for LAL Discharges directly upstream of a Great Lake**

As previously state, limited aquatic life (LAL) systems do not have applicable phosphorus criteria at this time. The need for, and calculation of, limits for these discharges should be based on the downstream water with applicable phosphorus criteria. In cases where the immediate downstream water is a Great Lake, the discharge should be given an “interim” limit of 0.6 mg/L in the WPDES permit until a nearshore or whole lake model is available [s. NR 217.13(4), Wis. Adm. Code] to determine the potential impacts of the discharge of the Lake. For reasons of simplicity and consistency, interim limits for a Great Lakes discharger [s. NR 217.13 (4), Wis. Adm. Code] should be expressed as six-

month averages similar to adaptive management interim limits unless technology based limits are being retained in the permit as interim limits.

## **Chapter 2**

### **Section 2.04: Relationship between WQBELs and TMDL-based Limits**

**Author: Jim Baumann**

**Last Revised: December 23, 2010**

There are two general methods expressed in Subchapter III of ch. NR 217, Wis. Adm. Code, to determine water quality based effluent limitations (WQBELs) for phosphorus. The first is through the methods described in s. NR 217.13, Wis. Adm. Code (see Section 2.01 of the Guidance). The second method is to derive a WQBEL based on the wasteload allocation for the facility identified in a U.S. EPA approved total maximum daily load (TMDL) analysis.

Section NR 217.16, Wis. Adm. Code, describes the relationship between a U.S. EPA approved TMDL for phosphorus and WQBELs for point source permits. It does not describe or direct how the wasteload allocation of the approved TMDL is developed or how it is expressed. Since there is variation in how wasteload allocations are expressed from one TMDL to another, no single method can be described for translating the wasteload allocation to a WQBEL. Some wasteload allocations will be expressed as total loads over a period of time, such as a daily load or annual load, while others may be expressed as concentrations. It is conceivable that a TMDL wasteload allocation expressed as a mass load over time will also need to be expressed as a WQBEL concentration in a permit. Similarly, a TMDL wasteload described as a concentration may have to be expressed as a mass limit. Limit calculator staff should consult the individual TMDLs and the draft TMDL guidance for details on wasteload allocation expression. This section will be updated as more detail and experience is gained.

For a list of U.S. EPA approved TMDLs or TMDLs in development in Wisconsin, please visit <http://dnr.wi.gov/org/water/wm/wqs/303d/TMDL.html>.

#### **Section NR 217.16 (1), Wis. Adm. Code**

Section NR 217.16 (1), Wis. Adm. Code, allows the Department to derive a WQBEL from the wasteload allocation of a TMDL, if specific conditions are met. First, the TMDL must be designed to meet water quality standards in ch. NR 102, Wis. Adm. Code. Second, the TMDL must be approved by U.S. EPA. Third, the WQBEL must be consistent with the assumptions of the TMDL, such as critical conditions. This section of the rule also allows the TMDL-derived WQBEL to be used in lieu of, or in addition to, the limitation calculated using the methods in s. NR 217.13, Wis. Adm. Code. The TMDL-based WQBELs will be expressed as described in s. NR 217.14, Wis. Adm. Code.

In making the determination on use of the TMDL-derived WQBEL *in lieu of the WQBEL calculated under s. NR 217.13 Wis. Adm. Code*, s. NR 217.16 (1), Wis. Adm. Code, requires the Department to consider the following factors:

- *The degree to which nonpoint sources contribute phosphorus to the impaired water [s. NR 217.16 (1) (a), Wis. Adm. Code].*  
In general, the greater the degree of nonpoint source phosphorus contribution, the more appropriate the use of the TMDL-derived WQBEL. The TMDL should estimate the relative contribution of phosphorus from nonpoint sources and point sources, and should have an adequate description on the “reasonable assurance” of nonpoint source control. If this information is contained in the U.S. EPA approved TMDL, no further analysis is needed. If there is not “reasonable assurance” of nonpoint source controls through TMDL implementation, the WQBEL calculated under s. NR 217.13, Wis. Adm. Code, should be retained in the permit.
- *Whether waters upstream of the impaired waters are meeting the phosphorus criteria [s. NR 217.16 (1) (b), Wis. Adm. Code].*  
If there was not adequate information for the immediate receiving water, a TMDL may only cover downstream waters and not the immediate receiving water. In this case, the TMDL would not determine wasteload allocations for the immediate receiving water. For this type of situation, a WQBEL should also be calculated for the receiving water using the methods described in s. NR 217.13, Wis. Adm. Code.
- *Whether waters downstream of the impaired water are meeting the phosphorus criteria.*  
It is conceivable that a TMDL will be developed for an upstream impaired water prior to having adequate data on downstream waters. In this case the TMDL itself may be protective of downstream uses, thereby improving the downstream impairment. If the wasteload allocation of the TMDL does not account for downstream protection it may be necessary to evaluate WQBELs based on downstream protection and the TMDL. Throughout ch. NR 217, Subchapter III Wis. Adm. Code, there are a number of provisions relating to considering downstream waters in WQBEL derivation.

### **Section NR 217.16 (2), Wis. Adm. Code**

Based on the factors mentioned above, a less stringent TMDL-based limit may be included in the permit in lieu of the WQBEL calculated in s. NR 217.13, Wis. Adm. Code, if the WQBEL has not taken effect. Section NR 217.16 (2), Wis. Adm. Code, establishes a maximum timeframe for including the less restrictive TMDL based limit in lieu of the calculated WQBEL in subsequent reissuances, and describes the conditions where a less

stringent TMDL-based WQBEL may be used<sup>2</sup>. Limit calculators and permit drafters should keep in mind that if the TBL determined in Subchapter II of ch. NR 217, Wis. Adm. Code, is more stringent than the TMDL-based limit, then the TBL should be used. The conditions and maximum schedule for using a TMDL-based WQBEL in lieu of the s. NR 217.13, Wis. Adm. Code, WQBEL are:

1. The s. NR 217.13, Wis. Adm. Code, derived WQBEL has not taken effect. The provision is met if the TMDL was approved prior to permit reissuance with a phosphorus WQBEL or prior to the phosphorus WQBEL effective date. Although all permits must contain the final (not interim) WQBEL, the permit may have an extended compliance schedule where the final WQBEL becomes effective in the next reissued permit. Additionally, facilities that select the adaptive management option may be eligible for a TMDL-based limit if the final WQBEL has not yet taken effect.
2. The TMDL-derived WQBEL may be placed in a permit for up to two permit terms or the implementation period specified in the TMDL, whichever is less.

The intent of this condition is expressly stated in the rule to allow for implementation of the point source and nonpoint source elements of the TMDL. This paragraph in the rule also allows use of a compliance schedule, if necessary. (See Section 3.01 of the Guidance for details on compliance schedules).

3. If after two permit terms the Department determines the nonpoint source controls have not been substantially reduced, the Department may impose the more stringent WQBEL calculated under s. NR 217.13, Wis. Adm. Code. Alternatively, the Department may include the TMDL-based WQBEL for an additional permit term, if the Department determines there will be significant nonpoint source load reductions within the upcoming permit term.

This section requires the Department to make a determination on the likelihood of the TMDL to be adequately implemented after the additional permit terms. The determination of adequacy will be based on the Department's professional judgment and any specific evaluation procedures identified in the specific U.S. EPA approved TMDL or an implementation plan developed for the TMDL.

The Department also has the discretion to place the TMDL-based WQBEL in the next permit if it is likely that there will be significant nonpoint source load reductions during that permit term.

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<sup>2</sup> Through out NR 217 Subchapter III, the language "allows" rather than "requires" the Department to use the WQBELs in permits reflecting the inherent discretion of the Department in administering the program.

If the Department determines that the TMDL has been adequately implemented, the TMDL-based WQBEL may be placed in the subsequent permit.

4. If after up to two permit terms the Department determines that placement of the TMDL-based WQBEL is not appropriate, the more stringent s. NR 217.13, Wis. Adm. Code, derived WQBEL will be used in its place. The Department may place in the permit a compliance schedule of no more than five years from the date of the reissued or modified permit to meet the more restrictive water quality based limit.

As stated above, the determination will be based on the adequacy of the progress in implementing the TMDL. Section NR 217.17, Wis. Adm. Code, describes factors to be considered in determining the length of a compliance schedule. However, the five-year maximum applies.

#### **Section NR 217.16 (3), Wis. Adm. Code**

Section NR 217.16 (2), Wis. Adm. Code, deals with situations where the phosphorus WQBEL calculated pursuant to s. NR 217.13, Wis. Adm. Code, has not yet taken effect. Section NR 217.16 (3), Wis. Adm. Code, allows use of a less stringent TMDL-based WQBEL after the WQBEL has taken effect if the antidegradation procedures in ch. NR 207, Wis. Adm. Code, authorize the Department to include the higher WQBEL limitation. The TMDL may provide new information that can be taken into account in determining that the WQBEL is sufficient to meet water quality standards when control of phosphorus from nonpoint sources is accounted for in the TMDL.

If it is determined that the less stringent TMDL-based WQBEL is consistent with the antidegradation provisions in ch. NR 207, Wis. Adm. Code, the provisions for number of permit terms expressed in s. NR 217.16 (2), Wis. Adm. Code, would apply.

#### **Section NR 217.16 (4), Wis. Adm. Code**

Section NR 217.16 (4), Wis. Adm. Code, requires that if the TMDL-based WQBEL is more stringent than the WQBEL derived from s. NR 217.13, Wis. Adm. Code, then the more stringent TMDL-based WQBEL must be placed in the permit. This situation may occur when the WQBEL derived in s. NR 217.13, Wis. Adm. Code, is set equal to the criterion as provided for in s. NR 217.13 (7), Wis. Adm. Code. The U.S. EPA approved TMDL may identify the need for a WQBEL being set more stringent than the phosphorus criterion for the receiving water. It is anticipated that this situation will not be common.

## Chapter 2

### Section 2.05: Consideration of Downstream Waters

Author: Jim Baumann and Amanda Minks

Last Revised: November 20, 2011

Consideration of the water quality in downstream waters is mentioned in a number of places in Subchapter III of ch. NR 217, Wis. Adm. Code, including:

- “Water quality based effluent limitations for phosphorus shall be included in a permit whenever the Department determines:
  - The discharge from a point source contains phosphorus at concentrations or loadings which will cause, has the reasonable potential to cause or contribute to, an exceedance of the criteria in s. NR 102.06, Wis. Adm. Code, in either the receiving water or downstream waters.” [s. NR 217.12 (1) intro and (1) (a), Wis. Adm. Code] (emphasis added)
- “Water quality based effluent limitations for phosphorus shall be calculated based on the applicable phosphorus criteria in s. NR 102.06, Wis. Adm. Code, at the point of discharge, except the Department may calculate the limitation to protect downstream waters.” [s. NR 217.13, Wis. Adm. Code] (emphasis added)
- “A mass limit shall also be included in a permit for discharges of phosphorus to any of the following receiving or downstream waters:
  1. A lake or reservoir;
  2. An outstanding or exceptional resource water, as designated in ss. NR 102.10 and 102.11, Wis. Adm. Code;
  3. A phosphorus impaired water: or
  4. A surface water that has an approved TMDL for phosphorus.” [s. NR 217.14 (1) (a), Wis. Adm. Code] (emphasis added)
- “The Department may establish mass limitations in permits for any other discharges of phosphorus if a concentration limit for phosphorus is included in the permit, and where an increase in phosphorus load is likely to result in adverse effects on water quality in the receiving water or downstream water.” [s. NR 217.14 (1) (b), Wis. Adm. Code] (emphasis added)
- “The Department shall include a water quality based effluent limitation for phosphorus in a permit whenever the discharge or discharges from a point source or point sources contain phosphorus at concentrations or loadings which will cause, has the reasonable potential to cause or contribute to an exceedance

of the water quality standards in s. NR 102.06, Wis. Adm. Code, in either the receiving water or downstream waters.” [First sentence of s. NR 217.15 (1) (a), Wis. Adm. Code] (emphasis added)

Downstream protection is also closely correlated to reasonable potential as discussed in Section 2.03 of the Guidance.

### **General Guidance**

In all cases, streams with a criterion of 75 µg/l flow into another stream with a criterion of 75 µg/l or a river with a criterion of 100 µg/l. In no case does a river flow into a stream. The only situations where a stream or river flows into a waterbody with a lower phosphorus water quality criterion are those where the downstream water is a lake, reservoir or Great Lake.

To determine whether a discharge will affect a downstream water, consideration should be given to all relevant information available, including the following general factors:

1. Distance of the outfall to the downstream water.  
The longer the flow distance of a river or stream from the outfall to the downstream water, the greater the opportunity for phosphorus to be retained.
2. Amount of phosphorus discharged compared to the flow of the receiving water.  
The relative contribution of phosphorus from the discharger to the downstream water should be considered.
3. Presence of an impoundment or other natural or artificial feature which would impede the movement of phosphorus downstream.  
Many impoundments, reservoirs or lakes will retain a portion of the phosphorus entering the water body.
4. Presence of floodplains, wetlands and similar physical features where phosphorus may be retained.  
Phosphorus attached to sediment may be deposited on floodplains and not subject to downstream transport.
5. Existence of an impaired water.  
In some cases the downstream waterbody may be phosphorus impaired. Additional protection is afforded to these waters in order to improve the water quality and attain the applicable phosphorus standard.

6. Presence of biological response due to excess phosphorus

Downstream waterbodies may show biological responses due to excess phosphorus loading from upstream point and nonpoint contributions. This may or may not result in criteria exceedance.

The presence of these factors increases the likelihood that a point source could cause downstream impacts. Where downstream waters require more protection than the immediate receiving water, a more stringent effluent limit will be included in the WPDES permit. In these cases, the conservation of mass equation in s. NR 217.13, Wis. Adm. Code, may be adjusted to be protective of the downstream water. However, use of a conservation of mass equation in the presence of these factors will likely overestimate the impact of the discharges to downstream waters. In some cases, the presence of these factors will require use of more “sophisticated” models that take into account transport of phosphorus.

Note: There may be some instances where the downstream criterion is exceeded, but there is no biological response. It may be appropriate to calculate a site-specific criterion (SSC) in these cases. By calculating a SSC, the applicant will determine the appropriate level of protection for the receiving and downstream water. The Department will use this information to adjust the final WQBEL and downstream protection evaluation. For additional information, see Section 1.04 of the Guidance or contact the Water Evaluation Section, Water Quality Standards Specialist.

### **Specific Guidance**

- **The point source discharges to a limited aquatic life stream or wetland.**

Presently, the criteria in s. NR 102.06, Wis. Adm. Code, do not apply to limited aquatic life (LAL) systems, ephemeral streams, or wetlands [s. NR 102.06 (6) (d), Wis. Adm. Code]. These waters were not included in the USGS/WDNR stream and river studies and, therefore, the Department lacked the technical basis to determine and propose applicable criteria. At some time in the future, the Department may adopt phosphorus criteria based on new studies focusing on these waterbody types. During the interim, WQBELs should be based on the criteria and flow conditions for the next stream segment downstream (or downstream lake or reservoir, if appropriate). If the discharge does not have the potential to cause or contribute to an exceedance in the applicable criteria in the downstream water, no limits are required. See Section 2.04 of the Guidance for details.

- **The downstream phosphorus criterion is lower than the criterion for the receiving water (e.g., a downstream lake or reservoir).**

A downstream protection evaluation needs to be performed for rivers or streams that flow into a lake or reservoir. In these cases, it is highly recommended that a lake

modeling mass balance analysis be conducted prior to developing a WQBEL for phosphorus. The conservation of mass equation in s. NR 217.13, Wis. Adm. Code, may also be used; however, it will likely over estimate the impact of the upstream discharges. For lakes or reservoirs that have been identified on the 303(d) list as phosphorus impaired, a TMDL should be developed and implemented. Tools are currently being developed to help streamline the TMDL development process. In the interim, phosphorus limits should be included in the permit equal to the water quality criteria to ensure that further degradation does not occur. Staff should use professional discretion to determine if the point source should be set equal to the criteria at the point of discharge or the downstream criteria. In cases where the point source is immediately upstream of a reservoir or lake, the downstream criteria should be selected. Dischargers or other third parties can develop a TMDL with Department support. In the absence of a TMDL the conservation of mass equation in s. NR 217.13, Wis. Adm. Code, should be used.

There are several tools available to perform a lake modeling mass balance analysis. The BATHTUB model is one option that is recommended. BATHTUB is a steady-state water quality model that simulates eutrophication-related water quality conditions in lakes and reservoirs, and accounts for advective and diffusive transport as well as nutrient sedimentation. Required data types for the BATHRUB model include watershed characteristics, water and nutrient loads, lake/reservoir morphology, and observed water quality data. Model outputs include tabular and/or graphic displays of segment hydraulics, water and nutrient balances, and predictions of nutrient concentrations, transparency, and chlorophyll-a concentrations. Model results will help determine the “holding capacity” of phosphorus for the given waterbody. Based on this information, results can be used to adjust phosphorus WQBELs to the appropriate concentration in order to protect the downstream lake/reservoir. If a lake modeling mass balance analysis is not available, phosphorus WQBELs must be based solely on the water quality criteria of the downstream water, which may result in an overly conservative WQBEL. These analyses, as necessitated by limited staff time, must be done on a priority basis and done in accordance with work planning. High priority areas may include areas where WPDES permits are up for reissuance, areas where a number of WPDES permits would benefit from this evaluation, or areas that are close to or exceed applicable phosphorus water quality criteria. Dischargers or other third parties can also perform a lake modeling mass balance analysis and submit applicable results to the Department for consideration.

- **The downstream phosphorus criterion is exceeded and the waterbody is listed on the 303(d) impaired waters list**

A downstream protection evaluation needs to be performed for rivers or streams that flow into phosphorus impaired river/stream segments. The same methodology for lakes and reservoirs cannot be applied to river and stream impairments. This is because the BATHTUB model is specific to reservoirs and lakes. Additionally, reservoirs and lakes tend to be more sensitive to phosphorus than streams and

reservoirs, thus their more stringent criteria. Absent a TMDL for impaired river/stream segments, it is recommended that the conservation of mass equation in s. NR 217.13, Wis. Adm. Code, be used and the ambient phosphorus concentration be set equal to the criteria. However, it will likely overestimate the impact of the upstream discharges. Ideally, a TMDL would be developed and implemented in these cases. As mentioned, tools are being developed to help streamline the TMDL development process. Dischargers or other third parties can develop a TMDL with Department support. In the absence of a TMDL the conservation of mass equation in s. NR 217.13, Wis. Adm. Code, should be used.

- **There is an approved TMDL for phosphorus for the downstream water.**

In general, WQBEL development based on a U.S. EPA approved TMDL for the downstream water should always be considered where a TMDL has been developed for that water that includes a wasteload allocation for the specific point source. There may be situations where the water quality based effluent limitation calculated for the receiving water is more stringent than the water quality based effluent limitation based on the TMDL wasteload allocation. In this situation, the Department may include the less stringent TMDL derived limit. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may impose the more stringent water quality based effluent limitation calculated under s. NR 217.13, Wis. Adm. Code (See logic diagram 2, page 14, of this Guidance).

Note: there may be cases where a TMDL is developed for a downstream water, but the immediate receiving and downstream water are not covered under the TMDL. In this case, the previous methods described should be applied.

- **In the absence of a TMDL, the analysis would need to include complex calculations of phosphorus transport**

In many of our larger stream and river systems, phosphorus is potentially transported through a series of impoundments or reservoirs; wetland-floodplain complexes; and other physical aquatic features where the conservation of mass calculation is s. NR 217.13, Wis. Adm. Code, may overestimate the phosphorus transport to a downstream water body and result in a more stringent water quality based effluent limit than appropriate. These situations should only be addressed through a TMDL analysis or a modeling analysis, like BATHTUB. These analyses, as necessitated by limited staff time, must be done on a priority basis and done in accordance with work planning. There may be situations where a discharger or third party will conduct the needed analysis or develop the TMDL.

- **For discharges where the downstream water is the Great Lakes**

We currently lack an adequate model or tool to calculate a WQBEL using the Great Lakes as a downstream water. Presently, the open waters of both Lake Michigan and Lake Superior are meeting their criteria. However, there is a concern with the cladophora (filamentous algae) problem in the nearshore area of Lake Michigan. It is possible that by achieving the phosphorus criteria in tributary streams and rivers that the criteria will also be met in the nearshore waters. There have been a number of discussions with U.S. EPA Region 5 and U.S. EPA GLNPO, on the development of a model or tool to use to set water quality based effluent limits. Until the time that a model or tool is developed, water quality based effluent limits should be based on attaining the appropriate criteria in the tributary streams and rivers.

## Chapter 2

### **Section 2.06: Multiple Discharges**

**Author: Jim Baumann**

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Section NR 217.13 (6), Wis. Adm. Code, requires that when more than one discharge may be affecting the water quality of the same receiving water, the water quality based effluent limits are to be based on allocating the allowable discharge among the various dischargers based on site-specific considerations. Although the rule mentions the same receiving water, it is most important to use this option when the multiple discharges are impacting the same segment or reach of a river or stream. **The same rule subsection requires the Department to notify all permittees and provide an opportunity for comment.** This subsection is not used when a TMDL is developed.

The intent of this subsection is to avoid to the extent practicable allocating the same assimilative capacity to multiple dischargers and to avoid allocating all or most of the assimilative capacity to an upstream discharger; leaving little or no assimilative capacity to a nearby downstream discharger. These situations are likely to occur when there are both industrial discharges of phosphorus and municipal wastewater discharges in the same community. These situations may also occur where neighboring communities all have their own wastewater treatment facilities.

An analysis of multiple dischargers is useful under any, some or all of the following conditions:

1. Phosphorus discharge mixing zones overlap or are likely to overlap.
2. The phosphorus concentration upstream of the first discharge is less than applicable criterion, indicating that there is an amount of assimilative capacity available. If the concentration upstream of the first discharge exceeds the criterion, no assimilative capacity is available, all of the discharges will have the WQBEL set equal to the criterion and a multiple discharge analysis is not useful.
3. Similar to number 1 above, the phosphorus concentration upstream of the first discharge is less than applicable criterion and the concentration upstream of the second discharge exceeds the criterion. This indicates that the upstream discharge may be using all of the assimilative capacity and there is no assimilative capacity for the downstream discharge.
4. Where it is not practicable to collect stream data between the outfalls or where there is incomplete mixing between the outfalls.

5. Where the downstream discharger requests the multiple discharge analysis and offers adequate justification for the analysis.

The conservation of mass equation in s. NR 217.13 (2), Wis. Adm. Code, should be used when the river or stream segment between the dischargers does not include significant impoundments/reservoirs or other features that reduce the transport of phosphorus. Situations with impoundments or reservoirs will require adjustments to the equation for the amount of phosphorus retained.

The multiple discharge analysis can be conducted where all of the discharges are initially grouped or as a series of calculations. Under the grouped analysis the effluent flow,  $Q_e$ , used in the equation is the combined effluent flows from all of the dischargers. The 7-day  $Q_2$  stream will not vary for those discharges in the group. The resulting WQBEL would then be a concentration that would be applicable for all of the discharges.

If the analysis is conducted as a series of calculations, a conservation of mass equation must be used to predict the in-stream concentration upstream from the second discharge and so on for all the discharges. The analysis may need to be repeated varying the upstream WQBEL. The steps in the analysis are as follows:

1. Calculate the WQBEL for the upstream discharge using the equation in s. NR 217.13, Wis. Adm. Code.
2. Use the WQBEL calculated in step one to predict a concentration upstream of the second discharge as follows:

$$C_{\text{predicted}} = (C_{\text{upstream}} * Q_{\text{upstream}} + \text{WQBEL} * Q_{\text{effluent}}) / (Q_{\text{upstream}} + Q_{\text{effluent}})$$

3. Calculate the WQBEL for the second discharge using  $C_{\text{predicted}}$  and the equation in s. NR 217.13, Wis. Adm. Code.

## Chapter 2

### Section 2.07: New Discharges

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The term “New Discharger” is used in several subsections of chs. NR 217 and NR 207, Wis. Adm. Code. The subsections are shown below followed by guidance on implementation of the subsection.

#### Chapter NR 217, Wis. Adm. Code

**Section NR 217.11(3), Wis. Adm. Code, “New discharger” means a point source which was not authorized by a WPDES permit as of December 1, 2010. A new discharger includes a relocation of an outfall to a different receiving water.**

Guidance: A discharge to any waterbody that was not authorized in a WPDES permit prior to 12/1/10, is considered a new discharger. This includes an existing discharge that is moved to a new receiving water. For purposes of implementing this rule, moving a discharge downstream on the same water body is not considered a new discharger unless data shows this change could cause or contribute to an impairment downstream. The stream classification and conditions at that location must, however, be considered in determining limits.

**Section NR 217.13(8), Wis. Adm. Code, NEW DISCHARGERS. If a new discharger is proposing a discharge of phosphorus to a receiving or downstream water that is a phosphorus impaired water, the new discharger may not discharge phosphorus except as follows:**

- (a) The new discharge of phosphorus is allocated part of the reserve capacity or part of the wasteload allocation in a U.S. EPA approved TMDL;**
- (b) The new discharger can demonstrate the new discharge of phosphorus will improve water quality in the phosphorus impaired segment; or**
- (c) The new discharger can demonstrate that the new phosphorus load will be offset through a phosphorus trade or other means with another discharge of phosphorus to the 303 (d) listed water. The offset must be approved by the Department and must be implemented prior to discharge.**

Guidance: A new discharge of phosphorus to a phosphorus impaired water may not be permitted unless: 1) it is allocated in the reserve capacity of a U.S. EPA approved TMDL; 2) the discharge will improve the phosphorus water quality; or 3) a trade or other means of offsetting the phosphorus contained in the discharge has been implemented prior to initiating the discharge.

Note: In order for a trading scheme to occur to allow a new phosphorus discharge on an impaired water, a comprehensive phosphorus cap must first be developed. Absent a U.S. EPA approved TMDL, the new discharger and Department may need to work collaboratively to determine what the appropriate phosphorus cap would be for the receiving and downstream water.

A discharge to a flowing waterbody that has a phosphorus concentration which is less than or equal to the water quality criteria of the phosphorus impaired segment will be considered an

improvement of the phosphorus water quality. This is not applicable to discharges to lakes or impoundments.

A potential new discharger may use a combination of the options to demonstrate eligibility for a discharge under this subsection.

**Section NR 217.15(1)(e), Wis. Adm. Code, *New dischargers*.** The Department shall include a water quality based phosphorus limitation in a permit for a new discharger if the Department determines the new discharger will discharge phosphorus at concentrations or loadings which may cause or contribute to exceedances of the water quality criteria in s. NR 102.06 in either the receiving water or downstream waters. To estimate the amount of phosphorus discharged by a new discharger, the Department may consider projected discharge information from the permit applicant

**Section NR 217.17(4), Wis. Adm. Code, *New dischargers*.** Any new discharger may not receive a compliance schedule to achieve compliance with a phosphorus water quality based effluent limitation.

Guidance: A new discharge must meet the phosphorus limits upon initiation of the discharge. No compliance schedule can be provided in the discharge permit.

**Chapter NR 217.19, Wis. Adm. Code, *Variances for stabilization ponds and lagoon systems*. (1) GENERAL. (a) An owner or operator of a permitted wastewater treatment system that consists primarily of a stabilization pond system or a lagoon system may apply for a variance to the phosphorus water quality based effluent limitations pursuant to s. 283.15 (4) (a) 1. f., Stats., using the procedures in this section.**

Note: Stabilization ponds and lagoons are operated primarily by communities serving a population of 2000 or less and small industries. With currently available technology that could be used in conjunction with stabilization ponds or lagoons, it is unlikely that phosphorus water quality based effluent limits less than 1 mg/L can be consistently met. To meet phosphorus water quality based effluent limits of less than 1 mg/L, it will be necessary for owners of the systems to construct new wastewater treatment plants which could result in substantial and widespread adverse social and economic impacts.

**(b) A new discharger may not receive approval for a variance under this section or pursuant to any other variance procedure.**

Guidance: New dischargers are not eligible for any variances. For purposes of implementing NR 217, the date for defining a new discharger is the effective date of the rule, December 1, 2010.

**Section NR 207.03(4) , Wis. Adm. Code, *EXCEPTIONAL RESOURCE WATERS*.** If the Department determines that a WPDES permit application proposes a new or increased discharge to exceptional resource waters, it shall review the application as follows:

**(a) For a proposed new discharge which is needed to prevent or correct either an existing surface or groundwater contamination situation, or a public health problem, water quality based effluent limitations shall be determined in accordance with sub. (6).**

**(b) For a proposed new discharge which is not needed to prevent or correct either an existing surface or groundwater contamination situation, or a public health problem, water quality based effluent limitations shall be set equal to the existing levels of these substances upstream of, or adjacent to, the discharge site.**

Guidance: Notwithstanding this subsection, a new discharger to an exceptional resource water must comply with the provisions of ch. NR 217, Wis. Adm. Code. If the background levels of phosphorus exceed the criteria, the discharge limit will equal the criterion.

## **Chapter 3- Implementation Procedures**

There are some concepts that are fairly unique to phosphorus standards and phosphorus standards implementation. This Chapter is meant to provide Guidance to Department staff on these areas in order to speed up the implementation process and alleviate potential error.

Some facilities may have distinctive features that are not easily accounted for in this general Guidance. In these situations it may be prudent to work with the facility and other staff to identify reasonable implementation procedures.

## **Chapter 3**

### ***Section 3.01: Compliance Schedules***

**Author:** Tom Muga

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#### **First Permit Term Following Rule Promulgation**

At the time of permit application, many permittees will not know the best alternative for achieving compliance with a phosphorus WQBEL until the permittee has gone through facility planning. Even those for whom TMDL limits have been set will have had little time to determine their best alternative for meeting those limits. Additionally, phosphorus has many novel implementation options such as adaptive management and water quality trading, that facilities have not had time to consider. Therefore, selection of options to most cost-effectively meet water quality standards may, in many cases, be done during the term (or terms) of the permit. We may reissue permits with the WQBELs as calculated under s. 217.13, Wis. Adm. Code, or as set by a TMDL and include compliance schedules that require permittees to either: a) meet those limits during the term of the permit, or b) to allow permittees to consider selecting one of the other alternatives if the WQBEL, or a recalculated WQBEL, is not scheduled to become effective until future permit terms. These alternatives include:

- Operational changes to meet a WQBEL
- Construction to meet a WQBEL
- Adaptive management as specified in s. NR 217.18, Wis. Adm. Code
- Water quality trading
- A water quality standards variance under s. NR 217.19, Wis. Adm. Code, or 283.15, Stats.

The flexibility of this process will help provide the Department with time to process permits without the need to delay permit reissuance or modify permits to react to new information received during the permit term.

As we get several years into rule implementation, we will likely need to revise this guidance to reflect what we have learned. The need for a compliance schedule and the length of time allowed in a schedule will depend on individual circumstances. Section NR 217.17, Wis. Adm. Code, provides criteria for compliance schedules, factors that will help determine the length of compliance schedules, and requirements on the content of compliance schedules.

The rules allow compliance schedules of up to 7 or 9 years in cases where a significant upgrade is needed to meet a restrictive limit (must be determined necessary and appropriate by the permit drafter or basin staff person consistent with s. NR 217.17, Wis. Adm. Code). The permit fact sheet should contain a statement concerning the

capability of the current plant to meet the WQBEL and a brief discussion that the compliance schedule proposed in the permit is the appropriate length, considering the individual circumstances.

If a significant treatment system upgrade will likely be needed to meet a stringent phosphorus WQBEL and accordingly, the permit drafter or basin staff person determines an extended compliance schedule is necessary and appropriate (a schedule that goes beyond 5 years), the permittee may be interested in pursuing either the adaptive management approach, a variance or water quality trading. In cases where an upgrade is needed to meet the limit, the permittee will need to conduct facility planning during the term of the first permit and determine whether one of the implementation options mentioned above will be explored. If these options are not selected, the facility will be responsible to achieve the final WQBEL by the end of the compliance schedule.

The facility planning process below draws upon experiences of WDNR's municipal and industrial plan review staff on actions and time frames needed to evaluate alternatives in planning cost-effective solutions for plant construction or other alternatives to meet water quality. Initial steps are fairly standard for an engineering evaluation of current facility capabilities and the start of upgrade planning but may not require that the permittee obtain the services of an engineering consultant. Subsequent steps draw upon the results of initial steps in the process and the guidance branches to several general tracks. The specific tracks may dictate actions that will be difficult for some permittees to perform without outside expertise. In setting compliance schedules, permits staff should do their best to predict outcomes that will affect future requirements so as to minimize the need for future permit modifications. As time goes by, our experience should help future work in this area.

The terminology used below is generic so it applies to both municipal and industrial systems, although some of the standard facility planning terms used for municipal systems are primarily used. The Department recognizes that industrial systems have mechanisms, such as manufacturing process changes, to control discharge levels besides what happens at the wastewater treatment plant. Staff should consider specific situations when interpreting how to apply this guidance when setting permit conditions.

**Permit Reissuance Process (first reissuance following rule promulgation):**

1. The permittee completes and submits the permit application
  - Some amount of effluent phosphorus data will be available for purposes of determining the need for limits
  - The permittee will likely not know which solution or option it will pursue to meet water quality. However, in unusual circumstances, the permittee may already know if it wishes to pursue alternatives such as adaptive management (AM), a variance, or water quality trading (WQT). The permit reissuance application may

include an application for AM, an application for a variance, or a WQT agreement.

2. The Department limits calculator determines applicable final phosphorus limits (TBL or WQBEL, and accounting for TMDLs).
3. The limits calculator or other permit staff person determines if the existing facility, as *previously* (currently) operated, can already meet final limits. (Note – At least during the initial years of rule promulgation, it is not necessary that a study of possible operational improvements be conducted as part of the application process. This can be included as a first step of the compliance schedule.)
  - If the permittee can already meet the limit – No compliance schedule is allowed
  - If the permittee can't consistently meet the limit – A compliance schedule is allowed
4. If the Department is approving an AM plan or WQT agreement at this time (see chapter in this guidance on Adaptive Management or separate guidance on water quality trading), but plans haven't yet been implemented, reissue the permit with appropriate implementation requirements and appropriate numeric effluent limitation [see s. NR 217.18 (3)(e), Wis. Adm. Code].
5. If the Department is not approving an AM plan or WQT agreement at this time, include final limits, a compliance schedule (if allowed and necessary) and interim limits. If final limits are to become effective beyond the term of the permit, the limits must still be stated in the permit [s. NR 217.17 (3) (e), Wis. Adm. Code], even though they have a delayed effective date.
6. Interim effluent limits must be required in the permit [s. NR 217.17(3)(c), Wis. Adm. Code]. These limits may be:
  - Based on existing effluent quality, effective upon permit reissuance
  - Technology based limits, effective upon permit issuance or some future date as called for in a compliance schedule
  - Some other reasonable numeric level based on performance of other well-operated, similar treatment facilities effective upon permit issuance or some future date as called for in a compliance schedule

### **General Guidelines on Determining Appropriate Length of Compliance Schedule**

Prior to issuing a compliance schedule, the Department must use the available information to determine if the schedule of compliance 1) will lead to compliance with the phosphorus WQBEL as soon as possible, and 2) is appropriate and necessary because the permittee cannot immediately achieve compliance with the WQBEL based on existing operation of its treatment facility. Statements of these determinations should appear in the permit fact sheet.

When determining whether the compliance schedule will bring the permittee into compliance “as soon as possible”, the Department must consider the steps needed and time necessary for each step to achieve compliance. As previously stated, many permittees will not have had time to review compliance options and will determine the best compliance option during facility planning. Therefore, the Department believes it will be appropriate to grant compliance schedule time to review compliance options and alternatives. As phosphorus implementation continues, the Department will expect facilities to begin this evaluation prior to permit reissuance, assuming that the discharger has evaluated applicable compliance options.

The number of steps in a compliance schedule and the amount of time required to achieve these steps will likely be proportional to the stringency of the final WQBEL. In reviewing current effluent data and available technology, the Department considers limits less than 0.6 mg/L for mechanical plants or less than 1.5 mg/L for ponds and lagoons to be stringent limits, as a rule of thumb. Department staff must review this “rule” and make a case-by-case determination if the final WQBEL is indeed “stringent”. In most cases the facility upgrades required to meet these limits will be extensive, and extended compliance schedules are warranted to give facilities time to consider their options and obtain the financial resources required for the plant upgrade. In other cases, some facilities will only require slight operational changes to achieve compliance. In these cases, the compliance schedules will allow time for these slight operational adjustments to be made.

The following are examples compliance schedules that represent the maximum time available to achieve compliance. The Department sets and reviews compliance schedules on a case-by-case basis. Facilities may or may not be granted the maximum compliance schedule. Permit staff may use these as compliance schedule templates with sample steps and suggested time intervals. Individual circumstances should be considered in deciding to use these as is, or to tailor, or to mix-and-match them for use in permit drafting.

## **Setting Permit Compliance Schedules for Stringent Limits and How We Expect Facility Planning to Proceed**

As a rule of thumb, limits less than 0.6 mg/L for mechanical plants or less than 1.5 mg/L for ponds and lagoons are considered to be stringent limits.

### **1. Time = 0 ← Permit Reissued**

During the first year, allow for an Operational Evaluation (for municipal entities we call this an **Operation and Needs Review (ONR) study**). This includes data collection and may also include source reduction measures, operational changes or minor miscellaneous facility enhancements. If a previously conducted facility planning

study, or ONR study, has recently been completed there may be no need to allow time for another study. This means the time schedule for the following items would move ahead 1 year.

Note: The goal of the ONR is to find out if final limits can be met by simply making operational or other minor facility changes.

## **2. 12th month ← Obtain Department Acceptance of a submitted Operational Evaluation or ONR Study**

If a Department accepted study concludes only operational improvements are necessary to meet final limits, then no additional facility planning is required, and the operational improvements must be implemented according to a schedule to be contained in the accepted operational study plan. In accordance with s. NR 217.17 (1) (a) 1, Wis. Adm. Code, the schedule should ensure the operational improvements are implemented “as soon as possible”. Permit staff will send a letter to the permittee stating that limits will become effective on the date called for in the Department- accepted Operational Study or ONR.

**Start Facility Planning Study** (if determined necessary by the Operational Evaluation or ONR). The planning process may consider options such as industrial process changes, facility upgrading, consolidation with other sewerage systems, and alternative discharge locations. If a permittee is interested in pursuing an AM or WQT, the permittee should study these options as part of facility planning process. If an AM plan is to be evaluated, the information required by ss. NR 217.18(2) (a), (b) and (c), Wis. Adm. Code, should be submitted with the planning limits request to make a preliminary determination if the applicant qualifies for an AM plan (Note – the Department guidance for planning limit requests will be revised to address this option).

Note: Early on (within 1<sup>st</sup> year) of the planning study the permittee might need to request *planning effluent limit*, if they may differ from final effluent limits calculated prior to permit reissuance, in accordance with current Department guidance and procedures. The Department might prepare a Planning Limits Memo that would include revised limits for newly proposed design flows or discharge locations and attempts to explain any possible future permit limit changes expected for the appropriate planning period.

Note: For municipal facilities, a two year time period from the start of facility planning to the submittal of the facility plan should be used as the normal time period for a typical facility upgrade but the total time allowed for facility planning can be adjusted based on consideration of factors as listed in s. NR 217.17(1), Wis. Adm. Code. For example, if the phosphorus limit will be less than 0.6 mg/L, this might require a more extensive engineering study and in accordance with the factor

described in s. NR 217 (1)(b)4, Wis. Adm. Code, the compliance schedule may be extended. It is recommended this extension be no more than 6 additional months in order to allow the approved facility plans to be considered as part of the next permit reissuance. If the schedule is extended the associated following action dates could be set back accordingly.

Note: The purpose of the ONR is to determine if final limits can be met by simply making operational or other minor facility changes

**3. 24<sup>th</sup> month ← Permittee submits progress report on facility planning**

**4. 36<sup>th</sup> month ← Permittee submits a Facility Plan or Engineering Report for Department Review and Approval.**

The Department begins review of the facility plan or engineering report and communication between the facility or its consultant continues during this period.

**5. 48<sup>th</sup> month ← Department Approval of Facility Plan, Engineering Report, and/or Tentative Approval of an AM/WQT Plan**

The approval may be for a facility upgrading and/or a tentative approval for an AM plan [approval as referenced in s. NR 217.18(2), Wis. Adm. Code], or a WQT plan. Any AM plan would include an assessment of whether existing facilities can meet an interim limit of 0.6 mg/L P.

If proposed upgrading, prepare construction plans and specifications (allowing 9 months)

**Start WPDES Permit Reissuance Application Process for next permit term:** Based on results of the facility planning, the permittee might request a s. NR 217.19, Wis. Adm. Code, lagoon variance (or a s. 283.15, Stats. variance) or the AM option with the next permit reissuance. At this time, the Department might be deciding to propose to implement an AM or WQT agreement into the next permit term.

**6. 57<sup>th</sup> month ← Submit Construction Plans and Specifications (if the approved plan includes any facility upgrading)**

Department review of construction plans and specifications (allow 3 months minimum)

**7. 60<sup>th</sup> month ← Department approval of Construction Plans and Specifications**

8. **60<sup>th</sup> month ← Reissue Permit (Second term following rule promulgation)** with appropriate phosphorus limits and a compliance schedule(s).

Note: Refer to chapter on AM in this Guidance for additional terms and conditions.

**Compliance Schedule** – If upgrading is proposed, **establish date for the facility construction completion and startup** based on 12 to 24 months after Department plan approval, dependent on the extent of upgrading project.

**If an AM or WQT plan is proposed** the permit should include an implementation schedule for specific plan elements or actions. If an AM plan is being implemented, then the interim limit of no greater than 0.6 mg/L (six month average) is applicable. An interim limit may also be applicable for this permit term (a short-as-possible compliance schedule(s) to meet the limits may be allowed). Per s. NR 217.18 (3) (e) 2, Wis. Adm. Code, the schedule to meet the interim, 0.6 mg/L limit may not exceed 5 years.

If a facility upgrade is proposed that does not include construction of filtration or a similar upgrade, the proposed effective date for meeting the P limit should be no more than 2 years into the new permit term (84<sup>th</sup> month). This complies with the maximum schedule of 7 years as allowed by s. NR 217.17(2), Wis. Adm. Code. If the upgrade includes filtration or similar extensive upgrading, the schedule may be extended to up to two more years [up to 9 years as allowed by s. NR 217.17(2), Wis. Adm. Code].

9. **84<sup>th</sup> to 108<sup>th</sup> month (24<sup>th</sup> to 48<sup>th</sup> of new term) ← Meet new P limit (if facility upgrading is needed)**

10. **108<sup>th</sup> month ← Permit Application Process**

If AM plan is being implemented, the limits would be re-calculated with new receiving water data. If water quality standards are not being achieved [s. NR 217.18 (3)(e)3, Wis. Adm. Code], the permit may be reissued provided a revised AM plan is submitted and accepted by the Department prior to the permit reissuance.

Note: Refer to chapter on AM of this Guidance for additional terms and conditions.

11. **120<sup>th</sup> month ← Reissue Permit (3<sup>rd</sup> permit term following rule promulgation)**

**If an updated AM is proposed** the permit should include an implementation schedule for specific plan elements or actions. The interim limit of 0.5 mg/L (six-month average). A 1 mg/L monthly average would also be applicable for this permit term. Per s. NR 217.18(3)(e)3, Wis. Adm. Code, a compliance schedule to meet the 0.5 mg/L limit may not exceed 5 years.

Note: Refer to chapter on AM of this Guidance for additional terms and conditions.

**12. 180<sup>th</sup> month ← Reissue Permit (3<sup>rd</sup> term after AM plan approval)**

If water quality standards are still not being attained as a result of AM plan measures, the permit would be issued with a requirement and schedule to meet the final limit. A compliance schedule for measures other than an AM plan would be required. The compliance schedule for the water quality based effluent limit may not exceed five years [s. NR 217.18(3)(e)4, Wis. Adm. Code].

Note: Refer to chapter on AM in this Guidance for additional terms and conditions.

**Example 1: Phosphorus Compliance Schedule (stringent limits)**

Steps/Actions	Due Date (after reissuance)
<p><b>Operation and Needs Review (ONR):</b> The permittee shall prepare an Operation and Needs Review (ONR) study report and submit it for Department approval. The report shall evaluate collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that would enable compliance with the final phosphorus WQBEL (water quality based effluent limit) or some improved level of effluent quality using the existing treatment system. Also, the ONR shall include a phosphorus discharge optimization plan for the current operation. If the report concludes that the facility can achieve the final phosphorus WQBEL, the study shall contain a schedule for implementation of any improvements or other study recommendations. The implementation schedule shall be based on providing compliance with the final phosphorus WQBEL as soon as possible. Once the ONR is approved by the Department the schedule, including the effective date of the final limit, will be incorporated into the permit by letter from the Department. If the Department approved ONR report concludes that the facility cannot achieve the phosphorus limit, the permittee shall initiate a Facilities Planning Study and implementation of the phosphorus discharge optimization plan for the current operation.</p>	<p>12 months</p>
<p><b>Facilities Planning Status Report:</b> Submit a Facilities Planning Status Report. This report shall provide an update on the permittee's progress in evaluating feasible alternatives which may include: facility upgrading, consolidation with other sewerage systems, alternative effluent discharge locations, an Adaptive Management Plan, Water Quality Trading Plan or a water quality standards variance.</p>	<p>24 months</p>
<p><b>Facilities Plan:</b> Submit a Facilities Plan for upgrading the treatment facility (if upgrading is the identified alternative) which includes an implementation schedule that also specifies a final construction date during the next permit term. The Facilities Plan shall also include an evaluation of alternatives for meeting the final WQBEL for phosphorus.</p>	<p>36 months</p>

<b>Refine Facilities Plan:</b> Refine and submit the Facilities Plan for approval. If the approved plan is for Adaptive Management or Water Quality Trading, the implementation of the plan shall commence upon Department approval.	48 months
<b>Construction Plans and Specifications:</b> Submit construction plans and specifications for approval if the approved Facilities Plan calls for upgrading.	57 months
<b>Construction Plan Approval:</b> Obtain Department approval of construction plans and specifications	60 months
<b>Progress Report (For Informational Purposes Only):</b> Submit construction progress report.	72 months
<b>Progress Report (For Informational Purposes Only):</b> Submit construction progress report.	84 months
<b>Progress Report (For Informational Purposes Only):</b> Submit construction progress report.	96 months
<b>Complete Construction (For Informational Purposes Only):</b> Complete construction and comply with final phosphorus WQBEL.	84 to 108 months

For any compliance schedule date in the above (or below) schedule that does not include a submittal to the Department, or any date that is missed by 30 days or more, the permittee shall notify the Department in writing within 30 days of the scheduled date of its compliance or non-compliance with the scheduled requirement. If any interim requirement will take more than one year to complete, the permittee shall also include a projected completion date for the interim requirement.

Note: The purpose of the ONR is to determine if final limits can be met by simply making operational or other minor facility changes. The purpose of the optimization plan is to reduce as much as possible the levels going out.

## **Setting Permit Compliance Schedules for Less Stringent Limits and How We Expect Facility Planning to Proceed**

As a rule of thumb, limits equal to or greater than 0.6 mg/L for mechanical plants or greater than about 1.5 mg/L for ponds and lagoons are considered to be less stringent limits.

### **1. Time = 0 ← Permit Reissued**

During the first year, allow for an Operational Evaluation (for municipal entities we call this an **Operation and Needs Review (ONR) study**). This includes data collection and may also include source reduction measures, operational changes or minor miscellaneous facility enhancements. If a previously conducted facility planning study, or ONR study, has recently been completed there may be no need to allow time for another study. This means the time schedule for the following items would move ahead 1 year.

Note: The goal of the ONR is to find out if simply making operational or other minor facility changes can meet final limits.

### **2. 12th month ← Obtain Department Acceptance of a submitted Operational Evaluation or ONR Study**

If a Department accepted study concludes only operational improvements are necessary to meet final limits, then no subsequent facility planning is required, and the operational improvements must be implemented according to a schedule to be contained in the accepted operational study plan. In accordance with s. NR 217.17 (1) (a) 1, Wis. Adm. Code, the schedule should ensure the operational improvements are implemented “as soon as possible”. Permits staff will send a letter to the permittee stating that limits will become effective on the date called for in the Department- accepted Operational Study or ONR.

**Start Facility Planning Study** (if determined necessary by the Operational Evaluation or ONR). The planning process may consider options such as industrial process changes, facility upgrading, consolidation with other sewerage systems, and alternative discharge locations. If a permittee is interested in pursuing AM (unlikely with limits above 0.6 mg/L) or WQT, the permittee should study these alternatives as part of facility planning. If an AM plan is to be evaluated, the information required by ss. NR 217.18(2) (a), (b) and (c), Wis. Adm. Code, should be submitted with the planning limits request to make a preliminary determination if the applicant qualifies for an AM plan. Because one of the adaptive management eligibility requirements is “filtration or equivalent technology to meet the WQBEL”, many

facilities with less stringent limits will not be eligible for adaptive management [s. NR 217.18(c), Wis. Ad. Code].

Note: the Department guidance for planning limit requests will be revised to address the AM option.

Note: Early on (within 1<sup>st</sup> year) of the planning study the permittee might need to request *planning effluent limit*, if they may differ from final effluent limits calculated prior to permit reissuance, in accordance with current Department guidance and procedures. The Department might prepare a Planning Limits Memo that would include revised limits for newly proposed design flows or discharge locations and attempts to explain any possible future permit limit changes expected for the appropriate planning period.

Note: For municipal facilities, a one year time period from the start of this type of targeted facility planning to the submittal of the facility plan should be used as the normal time period for a typical facility upgrade but the total time allowed for facility planning can be adjusted based on consideration of factors as listed in s. NR 217.17(1), Wis. Adm. Code. For example, if other issues are being considered as part of a more comprehensive upgrade, this might require a more extensive engineering study and in accordance with the factor described in s. NR 217 (1)(b)4, Wis. Adm. Code, the compliance schedule may be extended. It is recommended this extension be no more than 6 additional months in order to allow completion of construction within the term of the permit. If the schedule is extended the associated following action dates could be set back accordingly.

Note: The purpose of the ONR is to determine if simply making operational or other minor facility changes can meet final limits

**3. 24<sup>th</sup> month ← Permittee submits a Facility Plan or Engineering Report for Department Approval**

The Department begins review of the facility plan and communication between the facility or its consultant continues during this period.

**4. 30<sup>th</sup> month ← Department Approval of Facility Plan, Engineering Report, and/or Tentative Approval of an AM/WQT Plan**

The approval will likely be for facility upgrading since adaptive management will not likely be a reasonable option and water quality trading will not likely be cost-effective for mechanical treatment plants.

**5. If proposed upgrading, prepare construction plans and specifications (allowing 9 months).**

**39<sup>th</sup> month ← Submit Construction Plans and Specifications (if the approved plan includes any facility upgrading)**

Department review of construction plans and specifications (allow 3 months)

**6. 42<sup>nd</sup> month ← Department approval of Construction Plans and Specifications**

48 month ← **Start WPDES Permit Reissuance Application Process for next permit term**

**7. 54<sup>th</sup> month ← ← Meet new P limit (if facility upgrading is needed)**

**Example 2: Phosphorus Compliance Schedule (less-stringent limits)**

For any compliance date within the term of this permit that does not include a submittal to the Department or any date that is missed by 30 days or more, the permittee shall notify the Department in writing within 30 days of the scheduled date of its compliance or noncompliance with the requirement

Steps/Actions	Due Date (after reissuance)
<p><b>Operation and Needs Review (ONR):</b> The permittee shall prepare an Operation and Needs Review (ONR) study report and submit it for Department approval. The report shall evaluate collected effluent data, possible source reduction measures, operational improvements or other minor facility modifications that would enable compliance with the final phosphorus WQBEL (water quality based effluent limit) or some improved level of effluent quality using the existing treatment system. Also, the ONR shall include a phosphorus discharge optimization plan for the current operation. If the report concludes that the facility can achieve the final phosphorus WQBEL, the study shall contain a schedule for implementation of any improvements or other study recommendations. The implementation schedule shall be based on providing compliance with the final phosphorus WQBEL as soon as possible. Once the ONR is approved by the Department the schedule, including the effective date of the final limit, will be incorporated into the permit by letter from the Department. If the Department approved ONR report concludes that the facility cannot achieve the phosphorus limit, the permittee shall initiate a Facilities Planning Study and implementation of the phosphorus discharge optimization plan for the current operation.</p>	<p>12 months</p>
<p><b>Facility Plan:</b> Submit a Facility Plan that evaluates feasible alternatives for meeting the final phosphorus WQBEL which may include: facility upgrading, consolidation with other sewerage systems, alternative effluent discharge locations, an Adaptive Management Plan, Water Quality Trading Plan or a water quality standards variance.</p>	

	24 months
<b>Construction Plans and Specifications:</b> Submit construction plans and specifications for approval if the approved Facility Plan calls for upgrading the treatment facility.	36 months
<b>Progress Report:</b> Submit a progress report on meeting the final WQBEL for phosphorus.	42 months
<b>Complete Actions:</b> Complete actions to meet the final WQBEL for phosphorus. Comply with the new phosphorus final limits.	54 months

**Example 3: Phosphorus Compliance Schedule (less-stringent limits, no facility planning required)**

For any compliance date within the term of this permit that does not include a submittal to the Department or any date that is missed by 30 days or more, the permittee shall notify the Department in writing within 30 days of the scheduled date of its compliance or noncompliance with the requirement

Steps/Action	Due Date (after reissuance)
<b>Operation Evaluation:</b> Prepare and submit an Operation Evaluation to meet the final phosphorus WQBEL. Also develop and implement a phosphorus discharge optimization plan for the current operation.	12 months
<b>Declaration:</b> Submit a declaration to use WQT; an AM application and preliminary plan for treatment, if necessary to meet interim effluent limits; or preliminary plans for wastewater treatment construction.	24 months
<b>Progress Report:</b> Submit a report on the progress of preparing a WQT agreement; a report on the progress of preparing an AM Plan with final construction plans if necessary to meet interim limits; or final plans for wastewater treatment construction.	36 months
<b>Required Submittal:</b> Submit a WQT agreement; an AM Plan plus initiate construction if necessary to meet interim limits; or a treatment system status report including budgeting.	48 months
<b>Status Report:</b> Submit a report on WQT implementation (e.g., management practices, construction); a report on the AM Plan implementation plus complete construction if necessary to meet interim limits; or initiate construction of wastewater treatment.	60 months
<b>Complete Actions:</b> Comply with the final WQBEL for phosphorus using Water Quality Trading; initiate Adaptive Management Plan; or complete construction.	72 months

## **Chapter 3**

### **Section 3.02: SWAMP Tools for Phosphorus**

**Author: Mary Ryan**

**Last Revised: November 19, 2011**

#### **Introduction**

The new phosphorus rules encompassed in chs. NR 102 and NR 217, Wis. Adm. Code, became effective on December 1, 2010. The System for Wastewater Applications, Monitoring and Permits (SWAMP) will be updated to include phosphorus requirements related to the new phosphorus rules as described below.

#### **Permit Application**

- **Monitoring:** The permit application will be updated to increase monitoring for Phosphorus from 4 samples (collected at least 1 month apart) to 12 samples (collected weekly for 3 months) and a recommended analytical method will be specified (U.S. EPA 365.1, 'Automated Ascorbic Acid Reduction'). The required sample type is a 24-hr flow proportional composite. Wastewater treatment lagoons may be allowed to collect grab samples if a composite sampler is unavailable.

Note: For fill and draw facilities, the permit application should be sent at a timescale appropriate for the facility to collect sufficient phosphorus data.

- **Variance Application for Stabilization Ponds & Lagoons:** The permit application will be updated to include an option for owners of a stabilization pond or lagoon system to apply for a variance to the phosphorus WQBEL per s. NR 217.19, Wis. Adm. Code.
- **Adaptive Management Request:** The permit application will be updated to include a request form for the AM Approach per s. NR 217.18, Wis. Adm. Code.

#### **Permit Reissuance Process**

The permit reissuance process is described in Compliance Schedule Chapter 3 Section 3.02, on page 58, and summarized below.

##### **Review the Permit Application Data**

Initially, the permit application data (and any existing representative phosphorus data in SWAMP) will be reviewed to determine the need for limits. If additional phosphorus data is needed for this determination the permittee should be contacted and asked to submit the additional data.

##### **Calculate Phosphorus Limits and Determine Compliance**

Phosphorus limits are calculated by the Limits Calculator (TBL or WQBEL and an accounting of any TMDL) and then WDNR staff must determine if it is possible for the facility, as currently operated, to comply with the phosphorus limits. Interim

phosphorus limits are also calculated as applicable per s. NR 217.17(3)(c), Wis. Adm. Code.

#### Permit Drafting

If the permittee can meet the final phosphorus limits then no compliance schedule is allowed. If the permittee cannot consistently meet the limits then a compliance schedule is allowed and interim limits are to be included in the permit per s. NR 217.17(3)(c), Wis. Adm. Code. In both cases monitoring must be required at an appropriate frequency (typically 3 times per week for majors and weekly for minors).

\*Surface Water Section: Include the final phosphorus WQBEL (monthly average) in the monitoring table if the permittee can meet the limit. (Note: A WQBEL limit is not required if the 30 day average  $P_{99}$  calculation does not exceed the calculated WQBEL and the facility did not previously have a technology based limit). However if phosphorus is present in the effluent at a level that warrants monitoring based on professional judgment then weekly or monthly monitoring should be included in the permit.) If the permittee cannot meet the final phosphorus WQBEL, include the interim phosphorus limit in the monitoring table (and note in the Table Notes that it is an interim limit) then use the checkbox for 'Phosphorus Limitations' at the Input & Footnotes tab to insert the standard footnote that specifies the final phosphorus limit as well as a reference to the compliance schedule:

#### Phosphorus Limitation(s) Footnote

See the Schedules section of this permit for more information on phosphorus effluent limitations. Final Phosphorus Effluent Limitation: The final calculated effluent limitation for phosphorus is \_\_\_\_\_ [**enter applicable units and averaging period**]. The final effluent limitation is included for informational purposes only and does not take effect until the next permit reissuance. The limitation may be recalculated at the next reissuance based on additional data or new information. Interim Phosphorus Effluent Limitation: The interim effluent limitation for phosphorus is \_\_\_\_\_ [**enter applicable units and averaging period**] and becomes effective on \_\_\_\_\_.

Note: Permit staff will fill in the blanks above with the applicable date in the permit.

The recommended monitoring requirements for phosphorus WQBELs are shown below:

Parameter: Phosphorus, Total

Units:  $\mu\text{g/L}$  (or  $\text{mg/L}$  if the WQBEL is expressed in  $\text{mg/L}$ ); mass limits may also be included per s. NR 217.14, Wis. Adm. Code

Sample Frequency: 3/Week for majors and Weekly for minors (or a frequency that is equal to the monitoring for BOD/TSS)

Sample Type: 24-Hr Flow Prop Comp (lagoon systems may be allowed to collect grab samples)

Note: If a TBL (Technology Based Limit) is included in the permit, in most cases the existing monitoring requirements for phosphorus can be continued in the reissued permit.

\*Compliance Schedules: There are 3 compliance schedules available in SWAMP at the Picklist button for phosphorus. Select the compliance schedule based on whether the new phosphorus limit is considered stringent or not stringent. Generally, if the new phosphorus limit is  $<0.6$  mg/L for mechanical plants or  $<1.5$  mg/L for lagoon systems then select the 'Phosphorus Compliance Schedule – Stringent Limits'. If the new phosphorus limit is  $\geq 0.6$  mg/L for mechanical plants or greater than about 1.5 mg/L for lagoons systems then select the 'Phosphorus Compliance Schedule – Less Stringent Limits'. If no facility planning is required select the 'Phosphorus Compliance Schedule – No Facility Planning Required'.

Note: The standard compliance schedules in the Picklist are meant to provide representative examples that should cover the majority of cases. The compliance schedule language may be modified as necessary and appropriate to represent case-by-case determinations and BPJ.

\*Standard Requirements: The Standard Requirements section will include an updated section on 'Appropriate Formulas for Effluent Calculations' to include calculations to determine compliance with six-month and annual concentration limits and total load limits.

## **Chapter 3**

### **Section 3.03: Variances and Variance Applications**

**Author: Tom Gilbert**

**Last Revised: August 19, 2011 by Rick Reichardt**

Requests for water quality standards variances are generally addressed in s. 283.15, Stats., and Subchapter III in ch. NR 200, Wis. Adm. Code. Section NR 217.19, Wis. Adm. Code, was created to more specifically process potential variances applicable only to lagoon systems with phosphorus WQBELs based on the criteria of s. 283.15 (4) (a) 1 f, Wis. Adm. Code. that “The standard, as applied to the permittee, will cause substantial and widespread adverse social and economic impacts in the area where the permittee is located”. A variance cannot be applied to a “new discharger” (see definition under s. NR 217.13 (8), Wis. Adm. Code.

#### **Section NR 217.19, Wis. Adm. Code, Variance Process:**

- The review of s. NR 217.19, Wis. Adm. Code, variance requests will be coordinated by the Wastewater Section in the Bureau of Water Quality. Approval letters on variances are signed by the Water Division Administrator.
- The Department must provide written notification of the expected phosphorus WQBEL to the permittee. This written notification will likely occur either as part of the permit application process or as part of a facility planning limits determination memo. The need for the variance is obviously premised on first knowing what the phosphorus WQBEL will be and what other alternatives, including adaptive management or water quality trading, are available.
- The application for s. NR 217.19, Wis. Adm. Code, variance must be made on Department forms (see attachments). One form is applicable to industrial wastewater systems and a second form is applicable to non-industrial wastewater systems (both municipal and private). The forms cover the information as required by s. NR 217.19 (2) (b), Wis. Adm. Code.
- The s. NR 217.19, Wis. Adm. Code, variance request shall be made no later than as part of the permit application process.
- If a permittee decides to pursue a variance following the conclusion of the facility planning process, the Department’s decision will be incorporated into the next permit reissuance or modification the permit. This permit action is needed to provide for the public participation process.
- The Department’s decision on the variance request must be issued on or before the date of the public notice for the proposed permit reissuance.

- Prior to reissuing a permit with a variance, the Department must obtain U.S. EPA approval of the variance. This U.S. EPA approval step adds to the total time required to process a permit reissuance.
- If the variance request is denied, the Department will notify the permittee in writing.
- If the Department proposes to grant a variance, the tentative decision will be incorporate into the public notice of the modified or reissued permit.

### **Department Decisions on s. NR 217.19, Wis. Adm. Code, Variance Requests**

In accordance with U.S. EPA guidance

<http://water.epa.gov/scitech/swguidance/standards/economics/index.cfm>, for municipal systems, if the resulting cost of implementing the phosphorus WQBEL is greater than 2% of the medium household income (MHI), it would generally be concluded that the economic impact is adverse enough to warrant granting of the variance. However, the incremental cost increase should also be considered. For example, one community might need a cost increase of 1 % to reach the 2% of MHI, whereas another community might need a 50% increase to reach the 2% of MHI.

For industrial systems, U.S. EPA guidance also applies. However, the determination of social and economic impact presented in the guidance is less straight-forward for industrial systems than for municipal systems.

### **Variance Conditions**

- The permit will identify any conditions of the variance in accordance with s. NR 217.19 (4), Wis. Adm. Code, and whether a phosphorus TBL would apply. As a minimum, phosphorus monitoring would be required and an interim phosphorus limit would be included.
- In accordance with s. 217.19 (4) (d), Wis. Adm. Code, the Department shall require, as an approval condition, an evaluation of possible means to achieve compliance with the applicable phosphorus WQBEL. The evaluation should include evaluations of operational changes, source reduction, capital improvements, and pollutant trading options. The results of this evaluation would provide information for use in determining the need for a continued variance at the time of the next permit reissuance.
- A s. NR 217.19, Wis. Adm. Code, variance is only be effective for the term of the permit. But the permittee may re-apply for the variance in future permit reissuances. If a variance is denied, after the permit is issued the permittee may not apply for a variance based on the factors in s. 283.15(4)(a)1.f., Stats, for the same permit term. U.S. EPA must approve all variance requests.

### **Section NR 217.19, Wis. Adm. Code, Variance Application Forms**

Two variance application forms, one each for municipal and industrial facilities that employ treatment consisting primarily of stabilization ponds or lagoons, are attached.

**Section 283.15, Stats. Variance request**

Variances for facilities that use treatments systems other than ponds and lagoons (mechanical plants) may be granted by the Department. The approval criteria and application and review process for these variances is documented in s. 283.15, Wis. Stats. and ch. NR 200, Wis. Adm. Code. Application for this variance must be made within 60 days of permit issuance.

**Relationship to Technology Based Alternative Phosphorus Limit (APL)**

Facilities which exceed the mass threshold value contained in ch. NR 217, Wis. Adm. Code, are still required to achieve a limit of 1.0 mg/L or an approved APL. For lagoon and pond systems we will continue to require evaluations to reduce the amount of P discharged and which will provide information to establish and APL. Permits for these facilities could, if appropriate, include a requirement to initiate chemical addition. This may be done either directly to the cells or using temporary chemical feed equipment to a manhole or other appropriate mixing location. The chemical addition should be required for the term of the upcoming permit reissuance. A report summarizing the results of the chemical addition should be submitted. Sample compliance schedule language will be included in SWAMP.

State of Wisconsin  
 Department of Natural Resources  
 Bureau of Watershed Management  
 PO Box 7921, Madison WI 53707-7921  
 dnr.wi.gov

**Phosphorus Variance Application for  
 Municipal Facilities**

Draft Form - Page 1 of 5  
 January 24, 2011

**Notice:** An owner of an existing WPDES permitted wastewater treatment system consisting primarily of a stabilization pond or other treatment lagoon may apply for a variance to phosphorus water quality based effluent limits (WQBEL) in accordance with s. NR 217.19, Wis. Adm. Code. For municipally owned facilities, and other non-industrial wastewater systems, this form must be completed and submitted to the Department to request the variance. Failure to provide all requested information may result in denial of your application. Personally identifiable information collected on this form will be used to administer the watershed management program and may be provided to requestors as required by Wisconsin Open Records law [ss. 19.31, Wis. Stats.]

Facility and Permit Information			Facility Owner Contact Information		
WPDES Permit No.			Contact Name		
Facility Name			Address		
Facility Street Address			City	State	ZIP Code
City	State	ZIP code	Phone No. (incl. area code)	FAX Number	
Receiving Water			Email address		

Facility Information (provide attachments as necessary)			
Provide listed information for each lagoon or pond basin (add additional page if more than 3 basins)			
	Basin 1	Basin 2	Basin 3
1. Type or Function of Basin – Describe treatment processes such as aeration, stabilization, settling, storage, or equalization			
2. Normal operating depth (feet) / Volume at normal operating water depth (million gallons)			
3. Detention time based on actual current average influent flow rate (days)			
4. Detention time at rated annual average design flow rate (days)			

<b>Facility Operation and Performance</b> (provide attachments as necessary)	Page 2 of 5
<p>1. <b>Current P removal capability</b> – If the facility is currently required by a WPDES permit to monitor effluent phosphorus (P) provide a summary of the influent and effluent annual average P concentrations for each of the past three years. If permit required P data is not available, the applicant should provide any other P data that may be applicable and available. If no data is available, the Department may estimate the P effluent concentration by based on data from other similar facilities.</p>	
<p>2. <b>Facility Operation</b> – Provide a summary description of overall facility operation. If not a continuously discharging facility, describe storage procedures and the time periods when effluent discharge occurs.</p>	
<p>3. <b>Previous Studies</b> – Reference or attach any facility planning or evaluation study that evaluated facility performance capabilities (Note – Only include studies that are recent or otherwise applicable for the evaluation of the existing facility and current conditions).</p>	

<p><b>Service Area Information</b></p> <p>Note: If the wastewater facility service area includes multiple municipalities provide the following information for each municipality.</p>	
Population served	Customer households served
Median annual household income (MHI)	
<p>Non-Residential Customers – Provide the percent of wastewater flow attributed to commercial, industrial, large institutional and any other special customer category. Describe types of non-domestic wastewater contributions that constitute a significant pollutant contribution or that significantly affect the treatment facility treatment capabilities (for example: large food processors, dairies, or industries with unique wastewater).</p>	

**Estimated Costs to Comply with Phosphorus Water Quality Based Effluent Limit and Associated Social and Economic Impacts**

This assessment consists of a preliminary determination for how compliance with a WQBEL would be achieved and then estimates the associated costs and user charge impacts to customers. In addition to user charges, the applicant may provide other information that are measures or indicators of social and economic impacts. Costs should be expressed as annualized costs and the cost components as identified in 3 through 8 should be provided. The applicant should provide a separate attachment to explain the basis for the cost estimates. If the WQBEL for phosphorus is less than 1.0 mg/L, the applicant may use the simplified formulas provided below in steps 3 and 4. The Department may not accept use of the formula method if the applicant has other, more accurate, cost information available from an ongoing facility planning study.

The formulas are based on the assumption that a new mechanical facility would need to be constructed at a cost of \$4.2 million for a 0.1 million gallon per day (mgd) facility, and that costs would increase at a linear rate to \$13 million for a 1.0 mgd facility. The formula for annualizing the capital cost assumes a state Clean Water Fund (CWF) loan would be obtained for financial assistance resulting in an annual debt service payment cost.

1. If using formula in Step 3, estimate New Design Flow:

Identify  $P_{20}$  = Future service area population expected 20 years in future based on official Department of Administration population projections. = \_\_\_\_\_

$P_0$  = Initial (current as of application) service population = \_\_\_\_\_

$Q_0$  = Initial (current) annual average influent wastewater flow rate = \_\_\_\_\_ (mgd)

$Q_{20}$  = Design Flow (mgd) =  $Q_0 \times (P_{20} / P_0)$  = \_\_\_\_\_ (mgd)

2. If using formula in Step 3, identify Construction Cost Index (CCI) for current year of application.

CCI = \_\_\_\_\_

3. Determine capital cost and express it as annual debt service payment, assuming CWF loan. Note – This estimate may be based on a separate determination (attach) or by the following formula.

(a) Capital Cost =  $[3,220,000 + (Q_{20} \times 9,780,000)] \times (CCI / 8293)$  = \$ \_\_\_\_\_

(b) Annual payment = (Capital cost from 3 a)  $\times (0.0640)$  = \$ \_\_\_\_\_ per year

4. Determine Annual Operation, Maintenance, and Replacement Costs for New Treatment Facility. Note – This estimate may be based on a separate determination (attach) or by the following formulas.

If P limit is  $> 0.35$  mg/L and  $\leq 1.0$  mg/L, estimate the O, M and R as a percentage of capital cost as follows.

(a) Percent of capital cost =  $3.84 + (Q_{20} \times 0.16)$  = \_\_\_\_\_ % (Note – if result  $< 3.84$ , use 3.84%)

(b) O, M & R cost =  $[(4 a) / 100] \times (3 a)$  = \$ \_\_\_\_\_ per year

If P limit is  $\leq 0.35$  mg/L, estimate the O, M and R as a percentage of capital cost as follows.

(c) Percent of capital cost =  $7.09 + (Q_{20} \times 2.79)$  = \_\_\_\_\_ % (Note – if result  $< 7.37$ , use 7.37%)

(d) O, M & R cost =  $[(4 c) / 100] \times (3 a)$  = \$ \_\_\_\_\_ per year

5. Annual Operation, Maintenance, and Replacement Costs to Maintain Collection System. = \$ \_\_\_\_\_ per year

6. Total Annualized Costs (sum of 3 b, 4 b (or 4 d), and 5) = \$ \_\_\_\_\_ per year

User Charge and Other Social and Economic Impacts

7. Identify Existing User Charges and Other Revenue Sources

**Note** – Question 7 is intended to identify what costs and charges would be in effect if the phosphorus variance is granted. If the permittee is in the process of facility planning for other purposes and would need to impose new costs and charges regardless of the phosphorus limit, then identify those costs and charges in this section if known.

Current annual cost per typical household for existing sewerage systems costs (existing debt retirement and operation, maintenance, and replacement costs for both collection and treatment systems)

= \$ \_\_\_\_\_ per household per year

Express above as percent of Median Household Income = \_\_\_\_\_ %

- a. Existing total revenue collected by residential user charges = \$ \_\_\_\_\_ per year
- b. Existing total revenue collected from commercial, industrial and other non-residential customer categories. = \$ \_\_\_\_\_ per year
- c. Any other revenue sources (e.g. property tax or other special assessments) = \$ \_\_\_\_\_ per year
- d. Total existing revenue (sum of a, b and c) = \$ \_\_\_\_\_ per year

8. Identify user charge and other costs associated with implementing changes to meet phosphorus limit

Annual cost per typical household for new sewerage system costs (include both existing and new debt retirement and operation, maintenance, and replacement costs for both collection and treatment systems)

= \$ \_\_\_\_\_ per household per year

Express above as percent of Median Household Income = \_\_\_\_\_ %

- a. Total revenue to be collected by residential user charges = \$ \_\_\_\_\_ per year
- b. Total revenue to be collected from commercial, industrial or other non-residential customer categories = \$ \_\_\_\_\_ per year
- c. Any other revenue sources (e.g. property tax or other special assessments) = \$ \_\_\_\_\_ per year
- d. Total new customer costs (revenue) for complying with new P limit (sum of a, b and c) = \$ \_\_\_\_\_ per year

9. **Social and Economic Impacts** – The Department will use the typical household user charge, expressed as a percent of MHI, as one indicator of affordability. The applicant may provide additional information on impacts to commercial, industrial, or other special customers or any other information regarding affordability or other indicators of social and economic impact. This information should be provided as a separate attachment to this form.

<b>Variance Request and Certification</b>		Page 5 of 5
Based on the information provided, I am requesting a variance on the basis that attainment of the applicable water quality standard for phosphorus may cause substantial and widespread adverse social and economic impacts in the area where this discharge is located.		
I certify that the information provided is true, accurate and complete.		
Print or type name of individual submitting request (must be an Authorized Representative for the treatment facility)	Title	
Signature of Official	Date Signed	

State of Wisconsin  
 Department of Natural Resources  
 Bureau of Watershed Management  
 PO Box 7921, Madison WI 53707-7921  
 dnr.wi.gov

**Phosphorus Variance Application for Industrial Facilities**

Draft Form - Page 1 of 2  
 January 24, 2011

**Notice:** Information requested is required for the Department to determine whether or not to grant a variance. An owner or operator of a WPDES permitted wastewater treatment system consisting primarily of a stabilization pond or lagoon may apply for a variance to phosphorus water quality based effluent limits using this form in accordance with s. NR 217.19, Wis. Adm. Code. Additionally, an owner or operator of a WPDES permitted wastewater treatment system of any type may apply for a variance in accordance with s. 283.15, Wis. Stats. Failure to provide all requested information may result in denial of your application. Personally identifiable information collected on this form will be used to administer the watershed management program and may be provided to requestors as required by Wisconsin Open Records law [ss. 19.31, Wis. Stats.]

**PROVIDE THE FOLLOWING INFORMATION. ATTACH ADDITIONAL SHEETS WHERE NECESSARY.**

Applicant Information			Contact Information (may be consultant)		
Owner Name			Contact Name		
WPDES Permit No.			Name of firm (if applicable)		
Facility Name			Street Address		
Facility Street Address			City	State	ZIP Code
City	State	ZIP code	Phone No. (incl. area code)	FAX Number	
Receiving Water			Email address		

Facility Information	
Type of Production	Describe treatment system, including units, volumes, and detention times (for main units).
Wastewater Treatment System ___ Aerated lagoon ___ Stabilization pond ___ Other (specify) _____	
Average annual wastewater discharge.	Is phosphorus treatment currently being provided? If so, describe.
Maximum monthly average discharge.	
Discharge periods	
Does your WPDES permit currently have a phosphorus limit?	Describe past or ongoing phosphorus minimization efforts, including industrial process changes.

**Treatment Costs**

If currently providing treatment to remove phosphorus, provide the following:

- Cost for phosphorus removal, including sludge handling.
- Cost per pound of phosphorus removed.
- Relationship of phosphorus removal costs to overall treatment costs.

Project treatment system or industrial process upgrades that will be necessary to achieve water quality based phosphorus limits. Provide estimated costs for the upgrades and relate the projected capital and O&M costs to the current treatment or manufacturing costs.

What feasible steps could be taken to reduce discharge levels below current levels, even if Water Quality Based Effluent Limits will not be met. Provide an estimate of costs for these steps.

What variance level is being requested?

**Affordability to Industrial Discharger and Wide Spread Economic Impact**

The U.S. EPA Interim Economic Guidance for Water Quality Standards Workbook which discusses these considerations is available on the following site:

<http://water.epa.gov/scitech/swguidance/standards/economics/index.cfm>

Provide any information which is believed to be relevant to addressing this Guidance document.

**Certification**

I certify that the information provided with this request is true, accurate and complete to the best of my knowledge.

Print or type name of individual submitting request (must be an Authorized Representative)

Title

Signature of Official

Date Signed

## **Chapter 4- Adaptive Management and Water Quality Trading**

Adaptive management (AM) is a new concept to Wisconsin and to the nation. Therefore, the Department will continue to expand and improve on the guidance in the Chapter as more experience is gained. The adaptive management strategy **will** require coordination with other discharges in a watershed. Therefore, this option may take some time to organize and implement. It is important for discharges interested in this option to take advantage of time given in the compliance schedule. Department staff are dedicated to working with permittees to help successfully implement this option.

Pollution trading is also a relatively new concept to Wisconsin. Implementation of this option is being carefully strategies by the Department and key stakeholders. This Guidance document will be updated as more information about this option comes available.

## **Chapter 4**

### **Section 4.01: Adaptive Management**

**Author: Amanda Minks**

**Last Revised: January 3, 2012**

#### **Summary**

*The following text is meant to provide a general summary of the adaptive management option and its requirements. Additional guidance is provided in subsequent subsections to discuss and provide more specific guidance on each element in s. NR 217.18, Wis. Adm. Code.*

Section NR 217.18, Wis. Adm. Code, provides a watershed adaptive management option as a strategy to “achieve the phosphorus water quality criteria in s. NR 102.06, Wis. Adm. Code, in the most economically efficient manner and as soon as possible taking into consideration the contributions of phosphorus from point and nonpoint sources in a watershed”. Similar to water quality trading (section 4.03 of the Guidance), adaptive management allows a point source to control phosphorus discharges from other point and/or nonpoint sources to achieve compliance with applicable phosphorus water quality criteria. By successfully implementing adaptive management, water quality criteria should be attained and less stringent water quality based effluent limits (WQBELs) may be required than the originally calculated WQBELs not accounting for water quality improvement.

In the watershed adaptive management option, WQBELs are established according to s. NR 217.13, Wis. Adm. Code, or a U.S. EPA approved TMDL. The Department will notify the applicant of the proposed phosphorus WQBEL limit, either as part of the permit application process, or as part of a facility planning limits determination memo. The permittee can also calculate or request an initial WQBEL limit estimate for the purposes of facility planning to enable a permittee to evaluate adaptive management. All requests should be submitted to the permit drafter.

Adaptive management may be appropriate for the permittee to consider where:

1. The WQBEL is stringent (generally 0.4 mg/L or less).
2. Achieving compliance would result in major facility modification even with the facility functioning at optimal conditions. If major facility modification is not required the applicant is not eligible for adaptive management.
3. Reducing nonpoint or other point sources is economically preferable.

If adaptive management is selected as the best compliance option, the applicant must submit a “Watershed Adaptive Management Request Form” at the time of the permit application for reissuance pursuant to s. NR 217.18(2), Wis. Adm. Code. Typically, this request form should be submitted with the first permit reissuance after the rule became effective. If, however, the Department determines (based on the requirements in s. NR 217.17, Wis. Adm. Code) that the appropriate and necessary compliance schedule for a

permittee will go beyond 5 years, the permittee may submit an application for adaptive management with the second permit reissuance after the rule became effective. In these cases the interested party is expected to explore the feasibility for adaptive management and develop a plan in the first permit term to be submitted with the "Adaptive Management Request Form" at the time of permit reissuance.

*Note: Adaptive management can also be used to comply with phosphorus limits based on wasteload allocations from U.S. EPA approved TMDLs. In these cases the "Watershed Adaptive Management Request Form" should be submitted with the first permit application following the TMDL effective date.*

All codified elements required to be submitted to the Department for adaptive management are built into the "Adaptive Management Request Form". Therefore, successful completion of this form should provide the Department with all information needed to make a determination. Pursuant to s. NR 217.18(2), Wis. Adm. Code, these codified elements are a demonstration that:

- a) The exceedance of the applicable phosphorus criterion is caused by both point and nonpoint sources
- b) The sum of the nonpoint source plus permitted municipal separate storm sewer systems contribution of phosphorus is at least 50 percent of the total contribution or that the applicable phosphorus criterion cannot be met without control of nonpoint sources
- c) The proposed water quality based effluent limit in the applicant's permit will require filtration or other equivalent treatment technology to achieve compliance and
- d) The permit applicant has submitted an adaptive management plan with specific actions to be implemented that will achieve compliance with the applicable phosphorus criterion through verifiable reductions of phosphorus from point and nonpoint sources. The plan must include:
  1. An analysis of the phosphorus levels in the permittees effluent and identification of the significant sources of point and nonpoint phosphorus loadings
  2. Goals and measures for determining if the actions in the plan are effective in achieving compliance
  3. Identification of any partners in implementing the plan and the level of involvement
  4. A demonstration that the permittee (and any partners) has the ability to fund and implement the plan

*Note: If a permittee is interested in pursuing adaptive management as part of facility planning options evaluation during the extended compliance schedule (see section 3.01 of the Guidance), the information required by ss. NR 217.18(2) (a), (b) and (c), Wis. Adm. Code, should be submitted with the planning limits request. In this case,*

*the applicant should submit a “preliminary adaptive management request” using the application available at the end of this Section. As alternatives planning proceeds, the permittee (or consultant) should develop the information necessary for s. NR 217.18(2)(d), Wis. Adm. Code. The elements required to fulfill s. NR 217.18(2)(d), Wis. Adm. Code, are required to be submitted at the time of the next permit reissuance.*

The Department must concur with the permit applicant’s demonstration in order to approve this request. If approved, the permittee must begin implementing the adaptive management plan in the first permit reissuance term following the AM approval. In this permit, WQBELs will be documented in the permit but will be held in abeyance pending the implementation of the adaptive management plan, including point or nonpoint source phosphorus reductions, as specified in the plan. In other words, the WQBEL is included in the permit, but compliance is not required until the third permit term of the adaptive management plan or the water quality criteria has been attained, whichever comes first. If water quality improvements have been achieved the final WQBEL can be recalculated based on current ambient phosphorus concentrations. Interim effluent limits shall be established in the WPDES permit during implementation of the adaptive management plan:

Table 1: Interim P limits and WQBEL expressed in each of the three permit terms, where three permit terms are determined necessary.

Permit term following AM approval	1	2	3
WQBEL*	AM Limits: <ul style="list-style-type: none"> <li>• 0.6 mg/L as a 6 mo. avg.</li> <li>• 1.0 mg/L as a 6 mo. avg.</li> </ul>	AM Limits: <ul style="list-style-type: none"> <li>• 0.5 mg/L as a 6 mo. avg.</li> <li>• 1.0 mg/L as a 6 mo. avg.</li> </ul>	Previously calculated WQBEL, recalculated WQBEL if water quality improved, or TMDL derived WQBEL if standard not met

\*- The initial WQBEL will be included in each permit term following the AM approval with a future effective date. The permittee will not be responsible to achieve the WQBEL until the third permit term.

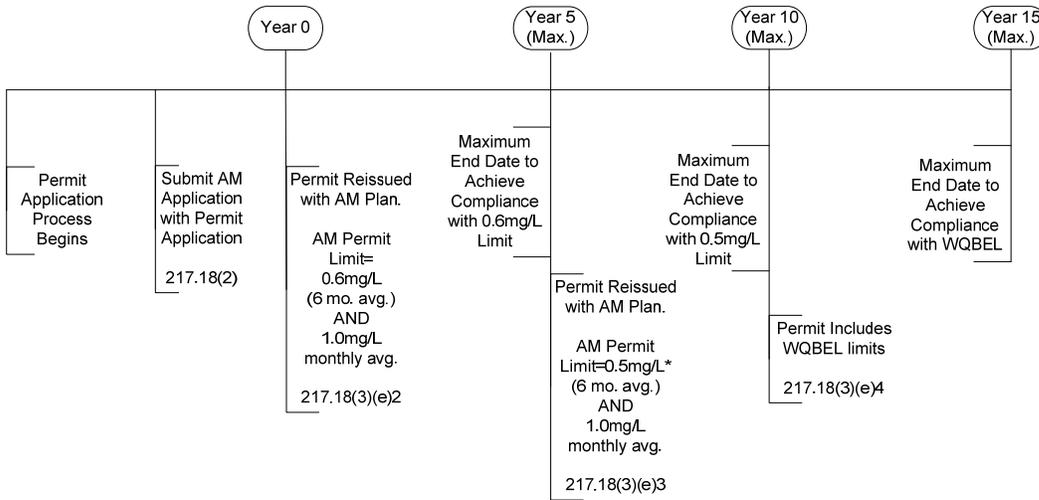
Note: interim limits are technology based limits rather than water quality based limits.

Compliance Schedules:

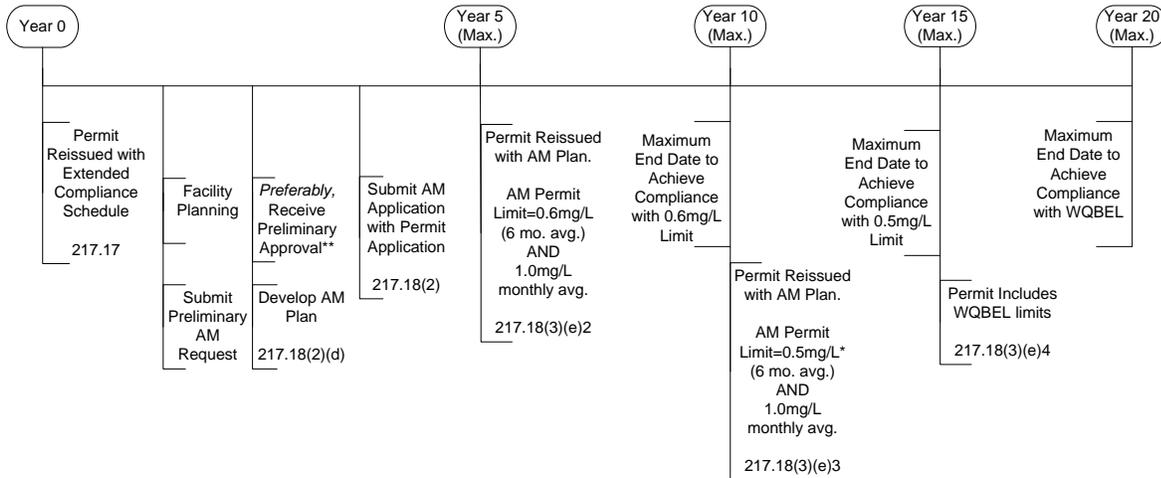
If the limit(s) given in the table above can be easily met, the limit will go into the permit without a compliance schedule. However, a compliance schedule of up to five years may be allowed to meet the limits (interim and final) in all three permits issued under adaptive management. Compliance schedules will reflect the amount of time necessary to achieve compliance with the applicable interim limit. Department permit staff are responsible to develop appropriate interim limit compliance schedules.

Timelines for Compliance:

Timeline for AM Implementation *without* Extended Compliance Schedule in First Permit Following Rule Promulgation



Timeline for AM Implementation *with* Extended Compliance Schedule in First Permit Following Rule Promulgation



\*- This more restrictive limit is only required if monitoring data of the receiving water indicate that the applicable WQC in NR 102.06 has not been met by the time the first permit issued under the AM option expires (NR 217.18(3)(e)3).

\*\*- Preliminary approval not mandated in code. However, it is recommended to receive preliminary approval prior to AM planning to ensure applicant qualifies for AM.

The timelines above represents the **maximum** time a facility can be granted to achieve the interim limits in a compliance schedule [s. NR 217.18(3)(e), Wis. Adm. Code].

Facilities will be expected to submit the “Adaptive Management Request Form” at the first permit term following the phosphorus standard effective date unless granted an extended compliance schedule pursuant to s. NR 217.17, Wis. Adm. Code. Furthermore, most facilities will NOT require the maximum time to achieve interim limits. Compliance schedules will be developed on a case-by-case basis and will reflect the time required to achieve the interim limit(s) or final WQBEL. The adaptive management plan as required under s. NR 217.18(2)(d), Wis. Adm. Code, should provide details on interim limits and the process by which the facility will comply with interim limits. The adaptive management plan should also consider options to achieve the phosphorus WQBEL if the adaptive management plan is ineffective at controlling the phosphorus concentration of the waterbody.

**Application Guidance ss. NR 217.18(2)(a)-(d) , Wis. Adm. Code:**

The following discussion highlights the eligibility requirements as expressed in ss. NR 217.18(2)(a)-(d), Wis. Adm. Code. Additionally, guidance is included to inform applicants and Department staff on tools available to make eligibility determinations.

**Phosphorus Exceedances (S. NR 217.18(2)(a) , Wis. Adm. Code).** Section (a) limits adaptive management to permittees discharging to waters that exceed the phosphorus criteria and that receive both point and nonpoint source contributions. Since virtually all watersheds in Wisconsin include nonpoint sources, this factor will be deemed met simply by establishing an exceedance of the applicable criteria. In-stream phosphorus data is available on the Surface Water Data Viewer (SWDV) for internal and external use: [http://dnr.wi.gov/org/water/data\\_viewer.htm](http://dnr.wi.gov/org/water/data_viewer.htm). This data can be used to illustrate an exceedance for the purpose of determining eligibility for adaptive management. The data in this layer reflects the “upstream concentration” methodology as specific in s. NR 217.18(4)(d), Wis. Ad. Code, and may not reflect methodology used for other waterbody assessment purposes. The Department may also consider any additional in-stream data that has been collected using appropriate methods (see Section 5.01 of the Guidance) and submitted to the Department.

**Tools to Determine Phosphorus Exceedance Eligibility:** If the “River Phosphorus Data” layer in the SWDV concludes that there is an exceedance no further evaluation is required by the Department. If additional data is submitted to the Department, this data must be combined with all other data available for that waterbody segment and a determination should be made by the limit calculator. Data may be excluded from this evaluation if it has not been collected using appropriate methods, is more than five years old, or was collected during a large storm or runoff event.

**Nonpoint Source Contribution (s. NR 217.18(2)(b) , Wis. Adm. Code).** This section requires the applicant to establish that nonpoint sources must be controlled in order to meet the water quality criterion for phosphorus. This can be accomplished in two ways. The first is to establish that the total of the nonpoint and municipal separate storm sewer system (MS4) contributions of phosphorus are at least 50% of the total. To assist

in this analysis, the Department has developed a GIS-based model called “Pollutant load Ratio ESTimation TOol (PRESTO)”. PRESTO was developed to compare a watershed’s average annual point and nonpoint phosphorus loads. The tool delineates the watershed upstream of a respective point source outfall, calculates the contributing nonpoint source load, and compares the measured point source effluent phosphorus load to the upstream nonpoint source phosphorus load. PRESTO has been developed within the ArcGIS framework and allows for the various processes (watershed delineation and point and nonpoint source loading) to be computed all at once or separately. This model will be available to the public and model results can be used as sufficient evidence to fulfill the requirements in s. NR 217.18(2)(b), Wis. Adm. Code. Permittees are not limited to this model, however. Permittees can choose to use alternative model results and/or other credible data to establish the total loadings from point sources (excluding MS4s), MS4s and nonpoint sources. This should be done on a mass loading, annual basis and converted to percentages. For additional information, see Section 4.02, of this Guidance.

The second way is to establish that nonpoint sources of P must be controlled in order to achieve the P water quality standard. Again with credible data or model results, the P reduction necessary to achieve the criterion on a mass basis must be established and this number must exceed the reductions that can be achieved by the point sources. For this analysis, assume that the point source limits would be set at the criterion, not at zero discharge.

**Tools to Make Nonpoint Source Contribution Determination:** If the “PRESTO” model clearly states that 50% of the phosphorus load comes from nonpoint sources within the watershed, s. NR 217.18(2)(b), Wis. Adm. Code, will be fulfilled. The applicant must submit this analysis to the Department for review. Department limit calculators should review the submittal to ensure that “PRESTO” was used appropriately. For questions on “PRESTO”, the Water Evaluation Section Modeling Staff of the Bureau of Water Quality should be consulted.

If additional data, data analyses, or models are used to fulfill the requirements of s. NR 217.18(2)(b), Wis. Adm. Code, limit calculators must agree with and approve the submittal. Limit calculators should consult Department modeling staff in these instances.

Filtration Technology (S. NR 217.18(2)(c), Wis. Adm. Code). Under current available technology and available data, it was concluded that if the calculated WQBEL is 0.40 mg/L or less as a monthly average, that limit cannot be achieved without addition of filtration or other equivalent technology. If the limit is greater than 0.40 mg/L, the permittee will need to demonstrate that their current system cannot achieve the limit without adding technology beyond secondary chemical or biological treatment. To meet this requirement the applicant should submit a written certification that the permittee has optimized their system along with monitoring data showing that the newly

calculated WQBEL will be exceeded. This certification should be submitted with the Adaptive Management Request Form.

**Tools for Filtration Technology Determination:** Department permit staff may assume the requirement in s. NR 217.18(2)(c), Wis. Adm. Code, is fulfilled if the calculated WQBEL is 0.40 mg/L or less as a monthly average. For facilities that have a calculated WQBEL greater than 0.40 mg/L the Department permit staff must make a determination from the certification and monitoring data submitted. The permit drafter can approve or reject the certification. If insufficient data is available or the data suggests the WQBEL can be met with the current system, Department staff must conclude that filtration or equivalent technology is not required. In this case, the certification would be rejected and adaptive management would not be available for the applicant.

### **Adaptive Management Plan**

As previously stated, adaptive management allows a discharge to control phosphorus sources from other point and/or nonpoint sources to achieve compliance with applicable phosphorus water quality criteria. Section NR 217.18(2)(d), Wis. Adm. Code, requires that an adaptive management plan be submitted to the Department to illustrate:

1. The amount of phosphorus that will be accounted for through adaptive management
2. How the applicant will achieve compliance with interim and final WQBEL,
3. What strategies will be used to control the phosphorus contributions, and
4. Other implementation details including, but not limited to, partnership building capacities, funding sources, and monitoring plans.

### **Determining the Amount of Phosphorus that Must be Offset**

The goal of adaptive management is to achieve phosphorus criteria in the receiving water. The applicant will have 2 permit terms in order to achieve criteria. If the criteria is not attained by the third permit term of the adaptive management plan, the final WQBEL will become effective in the permit. In order to achieve the criteria, the applicant will be responsible to reduce its phosphorus discharge by the percent commensurate with its load or by the percent required to achieve water quality criteria in cases where the full load does not need to be accounted for to achieve the criteria. The applicant will not be responsible to reduce its phosphorus discharge by more than its contributing load in the first permit term the adaptive management plan is approved. If this offset is not sufficient to show water quality improvement, the adaptive management plan should be modified in the second permit term to either: a) add point sources to the AM plan to offset more phosphorus, b) offset more of the phosphorus load than the contributing, c) continue to implement the AM plan while developing a TMDL in order to account for additional P and achieve the applicable water quality criteria. The Department or a third party may develop a TMDL.

Note: In cases where a TMDL is effective or a TMDL is in development, a facility may choose a different impaired water than the direct receiving water if it is in the same watershed (HUC 12). Adaptive Management “action areas” are discussed in more detail below.

In cases where large-scale reductions would be required to achieve the applicable criteria, multiple facilities may wish to submit a watershed-scale adaptive management plan in order to offset additional phosphorus thereby achieving the criteria on a shorter time-scale. Additionally, the cost for the phosphorus reduction would be shared between the facilities covered under the plan. In cases where other facilities are not available or willing to join an adaptive management plan, the applicant may wish to offset its contributing load plus additional P loading in order to achieve the phosphorus criteria within the specified timeframe of the adaptive management plan. Facilities may benefit from this additional reduction as the calculated final WQBEL would likely be relaxed as a result of improved water quality.

In order to determine the contributing phosphorus load, the applicant must first calculate the long-term average phosphorus concentration of its effluent. The long-term average phosphorus concentration should be calculated from all representative effluent sample results collected over the term of the current permit. At least three years worth of data should be considered. The applicant may wish to request that the Department calculate a long-term phosphorus effluent concentration to be used in the adaptive management plan. In cases where site-specific data is not available, the Department may consider similar discharges for this calculation.

It is also necessary to have the receiving water background concentration for phosphorus to determine the applicant's load reduction. The background concentration should be equivalent to the concentration used to support the criteria exceedance in s. NR 217.18(2)(a), Wis. Adm. Code. As mentioned, default P concentrations for initial use are available through the Department's SWDV. The permittee should augment this background data as additional in stream data becomes available.

#### Example Calculation of the Amount of Offset

A municipal wastewater treatment system with a 1-MGD design capacity and a long-term phosphorus effluent concentration of 0.83 mg/L (i.e., the average of three years of weekly monitoring results) discharges to a receiving water with an annual average flow of 87 cfs (56 MGD). The receiving water is phosphorus impaired and has a background concentration of 0.23 mg/L upstream of the discharge. The proposed WQBEL equals the water quality criterion of 0.1 mg/L.

Step 1: Calculate the applicant's current discharge as an annual load.

$$1 \text{ MGD} \times 0.83 \text{ mg/L} \times 8.34 \times 365 \text{ days/yr} = \mathbf{2,527 \text{ lbs/yr}}$$

Note: 8.34 is a conversion factor for converting mgd and mg/L into pounds per day

Step 2: Calculate the current load in the receiving water just downstream from the applicant's discharge.

$$2,527 \text{ lbs/yr} + (56 \text{ MGD} \times 0.23 \text{ mg/L} \times 8.34 \times 365 \text{ days/yr}) = 41,735 \text{ lbs/yr}$$

Step 3: Calculate the applicant's percent contribution of load.

$$2,527 \text{ lbs/yr} \div 41,735 \text{ lbs/yr} \times 100 = 6.1 \%$$

Step 4: Calculate the allowable load in the receiving water.

$$(56 \text{ MGD} + 1 \text{ MGD}) \times 0.1 \text{ mg/L} \times 8.34 \times 365 \text{ lbs/yr} = 17,351 \text{ lbs/yr}$$

Note: Substitute 0.075 mg/L for stream discharges for 0.1 mg/L, which represents the river criteria.

Step 5: Calculate the needed reduction in the receiving water.

$$41,735 \text{ lbs/yr} - 17,351 \text{ lbs/yr} = 24,384 \text{ lbs/yr}$$

Step 6: Calculate the applicant's proportional share of the needed reduction

$$24,384 \text{ lbs/yr} \times 6.1\% / 100 = \mathbf{1,487 \text{ lbs/yr}}$$

The municipality is responsible for offsetting 1,487 pounds of phosphorus per year as part of its AM plan. If the water quality standard of 0.1 mg/L is not achieved in the receiving water at the conclusion of the first permit's term, the municipality may be required to offset more phosphorus load. Again, the facility may wish to work with partners to achieve a greater reduction than its total load. This may help AM plans achieve compliance with the applicable criteria on a shorter timescale in order to receive a more relaxed final WQBEL. In some cases, the facility may also consider a different portion of the receiving water to implement a more effective adaptive management plan.

#### Options to Achieve Compliance with Interim Limits and Final WQBEL

The AM plan must clearly indicate the reductions required to meet compliance with the interim limits and final WQBEL and should indicate options to achieve compliance with these limits. The discharge must also determine the difference in annual mass between the interim limit and the final WQBEL. These calculations should be based on the design capacity of the facility. If something other than the design capacity is proposed or the design capacity is exceeded, Permit Staff should be contacted.

Note: Compliance schedules will be included in the WPDES permit as appropriate to achieve compliance with interim limits and final WQBEL.

The annual mass for a facility is calculated as follows:

Limit concentration \* flow \* 8.34 \* 365 = mass, where

- The limit concentration is the interim limit of 0.6 mg/L, 0.5 mg/L, or other interim limit.

Or

- The WQBEL concentration in mg/L for final WQBEL.
- Flow is in million of gallons per day (mgd)
- 8.34 is a conversion factor for converting mgd and mg/L into pounds per day
- 365 is number of days per year
- Mass is in lb/year

Example:

Facility has a 1 mgd annual design capacity and a final WQBEL of 0.1 mg/L. For the first permit term, the interim limit is 0.6 mg/L.

Interim limit mass

$$0.6 \text{ mg/L} * 1 \text{ mgd} * 8.34 \text{ (unit conversion)} * 365 \text{ days} = 1826 \text{ lb/year}$$

Final WQBEL

$$0.1 \text{ mg/L} * 1 \text{ mgd} * 8.34 \text{ (unit conversion)} * 365 \text{ days} = 305 \text{ lb/year}$$

$$\text{Difference in mass} = 1826 \text{ lb/year} - 305 \text{ lb/year} = \underline{1521 \text{ lb/year}}$$

The adaptive management plan should identify strategies to achieve compliance with the interim limits and the final WQBEL. The plan should also identify how the annual

mass contribution from the effluent will change as the adaptive management plan is implemented. Because the applicant is responsible to reduce the P load up to the percent contribution of the discharge, sufficient control strategies should be selected to mitigate the total annual mass of the discharge. These strategies should be implemented, as appropriate, to achieve the WQC of the receiving water.

It is strongly recommended to include more strategies in the adaptive management plan than required to achieve the WQC in the receiving water. The applicant will not be responsible to implement additional control strategies if the WQC in the project area is being attained. However, these additional strategies can serve as an assurance or back-up in cases where nonpoint sources do not properly implement BMPs, extreme weather events inhibit or destroy certain reduction strategies, or water quality improvements are not being measured on a reasonable timeline. In these situations, the Department will provide reasonable time for the applicant to initiate these “back-up” strategies. A more detailed discussion about selecting control strategy follows.

**Department Determination for Complying with Interim and Final Limits:** Interim limits should be achieved in the fastest and most economic way possible. Permit drafters should review and agree with any facility modification proposed to achieve interim limits and the final WQBEL. If Department staff do not agree with the proposed options, the Department can reject or approve the adaptive management plan with modifications. As previously stated, compliance schedules should be put in the WPDES permit as necessary to achieve compliance with the applicable limit.

#### Reducing P Contribution

##### *Step 1: Identify Project “Action Area”*

It is in the best interest of the applicant to control P loads upstream of the discharge in order to achieve the water quality criteria at the discharge point. This would likely result in the discharge receiving a less restrictive final WQBEL due to the improvement in water quality. However, in some instances the contributions from other sources or the legacy phosphorus in the receiving water makes achieving compliance with the criteria infeasible at the point of discharge within two permit terms. In these instances the applicant may use modeling to show compliance with the intent of adaptive management. In this case, model results/data should illustrate that water quality criteria would be attained if the residual phosphorus in the waterbody were removed. The applicant may also consider reducing P from other waterbody segments in the same watershed (HUC 12). This may be of particular benefit for watersheds with U.S. EPA approved TMDLs or watersheds that are soon to have approved TMDLs. If the upstream waterbody segment is not identified as the action area the applicant should submit written justification to the Department with the adaptive management request form.

The action area for the adaptive management plan should, at minimum, cover all areas where phosphorus controls are being actively pursued. The action area should also cover the targeted waterbody segment and the area where “back-up” strategies may be

implemented, if necessary. The size of the action area will be case-by-case and should be of sufficient size to reduce P by the percent commensurate with the load or by the percent required to achieve water quality criteria in cases where the full load does not need to be accounted for to achieve the criteria. For projects on an alternative waterbody segment within the same HUC 12 the action area must be of sufficient size to reduce P by the percent commensurate with the load.

### *Step 2: Identify Partners*

As previously stated, adaptive management requires the applicant to offset the phosphorus load of their discharge through other point or nonpoint source reductions. Therefore, the applicant must identify other phosphorus sources and estimate their contributions within the action area. In some cases, these may be easy to identify. In other instances the applicant may need to work with county conservation department(s) or the Department to identify significant P sources. PRESTO may also be a useful tool to help determine other significant sources of phosphorus. Permittees may also need to contact sources when information is not available and/or use pollutant loading models. The applicant will not be responsible to collect monitoring data to quantify other point and nonpoint sources.

Note: The Department intends to update the PRESTO model to identify and estimate areas in a watershed that contribute the majority of the phosphorus to the waterbody. This second iteration of PRESTO will likely be available summer 2012. Please note that permittees are not limited to this model to fulfill the requirements in this section, and in some cases, model results may be insufficient. Permittees can choose to use alternative model results and/or other credible data to establish the total loadings from point and nonpoint sources.

Once the contributing sources have been ascertained, the applicant must identify the partners that will be solicited and their anticipated role pursuant to s. NR 217.18(2)(d)3, Wis. Adm. Code. The Department recommends that high contributing areas be solicited first as these areas will likely result in the most economically efficient P reductions. The applicant is responsible for tracking that partners are properly implementing any control strategy that has been identified in the adaptive management plan. The applicant may wish to consider entering into a contractual agreement with the partner to ensure the identified strategy is maintained over time. Any contract reflecting commitments by partners should be submitted to the Department. If the obligations under the contract are not upheld, the Department will provide reasonable time for a resolution or for the applicant to implement alternative control strategies. The applicant may wish to identify more partners and/or phosphorus reduction strategies than required to act as a “back-up” for these cases.

### *Step 3: Identify P Reduction Strategies*

As previously stated, the applicant is responsible to reduce P by the percent commensurate with the load or by the percent required to achieve water quality criteria

in cases where the full load does not need to be accounted for to achieve the criteria within the action area. This offset amount should have been previously calculated. Pursuant to s. NR 217.18(2)(d)2, Wis. Adm. Code, the applicant must identify strategies that will be used to achieve this reduction and implementation goals for these strategies. Partners should be consulted to identify BMPs or other control strategies that are acceptable to the partner. The applicant should consider providing the Department with a preliminary evaluation to corroborate that these proposed actions will result in water quality improvement and water quality criteria attainment. As previously mentioned, the applicant should also consider identifying more strategies in the adaptive management plan than required. These additional strategies can serve as a back-up in cases where nonpoint sources do not properly implement BMPs, extreme weather events inhibit or destroy certain reduction strategies, or water quality improvements are not being measured on a reasonable timeline.

There are many strategies to reduce/control phosphorus loading. Some examples include:

- Educating agricultural producers
- Agricultural land retirement
- Grazing land protection
- Stream fencing
- Stream bank stabilization
- Use of cover crops
- Grass filter strips
- Buffer strips
- Animal water control facilities
- Conservation tillage
- Agricultural nutrient management
- Wetland restoration

Pursuant to s. NR 217.18(2)(d)2, Wis. Adm. Code, the applicant is also responsible to validate that the adaptive management plan is being effective at controlling the selected phosphorus sources to the waterbody in question. To ensure these actions are implemented properly and to evaluate their effectiveness, the applicant will be required to perform audits, inspections and/or monitoring. Modeling may also be used to illustrate the effectiveness of the phosphorus reduction strategy and to illustrate compliance with the adaptive management plan.

Table 2: Description of items to include in adaptive management plan to fulfill s. NR 217.18(2)(d)2, Wis. Adm. Code.

Topic	General Guidance	Examples
Possible Actions	Use basic tools to identify verifiable BMPs that will reduce NPS contributions to	Provide general analysis of compliance with ch. NR 151, Wis. Adm. Code, within

	<p>needed level. These tools may be available from the county or the Department. If data unavailable, minimal data collection may be required. The water quality trading guidance document may also be a useful tool to identify appropriate BMPs to consider.</p>	<p>area (PI, BMPs, production areas). Provide financial support for some BMPs (e.g. NMPs) adequate to reduce P by percent commensurate with load; identify and assist with MS4 BMPs, if applicable. Identify point source partner to reduce phosphorus load. Provide education for agricultural community.</p>
<p>Example Goals and Timeline</p>	<p>Use current known water quality conditions to describe goals in achieving WQC and the general timeline for a waterbody to achieve compliance with WQC. General WQC should be achieved within 2-4 years of the second permit term.</p>	<p>Short-term: Complete NR 151, Wis. Adm. Code, analysis in years 1 – 2. Begin installing, updating, or improving BMPs and other identified strategies in years 2 – 5. If applicable, update AM plan to improve ch. NR 151, Wis. Adm. Code, compliance. If other point source partners are selected to perform extra P reductions, complete in years 3-5. Achieve adequate P reduction commensurate with load by year 4. This may result in more BMPs required or an extended action area.</p> <p>Long-term: Analyze in stream data to determine effectiveness of BMPs. Improve BMPs as required. Achieve water quality criteria in year 3 of second permit term.</p>
<p>Measures</p>	<p>Identify deliverables of the project to achieve the goals. These deliverables should be completed on the appropriate schedule to ensure that the goals and timeline of the project are maintained. Monitoring procedures should be developed pursuant to s. NR 217.18(3)(a), Wis. Adm. Code.</p>	<p>Short-term: Provide analysis in years 1-2 and determine phosphorus reductions in years 2 – 5 through tracking and / or modeling of compliance. Report site inspections to the county LCD or WDNR. In-stream monitoring should be performed annually and result should be submitted.</p> <p>Long-term: In-stream monitoring should continue recording water quality results and determine effectiveness of BMPs. Necessary BMP improvements should be installed. Achieve WQC in year 3 of second permit term.</p>

**Department Determination:** The AM plan, including phosphorus reduction strategies, should be submitted as part of the AM request form to the applicable permit drafter.

Department permit staff are responsible to review the AM plan and the strategies to reduce P contributions. Because AM is a new implementation option in Wisconsin, and in the nation, permit staff should consult with runoff management and water evaluation staff to review and approve the proposed phosphorus reduction strategies. This group of staff should review the AM plan to determine if the strategies were selected using reasonable information and assumptions, the strategies will result in phosphorus reductions to surface water, and the proposed actions are likely to result in achieving water quality goals in the proposed action area. As more experience is gained, the Department may look for more specificity in this section and will add to this guidance document. Facilities may wish to use basic modeling to justify BMP selection.

A copy of any approved AM plan should be sent to the Water Quality Standards Specialist in the Water Evaluation Section.

#### Other Implementation Details

The applicant should submit additional details about the AM plan including, but not limited to, partnership building capacities and funding availability pursuant to ss. NR 217.18(2)(d)3 and NR 217.18(2)(d)4, Wis. Adm. Code. The applicant should consider any additional partners that were considered or may be solicited in the AM plan in the future. The Department will be interested in all permittees in the watershed that are also opting for AM to ensure their plans are coordinated and not duplicative. The Department will encourage a joint plan, if possible, with a goal that the combined plan accomplishes greater environmental benefit than separate plans. Almost all plans should include municipalities and county land conservation staff as partners, but could also include watershed groups, or even individual producers.

The applicant should also demonstrate that the permittee has the ability to fund and implement the plan, including demonstrating that the authorities who will be implementing the plan have the necessary legal, financial, institutional, and managerial resources available. The funds may come from the permittee themselves, their partners, or other outside sources (e.g., grants) and should be adequate to support the plan initiatives.

#### **Adaptive Management Implementation Guidance ss. NR217.18(3)(a)-(e), Wis. Adm. Code:**

##### **Permit Terms and Conditions**

Section NR 217.18(3), Wis. Adm. Code, provides the requirements that must be included in a permit incorporating an AM permit:

- a) Times and locations of monitoring of the receiving water and effluent discharge.
- b) Requirements to design and implement the actions in the adaptive management plan along with any compliance schedules.

- c) Requirements to optimize the permittee's treatment system to control phosphorus.
- d) Reporting procedures and deadlines.
- e) Numerical effluent limits
  - 1. Calculated WQBEL or TMDL derived
  - 2. First permit term interim limit
  - 3. Second permit term interim limit
  - 4. Recalculated WQBEL or TMDL derived if P water quality standard not met for the third permit term.
- f) Provision on failure to implement
- g) Reasons for terminating adaptive management

Receiving Water Monitoring (S. NR 217.18(3)(a), Wis. Adm. Code). This section requires monitoring in the receiving water along with recording and reporting the mass and concentration of P in effluent. The location and times of monitoring and frequency of reporting must be specified in the permit by the Department. Consistent with the requirements for the AM plan, these provisions should be proportional to the level of contribution of P by the point source.

Table 4: Stream monitoring requirements

	Monitoring Requirement
Location	Upstream and downstream from the outfall(s) plus any plan requirements
Times	2x/Month- May through October, as a minimum
Report Frequency	As part of annual report

\*- Monitoring requirements are based on approved AM plan requirements. Locations of monitoring should be selected to represent ambient conditions, conditions in the action area, and the condition at the point of discharge.

Effluent discharge monitoring frequency is specified in the facility's permit. Monthly mass calculations reported as pounds should be based on the monthly average concentration in mg/L times the monthly average flow in MGD times 8.34 times the number of days in the month.

Adaptive Management Plan Expression (S. NR 217.18(3)(b), Wis. Adm. Code). This section requires provisions in the permit to design and implement the actions identified in the permittee's approved AM plan in accordance with any goals and measures in the plan and any applicable compliance schedule in the permit. It is anticipated that a provision that incorporates the plan by reference will address most of this requirement along with any applicable progress schedules.

Optimization (S. NR 217.18(3)(c), Wis. Adm. Code). Permits must contain a provision that permittees are required to optimize their existing treatment system to control P. Many variables as to what exactly constitutes treatment system optimization exist

depending on the treatment system used. Consult with the permittee to determine the specific actions to be taken to optimize their system and include these actions in the permit. (Optimize means to operate the treatment system to remove the greatest amount of phosphorous in the most efficient manner.)

Monitoring (S. NR 217.18(3)(d), Wis. Adm. Code). This provision requires reporting procedures and deadlines for monitoring, assessment and data gathering requirements in the plan. At a minimum, annual reporting should identify the actions in the approved AM plan that have been implemented and completed, the actions that are currently in progress of being implemented, and the status of the progress in achieving the goals. This status should be based on the measures in the plan and data monitoring.

Effluent Limits (S. NR 217.18(3)(e), Wis. Adm. Code). This is the section that requires numerical limits. A WQBEL that is calculated using the mass-balance equation in s. NR 217.13, Wis. Adm. Code, or is based on an approved TMDL must be included. As explained above, compliance with the WQBEL, although calculated, it is not required to be achieved until AM has been completed. This can be as long as three permit terms. Instead, interim P limits are established as follows:

Table 5: Interim P limits and WQBEL expressed in each of the three permit terms, where three permit terms are determined necessary.

Permit term following AM approval	1	2	3
WQBEL	<p>AM Limits:</p> <ul style="list-style-type: none"> <li>• 0.6 mg/L as a 6 mo. avg.</li> <li>• 1.0 mg/L as a mo. avg.</li> </ul>	<p>AM Limits:</p> <ul style="list-style-type: none"> <li>• 0.5 mg/L as a 6 mo. avg.</li> <li>• 1.0 mg/L as a mo. avg.</li> </ul>	<p>Previously calculated WQBEL, recalculated WQBEL if water quality improved, or TMDL derived WQBEL if an approved TMDL exists for receiving water.</p>

A compliance schedule of up to five years may be allowed to meet the interim limits or WQBEL in all three permits issued under adaptive management. Additionally, the final WQBEL will be included in the factsheet or footnote. Continuing AM from one permit term to the next is dependent on the permittee meeting the requirements of the previous permit. If necessary, the plan may be “adapted” at the time of reissuance or through a permit modification to add or delete actions as appropriate or to revise actions to better provide the expected response or that have proved to be infeasible as designed.

Failure to Comply (S. NR 217.18(3)(f), Wis. Adm. Code). This provision simply requires the permit to include a statement that failure to implement any of the terms or

conditions established under ss. 217.18 (3) (a) to (e), Wis. Adm. Code, is a permit violation.

Termination (S. NR 217.18(3)(g), Wis. Adm. Code). This section includes the reasons where the Department may terminate adaptive management. These include:

1. Failure to implement the adaptive management actions in accordance with the plan
2. New information that becomes available that changes the determinations made by the Department in approving the plan.
3. Changing circumstances beyond the permittee's control that have made compliance with the applicable P criterion in accordance with the plan's goals and measures infeasible
4. A determination by the Department that sufficient reductions of P have not been achieved in a timely manner to meet the applicable P criteria. No determination to terminate adaptive management is to be made without consultation and approval from the Director of the Bureau of Water Quality and the Administrator of the Water Division.

Note: If a permittee wishes to pursue AM during the term of a permit, the adaptive management request form must be submitted to the Department and the permit modification process will occur.

**Attachment 1**

State of Wisconsin  
 Department of Natural Resources  
 Bureau of Watershed Management  
 PO Box 7921, Madison WI 53707-7921  
 dnr.wi.gov

**Watershed Adaptive Management  
 Request Form**  
 Form \_\_ ( ) Page 1 of 4

DRAFT –

**Notice:** An owner of an existing WPDES permitted wastewater discharge may request adaptive management for phosphorus water quality based effluent limits (WQBEL) in accordance with s. NR 217.18, Wis. Adm. Code. For permittees requesting this option, this form must be completed and submitted to the Department at the time of the permit application. Failure to provide all requested information may result in denial of your request. Personally identifiable information collected on this form will be used to administer the watershed management program and may be provided to requestors as required by Wisconsin Open Records law [ss. 19.31, Wis. Stats.]

Facility and Permit Information			Facility Owner Contact Information			
WPDES Permit No.			Contact Name			
Facility Name			Address			
Facility Street Address						
City		State	ZIP code	City	State	ZIP Code
City		State	ZIP code	Phone No. (incl. area code)	FAX Number	
Receiving Water			Email address			
Type of Request: <input type="checkbox"/> This is the formal adaptive management request as required in s. NR 217.18(2), Wis. Adm. Code <input type="checkbox"/> This is a preliminary adaptive management request (to be submitted as part of facility planning)						

Facility Information (provide attachments as necessary)			
Required For AM Request	Code Reference	Conclusion	Evidence and source of information (attach as needed)
NPS contribute at least 50% of total P contribution	S. NR 217.18(2)(b), Wis. Adm. Code	<input type="checkbox"/> NPS contributes at least 50% <input type="checkbox"/> NPS DOES NOT contribute at least 50%	
WQBEL Requires Filtration or Equivalent Technology	S. NR 217.18(2)(c), Wis. Adm. Code	<input type="checkbox"/> Filtration or equivalent required <input type="checkbox"/> Filtration or equivalent NOT required	
AM Plan	S. NR 217.18(2)(d), Wis. Adm. Code	<input type="checkbox"/> Plan is Included – Page 3 <input type="checkbox"/> Plan is NOT Included <i>For a preliminary adaptive management request, AM plan not required</i>	

**Facility Operation and Performance** (provide attachments as necessary)

Page 2 of 4

1. **Current P removal capability** – If the facility is currently required by a WPDES permit to monitor effluent phosphorus (P) provide a summary of the influent and effluent annual average P concentrations for each of the past three years. If permit required P data is not available, the applicant should provide any other P data that may be applicable and available. If no data is available, the Department may estimate the P effluent concentration based on data from other similar facilities.

2. **Facility Operation** – Provide a summary description of overall facility operation. If not a continuously discharging facility, describe the time periods when effluent discharge occurs and any storage facilities and procedures.

3. **Previous Studies** – Reference or attach any facility planning or evaluation study that evaluated facility performance capabilities (Note – Only include studies that are recent, within the past 5 years, or that are otherwise applicable for the evaluation of the existing facility and current conditions).

<b>Adaptive Management Plan (s. NR 217.18(d), Wis. Adm. Code)</b> Note: If this is a preliminary adaptive management request this section is not required. (provide attachments as necessary) <span style="float: right;">Page 3 of 4</span>	
<b>Watershed-</b>	<b>Percent Contribution of Applicant Discharge-</b>
<b>Action Area (include map)-</b>	
<b>Watershed characteristics and timeline justification-</b>	
<b>Major Contributions of Point and Nonpoint Sources</b> (If the wastewater facility service area includes multiple municipalities provide the following information for each municipality)-	
<b>Proposed Actions-</b>	
<b>Goals and Measures for Determining Effectiveness-</b>	
<b>Partner(s)-</b>	
<b>Funding Sources-</b>	

<b>Adaptive Management Request and Certification</b>		Page 4 of 4
Based on the information provided, I am requesting the watershed adaptive management option to achieve compliance with phosphorus water quality standard in accordance with s. NR 217.18, Wis. Adm. Code.		
I certify that the information provided is true, accurate and complete.		
Print or type name of individual submitting request (must be an Authorized Representative for the treatment facility)	Title	
Signature of Official	Date Signed	

## **Chapter 4**

### ***Section 4.02: Determining a Non-Point Source Dominated Watershed***

**Author: Jim Baumann**

**Last Revised: November 21, 2011**

Section NR 217.18 (2), Wis. Adm. Code, allows the Department to approve and authorize use of the watershed AM option, when requested by the permittee and the four eligibility conditions are met. Two of the four relate to whether the watershed is nonpoint source dominated based on contributions of phosphorus to the receiving water. In s. NR 217.18 (2) (a), Wis. Adm. Code, the exceedance of the phosphorus criteria in s. NR 102.06, Wis. Adm. Code, is caused by phosphorus contributions from both point sources and nonpoint sources. It is highly likely that virtually all situations will meet this requirement. The other is the first part of s. NR 217.18 (2) (b), Wis. Adm. Code, where the sum of phosphorus contributions from municipal separate storm sewer systems and nonpoint sources is at least 50% of the total contribution. Section NR 217.18 (2) (b), Wis. Adm. Code, contains another option where the permittee demonstrates that the applicable phosphorus criterion cannot be met in the watershed without the control of phosphorus from nonpoint sources.<sup>3</sup>

The intent of this guidance is to identify applicable options for determining the relative contribution of phosphorus in a watershed. In many cases the percent contribution of phosphorus may have been previously determined and reported in an appropriate study, such as TMDLs or watershed plans. The PRESTO model also has calculated percent contributions based on presumed land cover and phosphorus data. In many cases it is assumed that PRESTO will be used to make this determination. As with all estimation tools, however, PRESTO does have error surrounding its point to nonpoint confidence ratios. Therefore, applicants have the option to use other methods for making this determination. Additionally, PRESTO does not predict urban watersheds and does not cover portions of Southeastern Wisconsin. If information on the relative or percent contribution does not exist, and the applicant does not wish to use PRESTO, two simple methods are available for making such a calculation:

1. Applying unit area loads appropriate to the watershed.
2. Applying phosphorus export coefficients appropriate to the watershed.

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<sup>3</sup> The determination of nonpoint source control is necessary to meet the criteria must be demonstrated by the permittee and reviewed by Department staff on a case-by-case basis.

In both of these methods, the entire drainage area to the outfall should be used in the calculation.<sup>4</sup>

### **Unit Area Loads:**

Unit area loads have been used since at least the early 1980s for determining phosphorus loads carried to a downstream location, whether it is a location on a stream, a lake or the Great Lakes. The unit area load is derived by calculating phosphorus loads from stream monitoring data over some number of years. After the influence of major point source contributions are subtracted from the calculated load, the remaining load is divided by the drainage area to the monitoring station. The unit area load thus represents the contribution of phosphorus from the combination of sources within the monitored watershed, such as agricultural nonpoint sources, tile drainage, septic systems, wetlands, woodlands, etc. They also take into account transport of phosphorus through the stream system. Use of a unit area load approach may be appropriate where the conditions in the evaluated watershed are similar to those in the monitored watershed.

USGS fact sheet FS-195-97 entitled “Unit-Area Loads of Suspended Sediment, Suspended Solids, and Total Phosphorus From Small Watersheds in Wisconsin” (Corsi et. al.) that lists the unit area loads for nearly 50 Wisconsin Streams. The fact sheet also suggests unit area loads for U.S. EPA aggregate ecoregions.

The user should use the fact sheet information with care. The information is not particularly good for some of the ecoregions, especially the North Central Hardwoods Forests where the land use and soils vary greatly. Also, there are only a few sites within this eco-region. Also, where land cover varies greatly, such as in the driftless area where percent agricultural use varies for about 50 percent to about 90 percent, an eco-region value may not be the best representative value.

### **Method:**

1. Select the unit area load from the USGS fact sheet for an individual stream, a similar nearby stream, or an eco-region.
2. Multiply the unit area load by the drainage area to arrive at a watershed average annual phosphorus load. For many situations, the low flow information tables used to obtain 7Q10 and 7Q2 flows will have a corresponding drainage area. If this information is not available, it may be possible to use 12-digit HUC

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<sup>4</sup> The reference to the entire drainage area is not meant to infer that implementation of the watershed adaptive management option must occur throughout the entire drainage area. See the watershed adaptive management option section of this guidance.

areas to estimate a drainage area or to use the Purdue drainage area calculation website <https://engineering.purdue.edu/~lthia/MSDSS/index.html>.

3. Determine the annual average phosphorus load from the point source. The information by year can be obtained from SWAMP, the Bureau of Water Quality Permit data management system. If the operating conditions of the point source have been consistent over the last few years, a mean value of three years should be used. If the operation has changed, such as an increase or decrease in volume, the year or years consistent with expected operation for the next permit term should be use.
4. Add the watershed annual phosphorus load and the average annual point source phosphorus load to determine the total average annual phosphorus load.
5. Determine the relative percent contribution for the watershed and point source. If the point source contribution is less than 50%, the situation should be considered as nonpoint source dominated.

**Phosphorus Export Coefficient Method (also available on the Wisconsin Lake Modeling Suite):**

Information about the Wisconsin Lake Modeling Suite (WiLMS) is available at <http://dnr.wi.gov/lakes/Model/WiLMSDocumentation.pdf>. This method applies a phosphorus export or loss coefficient to each major land use categories within the watershed to calculate an annual load. Generally, the phosphorus export coefficients are derived from monitoring or modeling individual land uses. They present contribution to the receiving water, but do not take into account transport within a stream system.

**Step 1. Determine the watershed area to the outfall**

For many situations, the low flow information used to obtain 7Q10 and 7Q2 flows will have a corresponding drainage area. If this information is not available, it may be possible to approximate the watershed area by summing the area of 12-digit HUC areas within the watershed or by using the Purdue drainage area calculation website at <https://engineering.purdue.edu/~lthia/MSDSS/index.html>

**Step 2. Determine the land use of the watershed**

For most situations, the WISCLand Anderson Level 1 for Wisconsin watersheds is sufficient. Anderson 1 land use is the broadest category with the land use broken into agricultural, urban, forested, wetland, etc. Although WISCLand is

1993 land cover, it is likely representative for most rural areas. For many areas with TMDLs, a more detailed land cover and load analysis may be available.

Step 3. Apply phosphorus export coefficients (unit area loads)

For general use, use the following information:

- For cropland use:

Driftless area – 2.0 to 3.0 pounds per acre per year

The phosphorus loads tend to be higher per unit of agriculture in the western part of the driftless area with the lowest values in the Sugar River Basin, the Black Earth Creek watershed and nearby watersheds and the eastern end of the Baraboo River subbasin.

Southeast and East Central areas – 0.4 to 0.5 pounds per acre per year

Phosphorus loads tend to be low end in the Kettle Moraine area and may be on the high end in the clay soil areas. Good information is not available throughout much of the Rock River Basin

Sandy areas – 0.2 pounds per acre per year

This is an estimate since little information is available.

Other areas should use one of the three unit area loads above. Much of the Lower Chippewa River Basin seems to be similar to the Sugar River Basin. Western Marathon County may be similar to the eastern clays, but could be slightly higher.

- Woodlands 0.05 to 0.18 pounds per acre per year

The lower end of the range is appropriate for lower slope, sandy soil areas, such as those in northeastern Wisconsin with the higher end of the range for the driftless area.

- Urban – 0.3 to 0.8 pounds per acre per year

The lower end of the range is for low density residential and the high end for mixes of residential and commercial. If the urban area is small, use 0.5 pounds per acre per year.

- Wetlands – 0.1 pounds per acre per year

Step 4. Determine the point source contribution

The information by year can be obtained from the Department's Bureau of Water Quality. If the operating conditions of the point source have been consistent over the last few years, a mean value of three years should be used. If the operation has changed, such as an increase or decrease in volume, the year or years consistent with expected operation for the next permit term should be use.

Step 5. Add the loads from each land cover category and the average annual point source phosphorus load to determine the total average annual phosphorus load.

Step 6. Determine percent of contribution from agriculture and urban land uses. If they are 50 percent or greater, consider the situation as nonpoint source dominated.

**References:**

Panuska, John C., and Lillie, Richard A., "Phosphorus Loadings from Wisconsin Watersheds: Recommended Phosphorus Export Coefficients for Agricultural and Forested Watersheds", Wisconsin Department of Natural Resources, Research Management Findings. April 1995.

Corsi, Steven R., Graczyk, David J., Owens, David W., and Bannermann, Roger T., "Unit-Area Loads of Suspended Sediment, Suspended Solids, and Total Phosphorus From Small Watersheds in Wisconsin", U. S. Geological Survey, Fact Sheet FS-195-97. undated.

## **Chapter 4**

### **Section 4.03: Water Quality Trading**

**Author: Mike Hammers**

**Last Revised: August 21, 2011**

Permittees may choose to engage in water quality trading (WQT) as a means to achieve compliance with water quality based effluent limits for phosphorus. At the direction of the Natural Resources Board, the Department prepared a WQT framework. The framework, which is available on the UW Extension website at <http://fyi.uwex.edu/wqtrading/> (or on the watershed drive for internal staff), will be used by the Department as the basis for developing guidance on implementing WQT in the WPDES permit program.

The framework suggests the following with respect to the WPDES permit program:

- The Department should create an application form for WQT. The form would require the permittee that is applying for the use of pollutant reduction credits to:
  1. Identify the pollutant reduction credit generator;
  2. Identify the methods or management practices that will be used to generate pollutant reduction credits;
  3. Provide the locations of each site where pollutant reduction credits will be generated;
  4. Provide the amount of pollutant reduction credits that will be generated;
  5. Provide the date when pollutant reduction credits become available; and
  6. Provide a trading ratio for each site and management practice used to generate credits
- The WQBELs recommendation memo, the permit fact sheet or both should communicate the fact that the permittee has applied for use of pollutant reduction credits and should identify the parameter that will be traded.
- Each application for WQT should be made available for public comment.
- The WPDES permit of the permittee using pollutant reduction credits should contain:

1. The WQBEL that must be met with or without WQT;
  2. Permit language allowing the use of pollutant reduction credits;
  3. An effluent limit representing a minimum level of effluent quality required (e.g., a technology based limit that must be met without the use of WQT);
  4. Reporting requirements of pollutant reduction credit use;
  5. A requirement that the permittee certify that the management practice used by the pollutant reduction credit generator is in place and being operated and maintained appropriately; and
  6. A requirement that the permittee or the permittee's agent inspect at least once per year the site and management practice used to generate pollutant reduction credits.
- If the pollutant reduction credit generator is a point source, the credit generator's WPDES permit should contain:
    1. Permit language allowing the generation and trading of pollutant reduction credits;
    2. When the traded pollutant is limited by the credit generator's permit, permit language should specify how compliance with effluent limits shall be demonstrated when pollutant reduction credits are traded; and
    3. Reporting requirements for pollutant reduction credit generation.
  - Discharge monitoring reports should track the use of pollutant reduction credits.
  - The Department should inspect the sites used to generate pollutant reduction credits.
  - The Department may decline the request for a WQT permit when the Department determines that the trade will not result in net water quality improvement to comply with effluent limits.

While the framework indicates that WQT may be used to demonstrate compliance with interim limits, it is likely that the guidance will allow WQT to be used only to demonstrate compliance with final WQBELs. WQT implementation guidance needs to be developed before widespread trading can occur.

## **Chapter 5- Tools for the Regulated Community**

This Chapter is meant to provide valuable information to the regulated community and other interested groups. When making decisions about a facility, it is important to work closely with appropriate Department staff. Many facilities are unique and must be handled on a case-by-case basis. However, this Chapter should help to explain the responsibilities and options that exist for the regulated community. Chapter 1 and the Frequently Asked Questions page of this Guidance may also provide useful information that can help answer phosphorus-related questions:

<http://dnr.wi.gov/org/water/wm/wqs/phosphorus/index.htm>.

If you have a phosphorus related question, please email us at [DNRPhosphorus@wisconsin.gov](mailto:DNRPhosphorus@wisconsin.gov).

## **Chapter 5**

### **Section 5.01: Monitoring Guidance**

**Author: Jim Baumann and Mary Ryan**

**Last Revised: February 1, 2011**

#### **Introduction**

Effluent monitoring and ambient stream monitoring for phosphorus to be conducted by the permittee is specified in Subchapter III of Chapter 217, Water Quality Based Effluent Limitations (WQBELs) for Phosphorus. There are several circumstances that may require effluent and stream monitoring:

1. Monitoring to provide data for calculation of water quality based effluent limitations using the conservation of mass equation in s. NR 217.13, Wis. Adm. Code.  
Explanation: Section NR 217.13(2)(d), Wis. Adm. Code, specifies that upstream phosphorus concentrations must be known or calculated in order to derive a WQBEL. The Department will use historical data from the specific stream or similar location to fulfill this need. However, a discharge may wish to monitor the ambient phosphorus concentration to provide site-specific information. Pursuant to s. NR 217.15(1), Wis. Adm. Code, permittees may also need to collect effluent samples of phosphorus to be evaluated for WQBELs, if data is not available. This data collection will be specified in the permit application for reissuance- s. NR 217.13(1)(d), Wis. Adm. Code.
2. Monitoring to fulfill the requirements of Adaptive Management (AM) in s. NR 217.18, Wis. Adm. Code. See Section 4.02 in Guidance document for details on AM Monitoring.  
Explanation: In order to request adaptive management, WQBELs must be calculated for phosphorus. Therefore, sufficient data must be collected to calculate and determine the necessity for these WQBELs (as described above). Furthermore, s. NR 217.18(3)(a), Wis. Adm. Code, specifies that monitoring in the receiving water and effluent monitoring must be performed to document the effectiveness of the AM plan. The frequency of this monitoring will depend on the AM plan and will be specified in the permit. This monitoring can also be used to re-calculate a water quality based effluent limit to reflect the improved water quality.
3. Monitoring to fulfill the requirements of a wastewater permit.  
Explanation: Permits with WQBELs for phosphorus will require effluent monitoring. This includes permits with approved phosphorus variances. Pursuant to s. NR 217.15(2), Wis. Adm. Code, the Department may also require monitoring of phosphorus discharges in a permit, even if WQBELs for phosphorus were not required. The frequency of this monitoring will be specified in the permit.

**Effluent Phosphorus Monitoring**

*Monitoring for the Permit Application*

The permit application will require 12 samples for phosphorus collected weekly for 3 months. The recommended analytical method is U.S. EPA 365.1 (Automated Ascorbic Acid Reduction) and the required sample type is a 24-hr flow proportional composite. Wastewater treatment lagoons may be allowed to collect grab samples, if a composite sampler is unavailable.

*Effluent Phosphorus Monitoring for the WPDES Permit*

Surface Water Section - WQBELs: All electronic discharge monitoring reports (eDMRs) as of April 2011 require LOD, LOQ and Lab ID to be reported for phosphorus. The Department encourages monitoring that will achieve a level of detection at 30 µg/L and a level of quantitation at 90 µg/L thereby enabling an understanding of the impacts of Phosphorus. The following U.S. EPA Methods are listed for consideration by facilities monitoring for phosphorus.

**Approved Methods for Analysis of Total Phosphorus in Wastewater  
Based on ch. NR 219, Wis. Adm. Code, Rev 2009**

Analytical Technology	U.S. EPA Method	Standard Methods	ASTM Method	USGS Method	Other <sup>1</sup>
<b>Persulfate digestion</b>		4500 - P B.5 18, 19, 20 or 21 edition			973.55
Followed by one of the following :					
<b>Manual Ascorbic acid reduction</b>	365.3 (1978)	4500 - P E <sup>2</sup> 18, 19, 20 or 21 edition	D515-88 (A)	I-4600-85	973.56
<b>Automated Ascorbic acid reduction</b>	365.1 rev 2.0 (1993)	4500 - P F <sup>2</sup> 18, 19, 20 or 21 edition			
<b>Semi-automated block digester</b>	365.4 (1974)		D515-88 (B)	I-4610-91	

1 "Official Methods of Analysis of the Association of Official Analytical Chemists" 16th Edition 1998

2 The letters E and F were switched in ch. NR 219, Wis. Adm. Code - this is the correct reference

When a WQBEL applies to the permittee's discharge the following monitoring requirements are recommended in the Surface Water section of the permit.

Parameter: Phosphorus, Total  
 Units: µg/L (or mg/L if the WQBEL is expressed in mg/L)  
*Note: mass limits may also be included per s. NR 217.14, Wis. Adm. Code.*

Sample Frequency: 3x/week for major wastewater treatment facilities; 1x/week for minor wastewater treatment facilities (or a frequency that is equal to the monitoring for BOD/TSS)

Sample Type: 24-Hr Flow Prop Comp (lagoon systems may be allowed to collect grab samples)

Note: If the  $P_{99}$  of the 30 day average discharge does not exceed the calculated WQBEL and the facility did not previously have a TBL then the WQBEL does not need to be included in the permit. However if phosphorus is present in the effluent at a level that warrants monitoring based on professional judgment then weekly or monthly monitoring should be included in the permit.

Surface Water Section - TBLs: If a TBL is included in the permit, in most cases the existing requirements for phosphorus can be continued in the reissued permit.

Standard Requirements Section: The Standard Requirements section for all WPDES permits includes the 'Sampling and Testing Procedures' as shown below:

#### Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code, and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. Again, the Department recommends a level of detection at 30 µg/L and a level of quantitation at 90 µg/L. If the required level cannot be met by any of the methods available in ch. NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

#### **Ambient Phosphorus Monitoring**

Consistent with the approach used to study more than 240 Wisconsin streams and 42 rivers for the purpose of developing phosphorus criteria, the objective of the monitoring is to characterize the phosphorus concentrations most commonly occurring in the stream during the primary algae and aquatic plant "growing season" of May through October. To avoid entering bias into the monitoring by purposefully monitoring high or low flow conditions, the monitoring should be conducted as follows:

- ***Samples should be collected using adequate methods during pre-selected days or dates (e.g. second Tuesday of the month) once per month (about 30 days apart) each month from May through October. If samples cannot be collected each of the six months, at a minimum four months should be sampled. Any applicable data collected should be submitted to the***

**Department for review. To determine adequate methods for data collection see s. NR 205.07, Wis. Ad. Code.**

The use of a median value of the sample results will discount the influence of short during high flow events or low flow periods.

#### Sample Location

The stream should be monitored based on the best location consistent with the following, recognizing that there may be a need to balance the desired objectives:

- ***In close proximity and upstream of the outfall***  
This is to avoid factors, such as additional drainage area adding flow and phosphorus to the stream that could change the results.
- ***Representative of the upstream conditions***  
Stream reaches with major springs or major sediment deposits, such as former millpond beds, may create much localized conditions that aren't reflective of the upstream conditions and should be avoided. As a rule of thumb the location selected should be representative of a quarter to half mile stretch upstream. Also avoid reaches downstream of where cattle are in the stream.
- ***Has thorough mixing of the stream water***  
Stream reaches immediately downstream from tributaries or major springs may not have complete mixing and should be avoided.

#### Sample Collection at Stream Location

At the stream location, the samples should be collected as follows:

- ***In portion of stream with greatest or strongest flow***  
This may or may not be in the middle of the stream. In general, relatively straight reaches of the stream are preferred. However, if a meander section of the stream is selected for sampling, the sample should be collected in the portion with greatest flow at the outside of the meander. Slow flow areas along the banks, in eddies or immediately downstream of islands should be avoided.
- ***3 to 6 inches below surface using thrice rinsed sample bottles, completely filling the sample bottle***  
Surface samples tend to have debris and other things floating on the surface and should be avoided. Whether a sample is collected by hand directly in a sample bottle or with a sampling device, such as a Van Dorn sampling bottle, the collection vessel needs to be rinsed three times with water from the

same location as the sample. Care should be made to avoid touching the inside cap of sample bottles.

- ***Avoid disturbing the sample site***  
If the sample is collected by wading in the stream, walk upstream to the sample location and take the sample facing upstream.
- ***Don't trespass on private lands to collect sample***  
Use a public access point, such as a road right of way, or seek permission from the landowner or operator to cross land for the purpose of collecting the samples.

#### Sample Handling

The collected sample should be handled as follows:

- ***Add the prescribed amount of  $H_2SO_4$  (generally 2.0 ml), cap and invert several times to mix.***
- ***Uncap and check pH by touching pH paper to residual water on the inside of cap. Add additional acid if a pH of 2 or less is not achieved.***
- ***Follow directions from laboratory for labeling bottle, including date, time and location.***
- ***Store bottle on ice or refrigerate to transport to laboratory for analysis.***
- ***Have sample analyzed by a WDNR certified or registered laboratory (s. NR 149.03(19); s. NR 149.03(66), Wis. Adm. Code).***

## **Chapter 5**

### ***5.02: Comparison of Implementation Options***

**Author: Jim Baumann**

**Last Revised: January 28, 2010**

Subchapter III of ch. NR 217, Wis. Adm. Code, contains or references a number of options for water quality based effluent limit calculation and implementation of those limits. The opportunity to “mix and match” these options not only provides flexibility, it potentially creates a picture of complexity. The purpose of this paper, and especially the table below, is to try to simplify the options in order to help the permit writer and the permittee select and use options.

For this simplified discussion, the options are broken into two groups, as follows:

- Methods for deriving WQBELs
  - Procedures in s. NR 217.13, Wis. Adm. Code (use as the base approach)
  - TMDL wasteload allocations
- Options for implementation
  - Extended compliance schedules
    - WQT
    - AM

Although WQT and AM are listed as options for implementation, they may, if fully implemented, result in a less stringent WQBEL due to improved water quality upstream from the point source discharge location or the point on a downstream water where the phosphorus criteria first apply. For this discussion, however, they are considered primarily as implementation options.

The options may be used together. For example, a TMDL could be developed during the period of a compliance schedule, potentially changing both the effluent limit and the compliance date. Some of the options are already combined or built in. For example, AM has a built in compliance schedule.

Before shifting to the table below which compares and contrasts the three implementation options, it is appropriate to briefly describe and discuss each of the options and provide a few additional notes.

#### Water Quality Based Effluent Limits derived under s. NR 217.13, Wis. Adm. Code.

This is the base approach to deriving WQBELs. The approach is based on the Clean Water Act obligation that the effluent limits must be sufficient to attain and maintain water quality standards. In general, for a given set of flow conditions and assuming the discharges are at the facility's design capacity, the total reduction in phosphorus load needed to attain water quality

standards is assigned to the point source. No other source control, such as upstream nonpoint source control, is assumed. However, in no case is the WQBEL set to less than the receiving water criterion.

#### Total Maximum Daily Load Derived WQBELs

Under the Clean Water Act, a TMDL analysis is the only means to shift a portion of the responsibility for controlling pollutants from the point source dischargers to other sources, such as nonpoint sources. A TMDL derived WQBEL could result in a less stringent WQBEL, especially in situations where the point source discharge is a relatively small contributor of phosphorus and/or when the upstream conditions are close to the phosphorus criterion – either above or below the criterion.

#### Extended Compliance Schedules

Compliance schedules are used to provide the time needed to install or otherwise bring about needed changes to the operation of the wastewater treatment facility. In the opinion of U.S. EPA, compliance schedules should be of the minimum length of time necessary to comply with the permit requirement. Indirectly, compliance schedules may also allow time for other options to materialize, such as completion of a TMDL.

#### Water Quality Trading<sup>5</sup>

WQT does not remove, shift, or transfer responsibility for pollutant control from the point source discharge. It does, however, provide an alternate means to create and realize an equivalent or greater reduction in phosphorus load from other sources. Generally, the alternate means of control will be at a lower cost.

#### Watershed Adaptive Management

Under this option, the point source discharger may choose to accept an interim limit (starting at 0.6 mg/L), conduct stream monitoring, develop with partners a watershed management plan and implement portions of that plan. Presumably, if the watershed management plan is fully implemented, the discharger's permit will eventually have a substantially less stringent WQBEL based on improvements in water quality upstream. The expectation for the role for the discharger in implementation of the watershed management plan is that it is proportional to the point source contribution. This may not be the best option for a facility where compliance with a 0.6 mg/L interim effluent limit will require a major capital investment.

Note: All of these options presume that the facility will have a stringent WQBEL for phosphorus that would otherwise require capital or major O&M additions to the facility's phosphorus removal processes. They are not intended to apply to situations where the change from existing technology based limits to WQBELs is small, such as from 1.0 mg/L to 0.8 mg/L.

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<sup>5</sup> At the time of preparation of this paper, details of water quality trading were still in development.

**Comparing and Contrasting Features of Implementation Options for Subchapter III of ch. NR 217, Wis. Adm. Code.**

This table briefly describes the features of three implementation options for complying with phosphorus WQBELs. Those effluent limits may be derived using the procedures in s. NR 217.13, Wis. Adm. Code, or through a TMDL. Although these options are presented as separate or distinct, to some degree they may be combined. Although variances to water quality standards pursuant to s. 283.15, Stats. are not presented as an option, they may constitute a fourth option. See accompanying discussion for a description of each option.

Feature	Extended Compliance Schedule later coupled with a TMDL	Water Quality Trading	Watershed Adaptive Management
General eligibility and duration	WDNR must determine a need based on factors in rules; seven years maximum, except up to nine years if tertiary treatment, such as filtration, is needed.	No restrictions on eligibility; duration to be determined	<p>Filtration or similar tertiary treatment needed to meet WQBEL</p> <p>Both point sources and nonpoint sources must contribute or cause exceedance of applicable phosphorus criterion</p> <p>Nonpoint source and urban stormwater contribution must be greater than 50% or permittee must demonstrate control of nonpoint sources necessary to meet applicable phosphorus criterion.</p>
Development of watershed plan	Not required	Not required	<p>Plan required; updated with each permit application for reissuance</p> <p>Permittee role in plan implementation proportional to phosphorus contribution</p> <p>Implementation focused to subwatersheds</p> <p>Progress ramped up over two permit terms</p>

Monitoring of stream water quality	Not required	Not required	Required
Discharge monitoring	As specified in permit	As specified in permit	As specified in permit
Subchapter II technology based limits (e.g., 1 mg/L)	Must be met	Must be met	Must be met.
“Final” WQBEL in permit (although compliance may not be in permit term)	<p>Yes, required by U.S. EPA</p> <p>Reviewed at each permit reissuance</p> <p>Monthly or annual limits, as specified in s. NR 217.14, Wis. Adm. Code, or consistent with TMDL, where applicable</p> <p>May be revised based on wasteload allocation of approved TMDL</p>	<p>Yes, required by U.S. EPA</p> <p>Reviewed at each permit reissuance</p> <p>Monthly or annual limits, as specified in s. NR 217.14, Wis. Adm. Code, or consistent with TMDL, where applicable</p>	<p>Yes, required by U.S. EPA</p> <p>Reviewed at each permit reissuance</p> <p>May change if watershed plan implementation is successful</p> <p>Monthly or annual limits, as specified in s. NR 217.14, Wis. Adm. Code, or consistent with TMDL, where applicable</p>
Interim effluent limits	<p>Required, but no specific limit specified</p> <p>Must represent good management and operation for similar facilities</p>	Not required	<p>0.6 mg/L limit specified for first permit term, up to 0.5 mg/L for second permit term. Expressed as six-month average.</p> <p>1.0 mg/L monthly average.</p> <p>Interim limit must be met by end of permit term.</p>
Trade ratio	Not applicable	Required; details to be determined	Not applicable; unless trading is part of watershed adaptive management plan
Other actions	Specified in permit, such as optimization plan	Determination of trade “value” for each trade; details to be determined	As specified in watershed adaptive management plan

Reporting and documentation	Annual reporting as specified in permit; consistent with s. NR 217.17, Wis. Adm. Code	Documentation of agreements with trade partners  Annual or more frequent compliance reporting; details to be determined	Annual reporting on progress to meet milestones in watershed adaptive management plan
Public comment/review	As part of permit public notice process; annual reports considered public information	Trading agreements will be public noticed as part of the permit reissuance. Also, annual reports considered public information; other details to be determined	Watershed adaptive management plan subject to public review as part of permit public notice; annual reports considered as public information

## **Chapter 5**

### **5.03: Polyphosphate Alternatives**

**Author: Amanda Minks**

**Last Revised: November 30, 2010**

Polyphosphates are frequently used in wastewater and water supply streams to control pipe corrosion and to sequester heavy metals such as iron (Fe) and manganese (Mn). These heavy metals are benign to human health but can cause several nuisances including staining clothing and an unpleasant taste. Despite these benefits, the addition of polyphosphates to water can have unintended consequences including accelerated algal growth in receiving waterways.

#### **Polyphosphates and Water Quality Criteria for Phosphorus:**

The use of polyphosphates can cause phosphorus standard exceedances at the point of discharge and can inhibit downstream uses due to elevated phosphorus concentrations. Facilities that use polyphosphates, thereby, adding polyphosphates to a discharge stream, must be evaluated for phosphorus limits.

There may also be some situations where a facility does not directly use or add polyphosphates, but uses water from a water supply that has elevated phosphorus concentrations due to the use of polyphosphates. Since the phosphorus concentration in the intake water has been modified from the ambient conditions, these facilities must be evaluated for phosphorus limits, even if they do not directly add or use polyphosphates. If limits are determined to be necessary the point source should work with water supply to find appropriate alternatives to phosphorus use.

#### **Alternatives:**

There are several alternative to using polyphosphates for corrosion control or heavy metal sequestration. Before alternatives are considered, however, the existing physical and chemical condition of the system should be evaluated. It may be that the physical condition of distribution pipes is the primary cause of the problem. Therefore, the ongoing replacement of system piping will resolve the majority of the problem. The acidity/alkalinity of the water could also cause rapid corrosion. In these cases, adding a simple acid or base polymer will help slow the rate of corrosion.

Although these measures will likely help, there may be some situations that will still require the use of chemical additives. Rather than using polyphosphates, bimetallic compounds, like bimetallic phosphates, may be used. These compounds are less soluble than other forms of phosphates and may perform better at lower concentrations.

Sulfite, particularly sodium sulfite or sodium bisulfite, is an effective replacement for polyphosphate as a corrosion inhibitor. Sulfite prevents corrosion by scavenging residual dissolved oxygen from the water system and controlling the pH level within an

acceptable range. Sulfite based corrosion inhibitors have a relatively low environmental impact, marginal environmental toxicity, are easy to test, and are economical alternative to polyphosphates. However, excessive or continuous air ingress into the system will increase the sulfite inhibitor demand and, therefore, the cost. Previous studies have suggested that adding sodium sulfite may increase the abundance of sulfate reducing bacteria in the water system. Sulfite may also be a contributing factor in the stress cracking of stainless steel expansion bellows. Typically, the application rate of sulfite is 50-100 mg/L  $\text{SO}_3$  (80-160 ppm  $\text{Na}_2\text{SO}_3$ ), depending on site-specific conditions.

An effective alternative for Fe and Mn sequestration is to add silicates, most commonly sodium silicate, to the water system. Studies have found that silicate addition is equally as effective as polyphosphates in metal sequestration. However, silicate efficiency may be reduced in water with high carbonate concentrations. It is recommended that a small amount of a secondary amendment, like hydrogen chloride or other acid, be added in these cases to improve the effectiveness of silicate. Previous studies have found that effective application rates of  $\text{SiO}_2$  range from 7 mg/L to 20mg/L, depending on site-specific conditions. Adding silicate can also act as a corrosion inhibitor in water streams. Studies have suggested that silicates form a protective layer against corrosion and elevate the pH of the water to further prevent corrosion. Silica based corrosion inhibitors have a low environmental impact, marginal environmental toxicity, are economical to use, and do not act as a nutrient for bacteria. However, studies have suggested that silicate as a corrosion inhibitor may not be as effective as polyphosphates or other corrosion inhibitors in static flow conditions. In static flow conditions, phosphate-silicate blends may be used to improve sequestration efficiency. Previous studies have found that effective application rates of  $\text{SiO}_2$ , as a corrosion inhibitor, range from 25 mg/L to 40mg/L, depending on site-specific conditions.

There are several other chemical additives that could be used for corrosion inhibition and for heavy metal sequestration. These include organic inhibitors, molybdate inhibitors, and nitrite inhibitors, among others. Although these compounds may be used, they may have unintended environmental consequences and should be carefully evaluated before use.

## Appendix A. Chapter NR 102.06, Wis. Adm. Code: Phosphorus Water Quality Standards for Wisconsin Surface Water

### Section NR 102.06, Wis. Adm. Code, Phosphorus.

(1) GENERAL. This section identifies the water quality criteria for total phosphorus that shall be met in surface waters.

(2) DEFINITIONS. In this section:

(a) "Drainage lake" means a lake with an outlet stream that continually flows under average summer conditions based on the past 30 years.

(b) "Ephemeral stream" means a channel or stream that only carries water for a few days during and after a rainfall or snowmelt event and does not exhibit a flow during other periods, and includes, but is not limited to, grassed waterways, grassed swales, and areas of channelized flow as defined in s. NR 243.03 (7).

(c) "Mean water residence time" means the amount of time that a volume of water entering a waterbody will reside in that waterbody.

(d) "Nearshore waters" means all waters of Lake Michigan or Lake Superior within the jurisdiction of the State of Wisconsin in the zone extending from the shore to a depth of 10 meters, based on the long-term mean elevation for Lake Superior of 183.4 meters (601.7 feet) and for Lake Michigan of 176.5 meters (579.0 feet).

(e) "Open waters" mean all waters of Lake Michigan or Lake Superior within the jurisdiction of the State of Wisconsin with depths greater than nearshore waters.

(f) "Reservoir" means a waterbody with a constructed outlet structure intended to impound water and raise the depth of the water by more than two times relative to the conditions prior to construction of the dam, and that has a mean water residence time of 14 days or more under summer mean flow conditions using information collected over or derived for a 30 year period. (fm) "Seepage lake" means a lake that does not have an outlet stream that continually flows under average summer conditions based on the past 30 years.

(g) "Stratified lake or reservoir" means a lake or reservoir where either of the following equations results in a value of greater than 3.8:

$$\frac{\text{Maximum Depth (meters)}}{\text{Log}_{10}\text{Lake Area (hectares)}} - 0.1$$

$$\frac{\text{Maximum Depth (feet)}}{\text{Log}_{10}\text{Lake Area (acres)}} * 0.305 - 0.1$$

$$\frac{\text{Maximum Depth (feet)}}{\text{Log}_{10}\text{Lake Area (acres)}} * 0.405$$

(i) "Stratified two-story fishery lake" means a stratified lake which has supported a cold water fishery in its lower depths within the last 50 years.

(j) "Total phosphorus" means all of the phosphorus in a water sample analyzed using the methods identified under the provisions of s. NR 219.04 (1).

**(3) STREAMS AND RIVERS.** To protect the fish and aquatic life uses established in s. NR 102.04 (3) on rivers and streams that generally exhibit unidirectional flow, total phosphorus criteria are established as follows:

(a) A total phosphorus criterion of 100 µg/L is established for the following rivers or other unidirectional flowing waters:

1. Apple River from the outlet of the Apple River Flowage in Amery to the St. Croix River, excluding Black Brook Flowage.
2. Bad River from confluence with the Marengo River within the Bad River Indian Reservation downstream to Lake Superior.
3. Baraboo River from highway 58 in La Valle to the Wisconsin River.
4. Bark River from confluence with Scuppernong River near Hebron to the Rock River.
5. Black River from confluence with Cunningham Creek near Neillsville to Mississippi River, excluding Lake Arbutus.
6. Brule River from state highway 55 in Forest County downstream to Menominee River.
7. Buffalo River from confluence with Harvey Creek near Mondovi to Mississippi River.
8. Chippewa River from Lake Chippewa in Sawyer County to Mississippi River, excluding Holcombe Flowage, Cornell Flowage, Old Abe Lake, Lake Wissota and Dells Pond.
9. Crawfish River from confluence with Beaver Dam River to Rock River.
10. East Branch Pecatonica River from confluence with Apple Branch Creek near Argyle to Pecatonica River.
11. Eau Claire River from confluence with Bridge Creek near Augusta to Chippewa River, excluding Altoona Lake.
12. Embarrass River from confluence with Pigeon River near Clintonville to Wolf River.
13. Flambeau River from outlet of Turtle–Flambeau Flowage in Iron County to Chippewa River, excluding Pixley Flowage, Crowley Flowage and Dairyland Flowage.
14. Fox River from outlet of Lake Puckaway near Princeton to Green Bay, excluding Lake Butte des Morts and Lake Winnebago.
15. Fox River from confluence with Mukwonago River near Mukwonago to state line, excluding Tichigan Lake.
16. Grant River from confluence with Rattlesnake Creek near Beetown to Mississippi River.

17. Jump River from confluence with the North Fork and the South Fork of the Jump rivers in Price County to Holcombe Flowage.
18. Kickapoo River from confluence with Weister Creek near La Farge to Wisconsin River.
19. Kinnickinnic River from confluence with Wilson Park Creek in Milwaukee to Milwaukee River.
20. La Crosse River from confluence with Fish Creek near Bangor to Mississippi River, excluding Neshonoc Lake.
21. Lemonweir River from outlet of New Lisbon Lake in New Lisbon to Wisconsin River, excluding Decorah Lake.
22. Little Wolf River from confluence with South Branch Little Wolf River near Royalton to Wolf River.
23. Manitowoc River from confluence of North Branch and South Branch Manitowoc rivers to the opening at the end of the piers at Lake Michigan.
24. Menominee River from confluence with Brule River to the opening at the end of the piers at Green Bay.
25. Menomonee River from confluence with Little Menomonee River to Milwaukee River.
26. Milwaukee River from confluence with Cedar Creek downstream to the openings of the breakwaters at Lake Michigan.
27. Mississippi River main channels and side channels.
28. Namekagon River from outlet of Trego Lake near Trego to St. Croix River.
29. Oconto River from confluence with Peshtigo Brook to the opening at the end of the piers at Green Bay.
30. Pecatonica River from confluence with Vinegar Branch near Darlington to state line.
31. Pelican River from confluence with Slaughterhouse Creek near Rhinelander to Wisconsin River.
32. Peshtigo River from confluence with Brandywine Creek downstream to Green Bay, excluding Cauldron Falls Flowage and High Falls Flowage.
33. Pine River from confluence with Popple River in Florence County to Menominee River, excluding Pine River Flowage.
34. Red Cedar River from confluence with Brill River to Chippewa River, excluding Rice Lake, Tainter Lake and Lake Menomin.
35. Rock River from outlet of Sinissippi Lake downstream to the state line, excluding Lake Koshkonong.

36. St. Croix River from confluence with Namekagon River downstream to Mississippi River, excluding Lake St. Croix near Hudson.
37. St. Louis River from state line to the opening between Minnesota Point and Wisconsin Point at Lake Superior.
38. Sheboygan River from outlet of Sheboygan Marsh to the opening at the end of the piers at Lake Michigan.
39. South Fork of Flambeau River from state highway 13 near Fifield to Flambeau River.
40. Sugar River from outlet of Albany Lake to state line, excluding Decatur Lake.
41. Tomahawk River from outlet of Willow Reservoir to Lake Nokomis.
42. Trempealeau River from confluence with Pigeon Creek near Whitehall to Mississippi River.
43. White River from outlet of White River Flowage in Ashland County to Bad River.
44. Wisconsin River from the Rhinelander Dam to Mississippi River, excluding Lake Alice, Lake Mohawksin, Alexander Lake, Lake Wausau, Mosinee Flowage, Lake Dubay, Wisconsin River Flowage, Biron Flowage, Petenwell Flowage, Castle Rock Flowage and Lake Wisconsin.
45. Wolf River from confluence with Hunting Creek in Langlade County to Lake Poygan.
46. Yahara River from outlet of Lake Kegonsa to Rock River. (b) Except as provided in subs. (6) and (7), all other surface waters generally exhibiting unidirectional flow that are not listed in par. (a) are considered streams and shall meet a total phosphorus criterion of 75 µg/L.

**(4) RESERVOIRS AND LAKES.** Except as provided in sub. (1), to protect fish and aquatic life uses established in s. NR 102.04 (3) and recreational uses established in s. NR 102.04 (5), total phosphorus criteria are established for reservoirs and lakes, as follows:

(a) For stratified reservoirs, total phosphorus criterion is 30 µg/L. For reservoirs that are not stratified, total phosphorus criterion is 40 µg/L.

(b) For the following lakes that do not exhibit unidirectional flow, the following total phosphorus criteria are established:

1. For stratified, two-story fishery lakes, 15 µg/L.
2. For lakes that are both drainage and stratified lakes, 30 µg/L.
3. For lakes that are drainage lakes, but are not stratified lakes, 40 µg/L.
4. For lakes that are both seepage and stratified lakes, 20 µg/L.
5. For lakes that are seepage lakes, but are not stratified lakes, 40 µg/L.

(c) Waters impounded on rivers or streams that don't meet the definition of reservoir in this section shall meet the river and stream criterion in sub. (3) that applies to the primary stream or river entering the impounded water.

**(5) GREAT LAKES.** To protect fish and aquatic life uses established in s. NR 102.04 (3) and recreational uses established in s. NR 102.04 (5) on the Great Lakes, total phosphorus criteria are established as follows:

(a) For both open and nearshore waters of Lake Superior, 5 µg/L.

(b) For both open and nearshore waters of Lake Michigan, excluding waters identified in par. (c), 7 µg/L.

(c) For the portion of Green Bay from the mouth of the Fox River to a line from Long Tail Point to Point au Sable, the water clarity and other phosphorus-related conditions that are suitable for support of a diverse biological community, including a robust and sustainable area of submersed aquatic vegetation in shallow water areas.

**(6) EXCLUSIONS.** The following waters are excluded from subs. (3) (b), (4) and (5):

(a) Ephemeral streams.

(b) Lakes and reservoirs of less than 5 acres in surface area.

(c) Wetlands, including bogs.

(d) Waters identified as limited aquatic life waters in ch. NR 104. Limited aquatic life waters are those subject to the criteria in s. NR 104.02 (3) (b) (2).

**(7) SITE-SPECIFIC CRITERIA.** A criterion contained within this section may be modified by rule for a specific surface water segment or waterbody. A site-specific criterion may be adopted in place of the generally applicable criteria in this section where site-specific data and analysis using scientifically defensible methods and sound scientific rationale demonstrate a different criterion is protective of the designated use of the specific surface water segment or waterbody.

**Note:** Reservoirs, two-story fishery lakes and water bodies with high natural background phosphorus concentrations are the most appropriate water bodies for site-specific criteria.

**Note:** When placing a water body on the 303 (d) list as impaired for phosphorus, the Department considers factors such as frequency and duration of criterion exceedances, the time of year of the exceedance and the magnitude of each exceedance above the applicable criterion. The Department may also choose to consider other factors such as the concentration of suspended algae and floating plants; density of benthic algae; macrophyte density; minimum and daily change in dissolved oxygen levels due to diurnal swings; water clarity; and natural background phosphorus concentrations. The 303 (d) list is a list of impaired waters established by the Department and approved by U.S. EPA pursuant to 33 USC 1313 (d) (1) (A) and 40 CFR 130.7. Information on frequency and duration is contained in the Department's impaired waters listing guidance, "Wisconsin Consolidated Assessment and Listing Methodology."

**History:** Cr. Register, July, 1975, No. 235, eff. 8-1-75; am. Register, October, 1986, No. 370, eff. 11-1-86; renum. from NR 102.04, Register, February, 1989, No. 398, eff. 3-1-89; am. Register, November, 1992, No. 443, eff. 12-1-92; **CR 10-035: r. and recr. Register November 2010 No. 659, eff. 12-1-10; renumbering of (2) (fm) made under s. 13.92 (4) (b) 1., Stats., Register November 2010 No. 659. NR 102.07 Lake Michigan and Lake Superior thermal standards.**

**History:** Cr. Register, September, 1973, No. 213, eff. 10-1-73; r. and recr. Register, July, 1975, No. 235, eff. 8-1-75; renum. from NR 102.05, Register, February, 1989, No. 398, eff. 3-1-89; CR 07-111: r. Register September 2010 No. 657, eff. 10-1-10. **NR 102.08 Mississippi river thermal standards.**

*Implementation Guidance for Wisconsin's Phosphorus Water Quality Standards*

**History:** Cr. Register, July, 1975, No. 235, eff. 8-1-75; renum. from NR 102.06, Register, February, 1989, No. 398, eff. 3-1-89; CR 07-111: r. Register September 2010 No. 657, eff. 10-1-10. **NR 102.09 Review of thermal standards.**

**History:** Cr. Register, July, 1975, No. 235, eff. 8-1-75; am. Register, February, 1977, No. 254, eff. 3-1-77; renum. from NR 102.07, Register, February, 1989, No. 398, eff. 3-1-89; CR 07-111: r. Register September 2010 No. 657, eff. 10-1-10.

## **Appendix B. Chapter NR 217 Subchapter II: Phosphorus Effluent Standards and Limitations**

**NR 217.02 Applicability.** This subchapter is applicable to point sources which discharge phosphorus to the surface waters of the state.

**History:** Cr. Register, November, 1992, No. 443, eff. 12-1-92; CR 10-035: am. Register November 2010 No. 659, eff. 12-1-10.

**NR 217.03 Definitions.** Definitions of terms and the meaning of abbreviations used in this subchapter are as defined in ss. NR 102.03, 106.03, 205.03, 210.03, and 243.03. In addition: "effluent standard" means any requirement for phosphorus established pursuant to s. 283.11 (3), Stats., and this subchapter.

**History:** Cr. Register, November, 1992, No. 443, eff. 12-1-92; CR 10-035: am. Register November 2010 No. 659, eff. 12-1-10.

### **NR 217.04 Effluent standards and limitations for phosphorus.**

**(1) GENERAL.** Effluent limitations for total phosphorus shall be imposed in WPDES permits for wastewaters discharged to surface waters as specified in this section.

(a) An effluent standard for total phosphorus shall apply as follows:

1. An effluent limitation equal to 1 mg/L total phosphorus as a monthly average shall apply to publicly owned treatment works and privately owned domestic sewage works subject to ch. NR 210 which discharge wastewater containing more than 150 pounds of total phosphorus per month, unless an alternative limitation is provided under sub. (2).
2. An effluent limitation equal to 1 mg/L total phosphorus as a monthly average shall apply in cases where the discharge of wastewater from all outfalls of a facility other than those subject to ch. NR 210 contains a cumulative total of more than 60 pounds of total phosphorus per month, unless an alternative limitation is provided under sub. (2). Outfalls consisting of noncontact cooling water without phosphorus containing additives may not be included in the calculation of the cumulative total of phosphorus discharged from the facility. Compliance with the concentration limit shall be determined as a rolling 12 month average as determined by the total phosphorus from all outfalls subject to the effluent limitation for the most recent 12 months divided by the total flow for all those outfalls for the same period.
3. Effluent limitations for phosphorus equal to 1 mg/L as a monthly average contained in permits on December 1, 1992 shall remain in effect.
4. Effluent limitations for phosphorus equal to 85% removal of influent concentrations of phosphorus contained in permits on December 1, 1992 shall be modified to 1 mg/L total phosphorus as a monthly average upon reissuance of the permit unless an alternative limitation is provided under sub. (2).

5. Runoff to surface waters from animal feeding operations shall be controlled using best management practices to achieve the purpose of this chapter pertaining to phosphorus.

6. The Department shall determine if a permittee is discharging more than the applicable threshold value specified in subd. 1. or 2. by examining available data on or requiring monitoring of the amount of phosphorus contained in the wastewater effluent. Such data shall be representative of the amount of phosphorus contained in the wastewater effluent during periods of discharge or operation.

**Note:** The threshold values of this section will be applied at the time of WPDES permit reissuance or permit modification which may occur due to changes in waste characteristics.

**Note:** See NR 102.06 in reference to water quality standards.

## **(2) ALTERNATIVE EFFLUENT LIMITATIONS TO THE EFFLUENT STANDARD FOR PHOSPHORUS.**

(a) Permittees subject to sub. (1) (a) 1., 2., or 4. may request an alternative effluent limitation for total phosphorus if one or more of the following apply:

1. A permittee may request an alternative effluent limitation in cases where achieving the 1 mg/L total phosphorus effluent standard is not practically achievable.

a. A permittee requesting an alternative effluent limitation under this subdivision shall provide, as a part of the WPDES permit process, information which demonstrates that the 1 mg/L total phosphorus effluent standard is not practically achievable and information necessary for the Department to establish an alternative effluent limitation. The information provided shall include but not be limited to the following: the results of a comprehensive phosphorus minimization study to determine the sources of phosphorus to the wastewater, an evaluation of possible methods to reduce the sources of phosphorus to the wastewater, a description of actions implemented to reduce the sources of phosphorus to the wastewater. In addition, the permittee shall provide data on the phosphorus concentrations in the influent to and effluent from the wastewater treatment facilities which are achievable after phosphorus minimization steps have been implemented, alternative treatment technologies which may be employed to achieve the 1 mg/L effluent standard, and their associated removal efficiencies and costs and the requested alternative effluent limitation.

b. The Department shall review requests and the information provided by permittees and may establish alternative effluent limitations to the effluent standard imposed under sub. (1) (a) 1., 2. or 4. where this standard, in the best professional judgment of the Department, is not practically achievable. For these cases, the Department shall establish an alternative effluent limitation considering the effluent quality achievable with the application of

treatment technologies, process changes, and phosphorus minimization steps to reduce the amount of phosphorus to the maximum extent practically achievable taking into account energy, economic and environmental impacts.

2. A permittee may request an alternative effluent limitation in cases where the operation of specific biological phosphorus removal technologies will achieve a level of performance equivalent to a 1 mg/L effluent standard. Systems which employ biological phosphorus removal technology shall result in the removal of not less than 90% of the phosphorus which would be removed by achieving the 1 mg/L total phosphorus effluent standard based upon a mass determination.

a. A permittee requesting an alternative effluent limitation under this subdivision shall, as a part of the WPDES permit application process, provide information which demonstrates that achieving the requested alternative effluent limitation using biological phosphorus removal will achieve this requirement. The information shall include data on the total mass of phosphorus discharged using biological removal with and without chemical polishing and the total mass of phosphorus discharged using treatment technologies to achieve the 1 mg/L effluent standard and the information necessary for the Department to establish an alternative effluent limitation.

b. The Department shall review requests and the information provided by permittees and may establish alternative effluent limitations to the effluent standard imposed under sub. (1) (a) 1, 2, or 4 where the alternative limitation, in the best professional judgment of the Department, will result in insignificant differences in the amount of phosphorus discharged, on a mass basis, compared to the mass which would be discharged by achieving the 1 mg/L total phosphorus effluent standard. For these cases, the Department shall establish an alternative effluent limitation considering the effluent quality achievable with the application of biological phosphorus removal technologies, taking into account the total phosphorus removal performance on a mass basis. The alternative effluent limitation established by the Department under this subparagraph may not exceed 2 mg/L as a monthly average.

3. A permittee may request an alternative effluent limitation in cases where phosphorus-deficient wastewaters necessitate the addition of phosphorus to a biological treatment system to assure efficient operation and compliance with other effluent limitations.

a. A permittee requesting an alternative effluent limitation under this subdivision shall, as a part of the WPDES application process, provide information which demonstrates that achieving the 1 mg/L total phosphorus effluent standard is not practically achievable and the information necessary for the Department to establish an alternative effluent limitation. The information provided shall include but not be limited to the following: the

results of a comprehensive phosphorus minimization study to minimize the amount of phosphorus discharged while allowing efficient operation of the wastewater treatment system, a description of actions implemented to reduce the amount of phosphorus discharged, the phosphorus effluent concentrations achievable after phosphorus minimization steps have been implemented, the removal efficiencies and costs associated with alternative treatment technologies which would be necessary to achieve the 1 mg/L effluent standard and the requested alternative limitation.

b. The Department shall review requests and the information provided by the permittee and may establish alternative effluent limitations to the effluent standard imposed under sub. (1) (a) 2 where this standard, in the best professional judgment of the Department, is not practically achievable. The Department shall establish an alternative effluent limitation considering the minimum phosphorus effluent quality achievable while allowing efficient operation of the wastewater treatment system. The alternative effluent limitation established by the Department under this subdivision may not exceed 2 mg/L as a monthly average.

(b) Permittees subject to sub. (1) (a) 1. or 2. which do not discharge their effluent into the basins of the Great Lakes or the Fox (Illinois) river may request an alternative effluent limitation for total phosphorus according to the provision of this paragraph.

1. A permittee may request an alternative effluent limitation under this paragraph in cases where achieving the 1 mg/L effluent standard would not result in an environmentally significant improvement in water quality and material progress towards the attainment and maintenance of associated surface water quality standards for the receiving water as established in chs. NR 102 to 104.

2. A permittee requesting an alternative effluent limitation under this paragraph shall propose for the Department's approval a study plan to identify the receiving waters affected or potentially affected by the discharge, describe how information will be obtained to justify an alternative effluent limitation under this paragraph, and provide the information necessary to establish interim and alternative effluent limitations under this paragraph. This study plan shall be submitted as a part of the WPDES permit application process. The results of the study shall include an evaluation of all point and non-point sources of phosphorus in the watersheds and the impacts of the phosphorus contributions on biological and chemical water quality conditions. Upon review of the study plan, the Department may require additional information as deemed necessary and may expand the study to include other watersheds or portions thereof that may be significantly impacted by the permittee's discharge of phosphorus.

3. The Department may establish an alternative effluent limitation where, in the best professional judgment of the Department and based upon the information

provided by the permittee pursuant to the study plan and other relevant information, achieving the effluent standard under sub. (1) (a) 1 or 2 would not result in an environmentally significant improvement in water quality and material progress towards the attainment of associated surface water quality standards for the receiving waterbody as established in chs. NR 102 to 104.

4. An interim effluent limitation and compliance schedule for completing the study shall be imposed in a permit until the request for an exemption from the 1 mg/L effluent standard is approved or denied. The interim effluent limitation shall be equal to the representative concentration of total phosphorus as a monthly average in the effluent based on the information provided by the permittee as a part of the WPDES permit application process.

5. Alternative effluent limitations established under this paragraph may not exceed the interim effluent limitation established under subd. 4.

**(3) ANALYTICAL METHODS AND LABORATORY PROCEDURES.**

Methods used for analysis of influent and effluent samples shall be as described in ch. NR 219 unless alternative methods are specified in the WPDES discharge permit.

**(4) COMPLIANCE.** The Department shall determine and specify a reasonable compliance schedule in the permittee's WPDES permit if the facility is unable to meet the effluent standard or limitations determined according to this section at the time of permit issuance or reissuance. The date for compliance with this section may not extend beyond 3 years from the date of permit issuance or reissuance, unless the Department determines that circumstances beyond the permittee's control, such as an environmental impact statement, require additional time for compliance. In such circumstances, the date for compliance with this section may not extend beyond 5 years from the date of permit issuance or reissuance.

**(5) DEPARTMENT DETERMINATIONS.** Effluent standards and limitations established under subs. (1) (a) and (2) are not subject to the variance procedure under s. 283.15, Stats.

**History:** Cr. Register, November, 1992, No. 443, eff. 12-1-92.

## **Appendix C. Chapter NR 217 Subchapter III: Water Quality Based Effluent Limitations for Phosphorus**

**NR 217.10 Applicability.** This subchapter applies to discharges of phosphorus to surface waters of the state from the following point sources:

- (1) Publicly and privately owned wastewater facilities or treatment works;
- (2) Noncontact cooling water discharges which contain phosphorus unless 100 percent of the phosphorus in the discharge originates from the receiving water as intake water;
- (3) Concentrated animal feeding operations that discharge manure or process wastewater from the production area through alternative treatment facilities under s. NR 243.13; and
- (4) A facility or site that is regulated under ch. NR 216 only where the Department has determined that compliance with the standards in chs. NR 151 and 216 are not sufficient to meet phosphorus criteria in s. NR 102.06.

**Note:** There may be other point sources that are not subject to the procedures in this subchapter, but which are subject to s. 283.13 (5), Stats., or procedures in other rules (e.g., ch. NR 243 requirements for concentrated animal feeding operations).

**History:** CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

**NR 217.11 Definitions.** Definitions of terms and the meaning of abbreviations used in this subchapter are as defined in ss. NR 102.03, 106.03, 205.03, 210.03, and 243.03. In addition, for purposes of this subchapter, the following definitions apply:

(1) "303 (d) list" means a list of waters established by the Department and approved by U.S. EPA pursuant to 33 USC 1313

(d) (1) (A) and 40 CFR 130.7.

(2) "Adaptive management" means the use of monitoring data and other information at the time of permit reissuance to reassess management decisions and permit requirements.

(3) "New discharger" means a point source which was not authorized by a WPDES permit as of December 1, 2010. A new discharger includes a relocation of an outfall to a different receiving water.

(4) "Phosphorus impaired water" means a surface water listed on the 303 (d) list that is impaired for phosphorus, nutrients, or diurnal swings of dissolved oxygen.

**Note:** A surface water may be impaired and placed on the 303 (d) list for a reason other than phosphorus, nutrients, or dissolved oxygen (e.g., mercury), however the procedures in this subchapter only apply to impairments related to phosphorus, nutrients, or diurnal swings of dissolved oxygen.

(5) "Privately owned wastewater facilities or treatment works" means a facility or treatment works owned by a nongovernmental entity that discharges domestic wastewater, commercial wastewater, or industrial wastewater or a combination thereof.

(6) "Technology based limitation" means an effluent limitation for phosphorus established pursuant to s. 283.11 (3), Stats., and subch. II or s. 283.13 (2) or (4), Stats.

(7) "Total maximum daily load" or "TMDL" means the amount of pollutants specified as a function of one or more water quality parameters that can be discharged into a water quality limited segment and still ensure attainment of the applicable water quality standard in a watershed.

(8) "US EPA" means the United States Environmental Protection Agency.

(9) "WQBEL" means a water quality based effluent limitation.

History: CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

#### **NR 217.12 General.**

(1) Water quality based effluent limitations for phosphorus shall be included in a permit whenever the Department determines:

(a) The discharge from a point source contains phosphorus at concentrations or loadings which will cause, has the reasonable potential to cause or contribute to an exceedance of the criteria in s. NR 102.06 in either the receiving water or downstream waters; and

(b) The technology based limitation or the alternative treatment technology limitation calculated under s. NR 243.13 is less stringent than necessary to achieve the applicable water quality standard for phosphorus in s. NR 102.06.

(2) If the technology based limitation expressed as a concentration is more stringent than the water quality based effluent limitation expressed as a concentration under s. NR 217.13, then the technology based limit shall be included in the permit, along with any mass limitations calculated under this subchapter as required under s. NR 217.14 (1) and (3).

History: CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

#### **NR 217.13 Calculation of water quality based effluent limitations for phosphorus.**

(1) BASIS FOR LIMITATIONS.

(a) The Department shall calculate potential water quality based effluent limitations for point source dischargers of phosphorus using the procedures in this section.

(b) Water quality based effluent limitations for phosphorus shall be calculated based on the applicable phosphorus criteria in s. NR 102.06 at the point of discharge, except the Department may calculate the limitation to protect downstream waters.

(2) DISCHARGES TO STREAMS AND RIVERS.

(a) *Limitation calculation.* For discharges of phosphorus to flowing streams and rivers, the water quality based effluent limitation shall be calculated using the following conservation of mass equation:

$$\text{Limitation} = [(WQC) (Q_s + (1-f)Q_e) - (Q_s - fQ_e) (C_s)] / Q_e$$

Where:

Limitation = Water quality based effluent limitation (in units of mass per unit of volume),

WQC = The water quality criterion concentration (in units of mass per unit volume) from s. NR 102.06,

$Q_s$  = Receiving water design flow (in units of volume per unit time) as specified in par. (b),

$Q_e$  = Effluent flow (in units of volume per unit time) as specified in par. (c),

$f$  = Fraction of the effluent flow that is withdrawn from the receiving water, and

$C_s$  = Upstream concentration (in units of mass per unit volume) as specified in par. (d).

(b) *Receiving water design flow ( $Q_s$ )*. Based on the availability of information and the professional judgment of the Department, the value of  $Q_s$  to be used in calculating the effluent limitation for discharges to flowing waters shall be determined using one of the following:

1. The average minimum 7-day flow which occurs once every 2 years (7-day  $Q_2$ ) based on information derived by the U. S. geological survey or other Department approved information source, using data from a representative gauging station with a period of record of at least 10 years.
2. If provided by the permittee and approved by the Department, the average low 30-day flow which occurs once every 3 years (30-day  $Q_3$ ) based on information derived by the U. S. geological survey or other Department approved information source, using data from a representative gauging station with a period of record of at least 10 years.
3. Other flow deemed more representative of flow conditions and approved by the Department.

(c) *Effluent flows ( $Q_e$ )*.

1. For dischargers subject to ch. NR 210 and which discharge for 24 hours per day on a year-round basis,  $Q_e$  shall equal the maximum effluent flow, expressed as a daily average, that is anticipated to occur for 12 continuous months during the design life of the treatment facility unless it is demonstrated to the Department that this design flow rate is not representative of projected flows at the facility.
2. For other dischargers not subject to ch. NR 210,  $Q_e$  shall equal, based on the best professional judgment of the Department, one of the following:
  - a. The maximum effluent flow, expressed as a 365 day rolling average of daily discharges that has occurred for 12 continuous months and represents normal operations.
  - b. The maximum effluent flow, expressed as a 30 day rolling average, which has occurred for 30 continuous days and represents normal operations.

3. For seasonal discharges, discharges proportional to stream flow, or other non-continuous discharge situations,  $Q_e$  shall be determined on a case by case basis.

(d) *Upstream concentrations (Cs)*. The representative upstream concentration of phosphorus shall be used in specific water quality based effluent limit calculations. At a minimum, the representative upstream concentration shall be either a concentration derived by the Department based on data from the specific stream or from a similar location. Where data is collected on the upstream location, the concentration used shall equal the median of at least four samples collected throughout the period of May through October. All samples collected during a 28-day period shall be considered as a single sample and the average of the concentrations used. Where data is available from more than one year in the last five years, the Department may use all of the years of data in the calculation of the upstream concentration. The Department may also use data older than five years provided that it is representative of current conditions. Upstream concentrations may not be measured at a location within the direct influence of a point source discharge. The determination of upstream concentrations shall be evaluated at each permit reissuance.

**Note:** The Department has guidance on collection methods for ambient water sampling and may develop guidance for the evaluation of representative data. The guidance may be obtained from the offices of the Department of natural resources, bureau of watershed management at 101 South Webster Street, P.O. Box 7921, Madison, Wisconsin 53707.

**(3) DISCHARGES TO INLAND LAKES AND RESERVOIRS.** For discharges of phosphorus directly to inland lakes, reservoirs, and other receiving waters which do not exhibit a unidirectional flow at the point of discharge, the Department shall set the effluent limit equal to the criterion for the receiving water or the downstream water.

**Note:** As described in s. NR 217.16, effluent limitations for discharges to lakes may also be based on the wasteload allocation of a total maximum daily load, where the total maximum daily load has been approved by US EPA.

**(4) DISCHARGES DIRECTLY TO GREAT LAKES.** For discharges directly to the Great Lakes, the Department shall set effluent limits consistent with nearshore or whole lake model results approved by the Department. The Department may set an interim effluent limit based on the best readily available phosphorus removal technology commonly used in Wisconsin.

**Note:** At the time this rule was promulgated, December 1, 2010, the best readily available phosphorus removal technology indicates a limit of 0.6 mg/L.

**(5) OTHER METHODS OF LIMIT CALCULATION.** The Department may use other models and equations for calculating a water quality based effluent limitation if, in the best professional judgment of the Department, the model provides a more accurate representation of the conditions.

**(6) MULTIPLE DISCHARGES.**

(a) Except as provided in par. (b), whenever the Department determines that more than one discharge may be affecting the water quality of the same receiving water, the resultant combined allowable load shall be divided among the various discharges

using an allocation method based on site-specific considerations. Whenever the department makes a determination under this subsection, the Department shall notify all permittees who may be affecting the water quality of the same receiving water of the determination and any limitations developed under this subsection. Permittees shall be given the opportunity to comment to the Department on any determination made under this subsection.

(b) This subsection does not apply if there is a US EPA approved TMDL for phosphorus for the receiving water. If there is a US EPA approved TMDL, the combined allowable load shall be divided in accordance with the approved TMDL.

**(7) MINIMUM EFFLUENT LIMITATIONS.** If the water quality based effluent limitation calculated pursuant to the procedures in this section is less than the phosphorus criterion specified in s. NR 102.06 for the water body, the effluent limit shall be set to be equal to the criterion.

**(8) NEW DISCHARGERS.** If a new discharger is proposing a discharge of phosphorus to a receiving or downstream water that is a phosphorus impaired water, the new discharger may not discharge phosphorus except as follows:

(a) The new discharge of phosphorus is allocated part of the reserve capacity or part of the wasteload allocation in a US EPA approved TMDL;

(b) The new discharger can demonstrate the new discharge of phosphorus will improve water quality in the phosphorus impaired segment; or

(c) The new discharger can demonstrate that the new phosphorus load will be offset through a phosphorus trade or other means with another discharge of phosphorus to the 303 (d) listed water. The offset must be approved by the Department and must be implemented prior to discharge.

**Note:** Section 283.84, Stats., establishes requirements for pollutant trades.

**History:** CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

**NR 217.14 Expression of limitations. (1) GENERAL.**

(a) Water quality based effluent limitations, when required pursuant to s. NR 217.15, shall be expressed in a discharge permit as a concentration. A mass limit shall also be included in a permit for discharges of phosphorus to any of the following receiving or downstream waters:

1. A lake or reservoir;
2. An outstanding or exceptional resource water, as designated in ss. NR 102.10 and 102.11;
3. A phosphorus impaired water; or
4. A surface water that has an approved TMDL for phosphorus.

(b) The Department may establish mass limitations in permits for any other discharges of phosphorus if a concentration limit for phosphorus is included in the

permit, and where an increase in phosphorus load is likely to result in adverse effects on water quality in the receiving water or downstream water.

(c) For discharges to lakes, the Department shall also include an annual mass limit for phosphorus in the permit.

(d) If there is a US EPA approved TMDL for the receiving water, the Department shall include a mass limit expressed in the manner consistent with the requirements of the TMDL. As provided in s. NR 217.16, this TMDL based mass limit may be included in the permit in addition to, or in lieu of the mass limit established pursuant to this section.

**Note:** In accordance with s. 283.84, Stats., the Department may approve the use of phosphorus trading as a means for a point source to achieve compliance with the water quality based effluent limitation, including a TMDL based limitation. The trade shall be incorporated into the terms of the WPDES permit for the point source and must be approved by the Department prior to implementation.

**(2) CONCENTRATION BASED LIMITATIONS.** Concentration effluent limitations calculated under s. NR 217.13 shall be expressed as a monthly average in permits, except for concentrations of less than or equal to 0.3 mg/L where limitations may be expressed as annual averages. If a concentration limitation expressed as an annual average is included in a permit, a monthly average concentration limitation equal to three times the water quality based effluent limitation calculated under s. NR 217.13 shall also be included in the permit.

**(3) MASS BASED LIMITATIONS.** Concentration effluent limitations as calculated under s. NR 217.13 shall be converted into mass effluent limitations using the effluent flow identified in s. NR 217.13 and an appropriate conversion factor, and expressed as a monthly average in the permit, except for concentration based limitations of less than or equal to 0.3 mg/L where mass limitations may be expressed as annual averages.

**History:** CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

**NR 217.15 Determination of necessity for water quality based effluent limitations for phosphorus.**

**(1) General.**

(a) The Department shall include a water quality based effluent limitation for phosphorus in a permit whenever the discharge or discharges from a point source or point sources contain phosphorus at concentrations or loadings which will cause, has the reasonable potential to cause or contribute to, an exceedance of the water quality standards in s. NR 102.06 in either the receiving water or downstream waters. The Department shall use the procedures in this section to make this determination.

(b) *Permittees with existing phosphorus limitations.* If a permittee has a technology based phosphorus limitation in a permit that is less restrictive than a water quality based effluent limitation for phosphorus calculated pursuant to s. NR 217.13, then the Department shall include the water quality based effluent limitation in the permit.

(c) *Permittees without existing phosphorus limitations.* If a permittee discharges phosphorus, but does not have a technology based limitation for phosphorus in its permit, the Department shall use the procedures in this paragraph to determine whether a discharge will cause, has the reasonable potential to cause or contribute to an exceedance of the phosphorus water quality criterion in s. NR 102.06 in the receiving or downstream waters, and whether to include a water quality based effluent limit for phosphorus in the WPDES permit.

1. Using at least 11 daily discharge concentrations of phosphorus, if the upper 99th percentile of the 30 day average discharge concentration of phosphorus exceeds the potential phosphorus limitation calculated under s. NR 217.13, then the water quality based effluent limitation for phosphorus shall be included in the WPDES permit. If the upper 99th percentile of the 30 day average discharge concentration of phosphorus is less than the potential phosphorus limitation calculated under s. NR 217.13, then a water quality based effluent limitation for phosphorus is not required in the WPDES permit. The upper 99th percentile of available discharge concentrations shall be calculated pursuant to s. NR 106.05 (5).
2. If 11 daily discharge concentrations of phosphorus are not available for a permittee, then a water quality based effluent limitation for phosphorus shall be included in the permit when the mean of available effluent concentrations is greater than one-fifth of the limit.
3. If no phosphorus effluent data is available for an existing permittee, the Department may require phosphorus sampling as part of a permit application for reissuance to determine whether a water quality based effluent limit is necessary in the WPDES permit under par. (a), or the Department may use effluent data information from similar point sources to make the determination under par. (a).

**Note:** The Department will develop guidance regarding the administration of this section to ensure that permitted discharges with a reasonable potential to cause or contribute to exceedances of the applicable phosphorus water quality criterion in s. NR 102.06 are identified.

(d) *Sampling.* Prior to permit reissuance, a permittee discharging any phosphorus shall collect effluent samples of phosphorus at a frequency specified by the Department in the permit application for reissuance.

(e) *New dischargers.* The Department shall include a water quality based phosphorus limitation in a permit for a new discharger if the Department determines the new discharger will discharge phosphorus at concentrations or loadings which may cause or contribute to exceedances of the water quality criteria in s. NR 102.06 in either the receiving water or downstream waters. To estimate the amount of phosphorus discharged by a new discharger, the Department may consider projected discharge information from the permit applicant and phosphorus discharge information from similar sources.

**(2)** If the Department determines a water quality based effluent limitation is not necessary in a permit based on the procedures in this section, the Department may still require monitoring for phosphorus discharges.

History: CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10; correction in (1) (c) 1. made under s. 13.92 (4) (b) 7., Stats., Register November 2010 No. 659.

**NR 217.16 Relationship of WQBELs and TMDL based limitations.**

**(1)** In addition to a water quality based effluent limitation calculated pursuant to s. NR 217.13, the Department may derive a water quality based effluent limitation for phosphorus consistent with the wasteload allocation and assumptions of a US EPA approved TMDL that is designed to achieve water quality standards in ch. NR 102. This TMDL based limitation may be included in a permit in addition to, or in lieu of, the water quality based limitation calculated under s. NR 217.13. When deciding whether to use a TMDL based limit as a substitute for the limitation calculated under s. NR 217.13, the Department shall consider the following factors:

- (a) The degree to which nonpoint sources contribute phosphorus to the impaired water;
- (b) Whether waters upstream of the impaired waters are meeting the phosphorus criteria; and
- (c) Whether waters downstream of the impaired water are meeting the phosphorus criteria.

**(2)** If the phosphorus limitation based on an approved TMDL is less stringent than the water quality based effluent limitation calculated in s. NR 217.13, the Department may include the TMDL based limit in lieu of the limit calculated in s. NR 217.13 if the limit calculated under s. NR 217.13 has not yet taken effect. If the Department includes the TMDL based limitation for phosphorus in the WPDES permit in lieu of the limit calculated in s. NR 217.13, the TMDL based limit may remain in the permit for up to two permit terms to allow time for implementation of the TMDL, or the implementation period specified in the TMDL, whichever is less. The Department may include a schedule of compliance to achieve a TMDL based limit if the Department determines a schedule of compliance is necessary. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may impose the more stringent water quality based effluent limitation calculated under s. NR 217.13, or may include the TMDL based limitation for an additional permit term if the Department determines there will be significant nonpoint source load reductions within the upcoming permit term. If the Department decides to remove a TMDL based phosphorus limit from a permit and instead include a more stringent water quality based phosphorus limit in the permit calculated under s. NR 217.13, the Department may provide a schedule of compliance for the more stringent limit if the Department determines additional time is needed for the permittee to comply with the revised limit. Such schedules shall require compliance as soon as possible, but in no case no more than five years from the date that the permit is reissued or modified to include the revised effluent limitations.

**(3)** If a phosphorus water quality based limit calculated under s. NR 217.13 has already taken effect in a permit, the Department may replace the limit with a less stringent TMDL based limit, if allowed pursuant to antidegradation procedures in ch. NR 207.

**Note:** The TMDL based limitation may be less stringent than the water quality based effluent limitation calculated under s. NR 217.13 in cases where nonpoint sources are the significant phosphorus sources responsible for the impairment.

**(4)** If the phosphorus limitation based on an approved TMDL is more stringent than the water quality based effluent limitation calculated under s. NR 217.13, the Department shall include the more stringent TMDL based limitation in the WPDES permit.

**History:** CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

### **NR 217.17 Schedules of compliance.**

#### **(1) GENERAL.**

(a) Except as provided in sub. (4), the Department may provide a schedule of compliance for a water quality based phosphorus limitation in a WPDES permit, where based on available information the Department finds that:

1. The schedule of compliance will lead to compliance with the water quality based effluent limitation as soon as possible; and
2. The schedule of compliance is appropriate and necessary because the permittee cannot immediately achieve compliance with the water quality based effluent limitation based on existing operation of its treatment system.

**Note:** Before any compliance schedule is established in a permit pursuant to this subchapter, the Department must make the finding in par (a).

(b) In determining whether a compliance schedule is appropriate and determining the length of the compliance schedule, the Department shall consider all of the following factors:

1. Whether there is any need for modifications to the treatment facilities, operations or measures to meet the water quality based effluent limitation, and if so, how long it will take to implement the modifications. If the Department determines that a permittee only needs to make operational changes to achieve compliance with a limitation, the compliance schedule shall be as brief as possible and only allow time for operational start-up adjustments.
2. The amount of time the discharger has already had to meet the water quality based effluent limitation under prior permits.
3. The extent to which the discharger has made good faith efforts to comply with the water quality based effluent limitation and other requirements in prior permits, if applicable.
4. The extent to which the phosphorus removal process technologies have been developed and proven to be effective.

(c) In determining whether a compliance schedule is appropriate and determining the length of the compliance schedule, the Department may also consider any of the following factors:

1. Whether there is a need to acquire a substantial amount of property to accommodate the needed modifications; and
2. Whether there is a need to develop an extensive financing plan and obtain financing for the proposed treatment plant upgrade.

**Note:** A compliance schedule may be provided for a water quality based effluent limit for phosphorus calculated under s. NR 217.13 and a TMDL based limit for phosphorus.

**(2) MAXIMUM COMPLIANCE SCHEDULE PERIOD.** Except for situations where filtration or a similar phosphorus removal process is required, any compliance schedule established by the Department under sub. (1) may not exceed seven years from the date a permit was first modified or reissued to include a water quality based phosphorus limit calculated under s. NR 217.13. Where compliance with the water quality based phosphorus limit requires the construction of filtration or a similar phosphorus removal process, the Department may grant a schedule of compliance not to exceed nine years from the date that the permit is first reissued or modified to include effluent limitations developed under provisions of this subchapter. In cases where a compliance schedule extends beyond five years, the Department may revise the schedule at reissuance or pursuant to a permit modification.

**(3) REQUIREMENTS, LIMITATIONS, DATES, AND REPORTING.** When granting a schedule of compliance, the Department shall include, as conditions of the permit, the following:

- (a) Dates for achievement of interim requirements. The time between interim dates may not exceed one year.
- (b) A sequence of actions or operations that may include, as appropriate, but are not limited to:
  1. Development and implementation of a phosphorus discharge optimization plan for the current operation.
  2. Preparation of preliminary and final designs for new or modified treatment technology.
  3. Initiation and completion of construction.
- (c) Interim effluent limitations representing good management and operation for similar treatment processes based on performance of other wastewater treatment facilities that will lead to compliance with the final water quality based effluent limitation.
- (d) A requirement that no later than 30 days following each interim date and the final date of compliance, the permittee shall notify the Department in writing of its compliance or non-compliance with the interim or final requirements, including submittal of progress reports. If any interim requirement will take more than one

year to complete, the permit shall also include a projected completion date for the interim requirement.

(e) The final water quality based effluent limit for phosphorus calculated pursuant to s. NR 217.13 shall be included in the permit even if the limit is not effective during the permit term. The Department may revise the final limit at permit reissuance or pursuant to a permit modification.

(f) If the permittee chooses to engage in water quality trading as a means to achieve compliance with interim limitation or final water quality based effluent limitations, then the terms and conditions related to the trade shall be incorporated into the permit.

**(4) NEW DISCHARGERS.** Any new discharger may not receive a compliance schedule to achieve compliance with a phosphorus water quality based effluent limitation.

History: CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

**NR 217.18 Watershed adaptive management.**

**(1) GENERAL.** Adaptive management is a strategy to achieve the phosphorus water quality criteria in s. NR 102.06 in the most economically efficient manner, and as soon as possible, taking into consideration the contributions of phosphorus from point and nonpoint sources in a watershed.

**(2) APPLICATION.** If requested by the permittee in the permit application for reissuance and if approved by the Department, the permittee may implement a watershed adaptive management approach under this section as a means to achieve compliance with the phosphorus water quality standards in s. NR 102.06. The Department may approve and authorize the adaptive management option in this section only if the permittee demonstrates and the Department concurs that all of the following conditions are met:

(a) The exceedance of the applicable phosphorus criterion in s. NR 102.06 is caused by phosphorus contributions from both point sources and nonpoint sources.

(b) Either the sum of the nonpoint sources and the permitted municipal separate storm sewer system contribution of phosphorus to the receiving water is at least 50 percent of a total contribution within the watershed of the receiving water where the applicable phosphorus criterion in s. NR 102.06 is exceeded; or the permittee demonstrates that the applicable phosphorus criterion cannot be met in the watershed without the control of phosphorus from nonpoint sources.

(c) Documentation that the proposed water quality based effluent limit in the applicant's permit will require filtration or other equivalent treatment technology to achieve compliance.

(d) The permittee has submitted an adaptive management plan that identifies specific actions to be implemented that will achieve compliance with the applicable phosphorus criterion in s. NR 102.06 through verifiable reductions of phosphorus

from point and nonpoint sources in the watershed. At a minimum, the plan shall include the following:

1. An analysis of the levels of phosphorus in the permittee's effluent and significant sources of point and nonpoint phosphorus loadings in the watershed.
2. Goals and measures for determining whether the actions identified in the plan are effective in achieving compliance with the applicable phosphorus criterion in s. NR 102.06.
3. Identification of any anticipated partners that will assist in implementing the phosphorus reductions to achieve compliance with the applicable phosphorus criterion in s. NR 102.06, including the partner's level of support for the plan.
4. A demonstration that the permittee has the ability to fund and implement the plan either individually, or in conjunction with other permittees and nonpoint sources, or other partners, including municipal and county governments, in the watershed. Plans should include any contracts reflecting commitments by partners to implement applicable actions.

**(3) PERMIT TERMS AND CONDITIONS.** If the Department determines that the permittee has provided all necessary information and the conditions in sub. (2) have been met, it may issue a permit that includes watershed adaptive management actions to achieve compliance with the applicable phosphorus criterion in s. NR 102.06 on a schedule approved by the Department. At a minimum, the permit shall include the following:

- (a) Monitoring in the receiving water at locations and times established in the permit to assess phosphorus loading and to document progress toward achieving the applicable phosphorus criterion in s. NR 102.06. The Department shall also require permittees to monitor, record and report the mass and concentration of phosphorus in the effluent at an appropriate frequency specified by the Department in the permit.
- (b) Requirements to design and implement the actions identified in the permittee's approved adaptive management plan in accordance with the goals and measures identified in the plan and any compliance schedule included in the permit.
- (c) Requirements to optimize the permittee's treatment system to control phosphorus.
- (d) Reporting procedures and deadlines for all monitoring, assessment and data gathering requirements in the plan. Permittees shall be required to file and the Department will review an annual report that identifies implementation of actions in the plan that were completed the previous year, and that documents any progress in achieving the goals and measures in the adaptive management plan. Adjustment or corrections, to the extent that they are needed, will be incorporated into the permit via permit modification procedures.
- (e) Numerical effluent limitations as follows:

1. All permits issued under adaptive management in this section shall include water quality based effluent limitations calculated consistent with the federal water pollution control act, 33 USC 1251 to 1387, that are established according to s. NR 217.13 or a US EPA approved TMDL. These limitations shall take effect in accordance with the timeframe established in this paragraph, or pursuant to par. (g) if adaptive management is terminated.
  2. In the first permit reissuance term following approval by the Department under sub. (2), the initial interim effluent limitation shall be no higher than 0.6 mg/L of total phosphorus expressed as a six-month average. An effluent limit not to exceed 1.0 mg/L of total phosphorus expressed as a monthly average shall also be included in the permit. The Department may allow the permittee a compliance schedule that may not exceed five years if necessary to meet this interim limitation.
  3. If the permittee has met all of the requirements of its previous permit, but the monitoring data of the receiving water indicate that the applicable phosphorus water quality criterion in s. NR 102.06 has not been met by the time the first permit issued under adaptive management expires, the Department may issue a subsequent adaptive management permit. The subsequent permit shall include an interim effluent limitation of no higher than 0.5 mg/L expressed as a six-month average. An effluent limit not to exceed 1.0 mg/L of total phosphorus expressed as a monthly average shall also be included in the permit. The subsequent permit shall also include an updated adaptive management plan to achieve the phosphorus water quality criterion in s. NR 102.06. The Department may allow the permittee a compliance schedule that may not exceed five years if necessary to meet this interim limitation.
  4. If by the expiration of the second permit issued under adaptive management, monitoring data collected for the receiving water indicate that the applicable phosphorus criterion under s. NR 102.06 has not been met, the Department shall require compliance with a water quality based effluent limitation for phosphorus calculated under s. NR 217.13 or a US EPA approved TMDL. The Department may allow the permittee a compliance schedule that may not exceed five years if necessary to meet this limitation.
- (f) A statement that failure to implement any of the terms or conditions established under pars. (a) through (e) above, is a violation of the permit.
- (g) Provisions that the Department may terminate adaptive management for a permittee and require compliance with a phosphorus effluent limitation calculated under s. NR 217.13 or a US EPA approved TMDL based on any of the following reasons:
1. Failure to implement the adaptive management actions in accordance with the approved adaptive management plan and compliance schedule established in the permit.

2. New information becomes available that changes the Department's determinations made under sub. (2).
3. Circumstances beyond the permittee's control have made compliance with the applicable phosphorus criterion in s. NR 102.06 pursuant to the plan's goals and measures infeasible.
4. A determination by the Department that sufficient reductions have not been achieved to timely reduce the amount total phosphorus to meet the criteria in s. NR 102.06.

**History:** CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.

**NR 217.19 Variances for stabilization ponds and lagoon systems. (1) GENERAL.**

- (a) An owner or operator of a permitted wastewater treatment system that consists primarily of a stabilization pond system or a lagoon system may apply for a variance to the phosphorus water quality based effluent limitations pursuant to s. 283.15 (4) (a) 1. f., Stats., using the procedures in this section.

**Note:** Stabilization ponds and lagoons are operated primarily by communities serving a population of 2000 or less and small industries. With currently available technology that could be used in conjunction with stabilization ponds or lagoons, it is unlikely that phosphorus water quality based effluent limits less than 1 mg/L can be consistently met. To meet phosphorus water quality based effluent limits of less than 1 mg/L, it will be necessary for owners of the systems to construct new wastewater treatment plants which could result in substantial and widespread adverse social and economic impacts.

- (b) A new discharger may not receive approval for a variance under this section or pursuant to any other variance procedure.

**(2) APPLICATION FOR A VARIANCE.**

- (a) The application for a variance under this section shall be submitted with the WPDES permit application for reissuance, or within 30 days after the permittee receives written notification of the proposed phosphorus limits, if the notification occurs later. The application shall be submitted on the phosphorus lagoon and stabilization pond variance form made available from the Department or on a form containing equivalent information.

**Note:** Owners or operators of stabilization ponds or lagoon systems may obtain the variance application form from the offices of the Department of natural resources, bureau of watershed management at 101 South Webster Street, P.O. Box 7921, Madison, Wisconsin 53707. The form will provide guidance on the type of information needed to demonstrate widespread social and economic impacts.

- (b) The application shall, at a minimum, include the following information:
1. Information required by s. NR 200.22, except for the information in s. NR 200.22 (1) (e) 6.
  2. A statement that the permittee is seeking a variance pursuant to this section and s. 283.15 (4) (a) 1. f., Stats.
  3. Information on the number and volume of lagoon or pond treatment cells, treatment processes, discharge periods, retention times, population served, influent flow, and available capacity for holding wastewater.

4. Other information requested by the Department that is relevant to the review conducted under sub. (3).

**Note:** It is recommended that the permittee ask for calculation of potential phosphorus water quality based limits at least 12 months prior to permit expiration. This information will help the permittee complete their variance request portion of the permit application which is due 180 days prior to permit expiration.

**(3) DEPARTMENT REVIEW.**

(a) The Department shall review the submitted application for the variance and determine whether the permittee can achieve the phosphorus effluent limitations calculated pursuant to s. NR 217.13 without widespread adverse social and economic impacts. In making this determination, the Department shall:

1. Compare the calculated phosphorus effluent limitations to the phosphorus effluent data submitted under sub. (2). If the permittee does not have sufficient phosphorus discharge data for its system, the Department may augment the data set with effluent data from a similar lagoon or pond system in the state to make the comparison. The Department may apply statistical methodologies to make its determination on the ability of the current lagoon or stabilization pond system to meet phosphorus limitations.

2. Evaluate the financial affordability analysis submitted by the permittee in response to the variance application requirement in s. NR 200.22 (p).

**Note:** The Department may use a US EPA publication titled, Interim Economic Guidance for Water Quality Standards — Workbook, EPA-823-B-95-002, March 1995, which provides information on evaluating economic and social impacts.

(b) The Department's decision to approve or deny a variance under this section shall be made on or before the date of the s. 283.53 (3) (d), Stats., public notice for the proposed permit reissuance and shall be made in accordance with the following:

1. If the Department determines that the permittee cannot meet the phosphorus water quality based effluent limitation without widespread adverse social and economic impacts, the Department shall approve the variance. If the variance is approved, the Department shall specify in the permit that the variance has been granted for phosphorus, and the requirements in sub. (4) shall also be included in the permit.

2. If the Department determines that the permittee can meet the phosphorus effluent limitations without widespread adverse social and economic impacts or that effluent limitations are not necessary as determined by s. NR 217.15, the Department shall deny the variance and notify the applicant of this determination in writing.

(c) If the Department denies a variance under this section, a permittee may not apply again after the permit is issued for a variance from the phosphorus water quality standard based on the factor in s. 283.15 (4) (a) 1. f., Stats., for the same permit term.

(d) A permittee may seek a variance from a phosphorus limit in a reissued WPDES permit based on the factors in s. 283.15 (4) (a) 1. a. to e., Stats., and using the procedures and requirements in s. 283.15, Stats., and ch. NR 200.

**Note:** All variances are subject to US EPA review and approval.

**(4) PERMIT TERMS IF VARIANCE IS APPROVED.** If the Department approves a variance to the phosphorus effluent limitations under this section, the following requirements shall be included in the reissued permit:

(a) The permit shall include a phosphorus variance effluent limitation as follows:

1. The numeric limitation shall equal the upper 99th percentile of representative daily discharge concentrations (one-day  $P_{99}$ ) as calculated in s. NR 106.05 (5) (a).
2. The variance limitation shall be expressed as a daily maximum concentration.

(b) The permittee shall conduct monitoring of phosphorus during discharge periods at a frequency specified in the permit.

(c) The permittee shall, to the extent practicable, identify and minimize the non-domestic sources of phosphorus to the system and operate the treatment system to minimize exceedances of the calculated limits.

(d) The permittee shall investigate treatment technologies, process changes, pollutant source reduction steps, wastewater reuse or other techniques that may result in compliance by the permittee with the applicable phosphorus water quality standard, and shall submit reports on those investigations as required by the Department.

**(5) CONTINUED VARIANCES.** If a permittee received approval for a variance to the phosphorus standard under this section in a reissued permit, the permittee may request a continued variance from the phosphorus standard in a subsequent reissued permit pursuant to the procedures and requirements in this section.

**History:** CR 10-035: cr. Register November 2010 No. 659, eff. 12-1-10.