

## Wisconsin Pollutant Discharge Elimination System Program

### PHOSPHORUS OPERATIONAL EVALUATION & OPTIMIZATION REPORT WORKSHEET

Please use this suggested format when developing the Operational Evaluation Report that may be contained in a Phosphorus Water Quality Based Effluent Limit compliance schedule of a Wisconsin Pollutant Discharge Elimination System (WPDES) Discharge Permit. We suggest that you follow this format to enable the Department to provide a quick review.

To streamline the evaluation and approval process, we have developed a 3-part document. This document asks for some basic information regarding the wastewater treatment plant's (WWTP) current "Baseline" phosphorus levels, a Worksheet for each proposed action to be taken, and a schedule for each item. It also includes a summary page which is used for approval of the submittal. The submittal may be prepared by a consultant or qualified individuals associated with the facility.

**Optimization is a very important step in achieving the final total phosphorus (TP) limit. A reduction in the discharge levels that can be achieved through minimization and minor additions or optimization of the existing WWTP can greatly reduce the costs of construction or other means of achieving limits. Considering the potential cost savings that can be realized by going through this process, we are turning much of the responsibility for performing a comprehensive evaluation over to you.**

**Department staff will review the report to determine whether key elements have been addressed and to ensure that the schedule which you propose conforms to the deadlines established in the permit compliance schedule. If the submittal meets these criteria, the Department reviewer will sign and return a copy of the summary sheet. Once the report is approved, the permittee shall proceed with implementation of the optimization plan in accordance with the approved schedule that is consistent with chapter NR 217, Wisconsin Administrative Code.**

Each facility is unique, but we are providing a listing of the items that should be considered to reduce the amount of TP that is discharged. Please review the list and determine which items may be applicable to your plant. Then determine a schedule for evaluating these items or others that may be appropriate. When developing the schedule, keep in mind that many of the items should be available when developing the Facility Planning Status Report that is due 2 years after permit issuance. The results of addressing the appropriate items will need to be included in the Preliminary Facilities Plan that is due 3 years after permit issuance.

## POTENTIAL ITEMS IN THE OPTIMIZATION REPORT

- Determine additional data needs.
- Identify monitoring needs of individual sources.
  - Industrial or commercial contribution.
  - Hauled in wastes, such as septage or holding tank wastes.
  - Industrial process lines.
  - WWTP process contribution, such as sludge decant.
  - WWTP unit effluent concentrations.
- Municipalities: work on P minimization with contributing sources; such as
  - Industrial: metal phosphatizing, dairy processing, meat packing, poultry processing, etc.
  - Commercial/institutional: vehicle washing, industrial cleaning & sanitizing, nursing homes, education facilities.
- Industry: explore reducing use of P chemicals, substitution for P chemicals, or alternate means of handling higher P loads.
- Work with water supplier to optimize P addition to the water supply used for corrosion control or iron and manganese sequestration.
- Optimize/increase chemical addition to increase P removal without impacting micro-organisms in WWTP.
- Evaluate multiple points of chemical addition.
- Optimize sludge decant.
  - Low rates
  - During low flow/loading periods.
  - Use side stream chemical addition to remove P from decant.
  - Increase chemical dosage during decant.
- Increase use of chemical polishing at Bio-P systems, particularly during sludge decant.
- Adjust sludge age/wasting at bio-P plants.
- Chemical addition to lagoons.
- For Pulp Mills (and other P deficient WW) optimize P addition thru use of on-line measurement of organic load to trigger nutrient addition.
- Identify minor construction (e.g., piping for additional chemical addition points) that may be necessary to further enhance P removal.
- Identify changes that may be necessary to the solids handling system due to the additional sludge that may be generated.

## REPORT CONSIDERATIONS

Following are general considerations regarding the content of Optimization Reports for some types of treatment systems. Please work with your DNR Wastewater Engineer/Specialist regarding any site-specific questions.

### Lagoons and Ponds

If a plant already has chemical feed equipment or is already directly applying chemicals to achieve the technology based limit of 1.0 mg/L or an Alternate Phosphorus Limit, the dosages should be varied to determine what discharge levels can be achieved and the associated costs. This information can be used to optimize the phosphorus removal.

If a facility is not currently adding phosphorus removal chemicals, it is not necessary to do so as part of the optimization evaluation. There can, however, be advantages to exploring the phosphorus removal that can be achieved through the addition of chemicals to ponds or lagoons.

- Monitoring has shown that many of these systems can achieve a discharge concentration of 1.0 mg/L by adding chemicals directly to the pond or at transfer structures or other points of good mixing. Lacking other information, the Department may presume that a facility can achieve a discharge level of 1.0 mg/L by directly adding chemicals and set interim permit limits accordingly. Any site-specific information generated by a facility will be used by the Department in determining interim limits and can also be useful to a facility's consultant for factoring into the design basis.
- Information from a chemical addition evaluation or pilot study may be valuable if a facility is pursuing a phosphorus variance that is available for ponds or lagoons. For municipal facilities the cost of treatment is compared to 2% of the median household income of the community residents. Site specific information will be valuable in determining eligibility for a variance and appropriate variance limits. (The process and information for obtaining a phosphorus variance for lagoons or ponds is addressed in the Department's Phosphorus Guidance Document.)

If a chemical addition study is performed, a one-time evaluation period should be adequate. For such an evaluation, it is not expected that capital equipment would be purchased nor electricity be supplied if it is not available at the point of chemical addition. One approach for an evaluation could be to treat the contents of a secondary pond cell with a broadcast application a few days before discharge. Phosphorus concentration would be measured before chemical application and again during discharge. For a continuous discharging aerated lagoon, a similar approach could be used by applying various dosages of the chemical directly to the final pond or via a transfer structure. The discharge levels would then be monitored at appropriate intervals, depending on the study plan. It is assumed that these type studies would be done during warmer weather to avoid freezing issues.

#### Mechanical Plants without Current Chemical Addition

The Department is not suggesting that equipment be purchased for chemical addition. If chemical feed capabilities exist, removals that can be achieved at various dosages should be evaluated. Adjusting dosages during times of the day, such as during sludge decanting or higher loading periods, should be considered. (The additional load this may place on the solids handling units should also be considered.) If the equipment and piping is available, chemical addition at alternative application points should be evaluated as well. Information that is gathered will be valuable for determining the effectiveness of chemical phosphorus removal for the specific wastewater characteristics. This will be useful for developing a stepped compliance approach, such as Adaptive Management, and for facility planning.

#### Recirculating Sand Filters

Full scale pilot testing of chemical addition to recirculating sand filters is not suggested. There is concern that floc carryover may plug the filter media. Additionally, chemically bound phosphorus may be released in the anaerobic environment of the septic tank component. Phosphorus influent minimization should be the main optimization focus for these systems.

#### Optimization Timing

If a facility has already done phosphorus removal optimization prior to this effort becoming a permit requirement, this may be identified in the submitted report. The Department believes it is appropriate to give "credit" for proactive efforts aimed at phosphorus reduction.

**PHOSPHORUS OPTIMIZATION REPORT WORKSHEET**

Facility Name: \_\_\_\_\_

WPDES Permit #: \_\_\_\_\_

**PART 1—BACKGROUND INFORMATION**

**(A) Briefly describe wastewater treatment facility processes and operations and the means of treating phosphorus, including any chemicals used. Attach a flow schematic which shows the point(s) of chemical addition for TP control. Include both liquid and solids treatment trains.**

**(B) Baseline Year:**

Month	Influent Avg. Flow (MGD)	Influent Avg. TP Concentration (mg/l)	Influent TP Mass (lb/day)	Effluent Avg. Flow (MGD)	Effluent Avg. TP Concentration (mg/l)	Effluent TP Mass (lb/day)
Jan						
Feb						
Mar						
Apr						
May						
Jun						
Jul						
Aug						
Sep						
Oct						
Nov						
Dec						
Avg						

**(C) Possible Contributors: For municipalities, list all possible industries, other commercial buildings and hauled in wastes that could be introducing phosphorus into the collection system**

Name Source	Type of Process	Already Contacted?	If so, possible contributor?

**Possible Contributors: For industrials list processes that could be introducing phosphorus into the collection system**

Type of Process	Chemicals used?	Product containing P?

**Water supply: What are the phosphorus levels within your water supply? Does the water utility add phosphorus for corrosion control or iron and manganese sequestration?**

**PART 2—OPTIMIZATION ACTION PLANS**

**List the items that will be addressed to reduce the phosphorus in the effluent and provide a schedule for accomplishing each item. Note that all items must be completed by no later than 3 years after the date of permit reissuance. For each optimization action fill out a separate plan sheet.**

Optimization Action: (example: Address Phosphorus from Industries) \_\_\_\_\_  
\_\_\_\_\_

Briefly describe optimization action plan: (example: determine contributors of phosphorus throughout the sewer area and work with them to reduce the incoming phosphorus. Parts of the plan include meeting with the industries, etc.) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Anticipated Time Frame for Optimization Action Plan:

Main Item to Complete	Date Start	Date Complete
Example: contact all industries		

Overall Optimization Action Plan Time Frame: \_\_\_\_\_

Overall Completion Date: \_\_\_\_\_

Outcome hoping for: \_\_\_\_\_  
\_\_\_\_\_

Anticipated reduction and/or comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PART 3—OPTIMIZATION APPROVAL**

Facility Name: \_\_\_\_\_ WPDES Permit #: \_\_\_\_\_

**Name and Contact Information of Person Preparing Report:**

Name: \_\_\_\_\_ E-mail Address: \_\_\_\_\_

Telephone #: \_\_\_\_\_

**OPTIMIZATION ACTION PLANS**

**Please provide a summary of the proposed action items and projected completion dates. The completion dates should be developed to enable the incorporation of the action items into the Preliminary Facilities Plan that is required in the WPDES Permit Phosphorus Compliance Schedule.**

**[INSERT OPTIMIZATION ITEMS (TITLE FROM EACH SHEET)]**

<b><u>Action Item</u></b>	<b><u>Proposed Date of Completion</u></b>
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For DNR use only
<input type="checkbox"/> Complete <input type="checkbox"/> Not Complete <input type="checkbox"/> Requesting more information? Comments:

Submitted for Approval by: (signed) \_\_\_\_\_

Date of Submittal: \_\_\_\_\_

(printed) \_\_\_\_\_

Authorized Permit Representative

Approved by: \_\_\_\_\_

Date of Approval: \_\_\_\_\_

DNR Wastewater Engineer or Designee