Phosphorus Management Plan Guide

Facility name:	Date:
Preparer:	Telephone:

The Phosphorus Management Plan (PMP) Guide can be helpful in preparing a PMP for internal use to gain a better understanding of your phosphorus levels and to outline ways to reduce phosphorus. If you are required by your National Pollutant Discharge Elimination System (NPDES) permit to submit a PMP to the Minnesota Pollution Control Agency (MPCA), this guide can be used to prepare it. Using the guide is optional and your PMP may be prepared using an alternate format. Using the guide can speed up the process of organizing and understanding your phosphorus data and allows the MPCA to review your plan more quickly.

The PMP and the PMP Development Resources were developed by the MPCA and the Minnesota Technical Assistance Program (MnTAP)—University of Minnesota (revised July 2006).

Seven Steps to Build Your PMP

Check your PMP against this list to be sure that you have included all of the sections below.

1. Provide facility description and flow schematic.
2. Measure your wastewater treatment facility (WWTF) influent and effluent phosphorus concentrations.
3. Evaluate your WWTF's phosphorus reduction potential.
4. Set phosphorus reduction goals for your WWTF.
5. Evaluate how to optimize your WWTF.
6. Evaluate the phosphorus reduction potential of your users.
7. Create an implementation plan to meet phosphorus reduction goals.

Using the Guide

This guide makes it easy to complete your PMP. Use the guide in one of three ways:

1. Hardcopy. Follow the six steps, compile and write out your data, calculations and narrative.
2. Microsoft Word form. Enter data, complete calculations and write narrative directly into a Word file.
3. Microsoft Word form and Excel tables. For Tables 1A, 1B and 3, you can use the Excel spreadsheets that complete some calculations and graphs for you. If you have opened these files from the Web site, save them to your computer hard drive or disk before working in them. Refer to this document to guide you through completing the electronic forms. Complete other calculations and write narrative directly into a Word file.

The PMP Development Resources, including this guide and other electronic forms, are available online at http://www.pca.state.mn.us/water/pmp.html . They are also available on CD from the MPCA.

Let these symbols lead you through the guide.

 **Complete this item**

 **Helpful ideas**

P **Meets NPDES permit requirement**

Phosphorus Assistance

If you have questions on how to use these resources or on how to prepare a PMP, the following assistance is available.

Nonregulatory technical assistance, including prevention options and assistance with identifying reduction strategies for a PMP:
Cindy McComas, MnTAP,
612/624-1300 or 800/247-0015

Regulatory requirements and assistance with preparing a PMP:
MPCA regional compliance staff:
Brainerd: 218/828-2492
Detroit Lakes: 218/847-1519
Duluth: 218/723-4660
Rochester: 507/285-7343
St. Paul: 651/296-6300
Willmar: 320/214-3786

MPCA staff contact:
Dennis Wasley, MPCA,
651/296-8860 or 800/657-3864

Step 1: Provide Facility Description and Flow Schematic

Briefly describe your wastewater treatment facility operations.

Include the following background information as attachments or fill in the blanks below:

1. Facility description from NPDES permit or engineering design documents.
2. Flow schematic from engineering design documents or sketch (include or attach).
3. Design data from NPDES permit or engineering design documents.
   - Average wet weather flow or average annual flow.
   - BOD design capacity.
   - TSS design capacity.

Step 2: Measure Your WWTF's Influent and Effluent Phosphorus Concentrations

Compile measurements taken at the WWTF for phosphorus coming into and going out of the facility.

Three to five years of data should be compiled. Most operators can expect changes in phosphorus levels over time due to daily, seasonal or annual variations, as a result of changes in facility operations or contributions from business or domestic sources. Business sources include industrial, commercial and institutional users.

Working your data into a PMP

You can use Discharge Monitoring Reports (DMR) or Supplemental Report Forms (daily values) to complete Table 1A or Table 1B. You may have only quarterly sampling results rather than monthly sampling results or monthly averages. Additional monitoring beyond what is required by your NPDES permit will be useful for preparing your PMP.

Mass Load

Usually WWTF operators use concentration (milligrams per liter or mg/L) to describe phosphorus levels. Because phosphorus concentrations change with flow, mass load (kilogram/day (kg/day)) is a more accurate indicator of the phosphorus level. To calculate mass load in the table, multiply the concentration and the flow (million gallons per day or MGD) by 3.785—a conversion factor. For WWTFs with industrial, commercial and institutional users, mass load will be useful for goal setting later in this guide.

Mass load (kg/day) = Flow (MGD) x Concentration (mg/L) x 3.785

Record data in Table 1A or 1B, or submit your own spreadsheets.

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☐ Check here if you used the Excel spreadsheet for Tables 1A or 1B to record your data; it automatically completes the calculations for you. Attach copies of your spreadsheets at the end of your PMP. Do not duplicate information in this Microsoft Word table. Complete one table for each year of data. Insert additional tables as needed.

Table 1A: Mechanical System

WWTF Calendar Month Average Influent and Effluent Data for Years and

	Year:						Year:					
	Influent			Effluent			Influent			Effluent		
	Flow (MGD)	Conc. (mg/L)	Mass (kg/day)	Flow (MGD)	Conc. (mg/L)	Mass (kg/day)	Flow (MGD)	Conc. (mg/L)	Mass (kg/day)	Flow (MGD)	Conc. (mg/L)	Mass (kg/day)
Jan												
Feb												
Mar												
Apr												
May												
Jun												
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												
Annual average												

Summary Data		**Formula**
Annual influent flow	MG/year	Annual average influent flow (MGD) x 365
Annual effluent flow*	MG/year	Annual average effluent flow (MGD) x 365 (if available)
Annual influent phosphorus load	kg/year	Annual influent flow [million gallons (MG)] x Annual average influent phosphorus concentration (mg/L) x 3.785
Annual effluent phosphorus load	kg/year	Annual effluent flow* (MG) x Annual average effluent phosphorus concentration (mg/L) x 3.785
Phosphorus percent removal	%	[Annual average concentration (mg/L) - Annual average effluent concentration (mg/L)] / Annual average influent concentration (mg/L) x 100

* If annual effluent flow value is not available, use annual influent flow value

Table 1B: Pond System

NOTE: Calculate effluent flow and mass load values per month. Units are million gallons (MG) and kg/month rather than million gallons per day (MGD) and kg/day.

WWTF Calendar Month or Quarter Average Influent and Effluent Data for Years and

	Year:						Year:					
	Influent			Effluent			Influent			Effluent		
	Flow (MGD)	Conc. (mg/L)	Mass (kg/day)	Flow (MG)	Conc. (mg/L)	Mass (kg/mo)	Flow (MGD)	Conc. (mg/L)	Mass (kg/day)	Flow (MG)	Conc. (mg/L)	Mass (kg/mo)
Jan												
Feb												
Mar												
Apr												
May												
Jun												
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												
Annual average												

Summary Data		**Formula**
Annual influent flow	MG/year	Annual average flow (MGD) x 365
Annual effluent flow	MG/year	Sum of monthly effluent flow values (MG)
Annual influent phosphorus load	kg/year	Total annual flow (MG) x Annual average influent phosphorus concentration (mg/L) x 3.785
Annual effluent phosphorus load	kg/year	Total annual flow (MG) x Annual average effluent phosphorus concentration (mg/L) x 3.785
Phosphorus percent removal	%	[Annual average concentration (mg/L) - Annual average effluent concentration (mg/L)] / Annual average influent concentration (mg/L) x 100

Step 3: Evaluate Your WWTF's Phosphorus Reduction Potential

By examining patterns and trends you can better understand your WWTF influent and effluent phosphorus levels. Multiple years of data may be needed to see patterns and trends. Graphs showing flow and concentration, or load, over time may help reveal them.

Analyzing your data

For more detail see the fact sheet *Sampling for Phosphorus*.

- Note variations or patterns in your WWTF data and wastewater data from your businesses. The relative importance of daily, weekly, seasonal and annual trends depend on the specific activities at the WWTF and your industrial, commercial and institutional users.
- The time at which samples are collected can impact your data. Spikes or trends in phosphorus concentration can result from business patterns like early morning cleanups at a dairy or chemical use at a food processor.

- Changes in flow and concentration from business or domestic sources will affect future phosphorus levels. Being aware of how businesses and the community are changing will help you build more-accurate projections of phosphorus levels. Changes in equipment or operational practices at businesses during the monitored period or in the future may impact your influent as well.

Record patterns and trends.

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As part of your analysis, evaluate past and present WWTF operations to determine the operating procedures that maximize phosphorus removal.

Compare Phosphorus Treatment of Your WWTF with Other WWTFs

Compare the performance of your WWTF to the range of influent, effluent and percent removal data shown in Table 2A and 2B for Minnesota WWTFs in 2005. For more detailed information on how to compare your facility to other WWTFs, see Appendix A: *Phosphorus Removal by Minnesota Wastewater Treatment Facilities.*

Table 2A: Continuous Discharge WWTFs (2005)

The majority of continuous discharge WWTFs only record influent flow values. Effluent flow is assumed to be equal to influent flow. Percent removal calculations are based on annual influent and effluent phosphorus load calculations.

WWTF Types	Number of WWTFs	Influent Concentration (mg/L)			Effluent Concentration (mg/L)			Percent Removal		
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max
Biological phosphorus removal	16	6.66	3.22	14.99	1.01	0.33	7.17	88%	52%	95%
Chemical phosphorus removal	37	6.12	2.77	12.85	0.63	0.13	1.75	88%	45%	98%
With Phosphorus Removal – Average		**6.28**	**2.77**	**14.99**	**0.75**	**0.13**	**7.17**	**88%**	**45%**	**98%**
Aerated ponds	7	6.35	2.90	11.37	3.55	1.64	6.13	40%	10%	69%
Activated sludge	31	5.99	2.63	10.53	3.07	1.38	5.93	48%	23%	74%
Extended air	7	7.18	2.86	11.57	3.26	1.52	5.13	53%	44%	62%
Oxidation ditches	21	7.03	3.11	25.05	4.08	0.95	15.38	44%	17%	77%
Trickling filter	19	5.78	3.30	10.58	3.83	2.04	7.56	33%	0%	63%
Trickling filter/activated sludge	8	5.00	2.99	7.88	3.33	1.62	6.45	35%	18%	64%
Trickling filter/rotating biological contactor (RBC)	6	8.58	4.23	14.93	6.10	3.51	10.12	28%	17%	43%
Without Phosphorus Removal–Average		**6.36**	**2.63**	**25.05**	**3.68**	**0.95**	**15.38**	**42%**	**0%**	**77%**

Avg = average. Min = minimum. Max = maximum.

Table 2B: Controlled Discharge WWTFs (2005)

To account for the variability of influent and effluent volumes for any given calendar year, Table 2B reports both annual (calendar year) phosphorus load percent removal and average concentration percent removal.

WWTF Types	Number of WWTFs	Influent Concentration (mg/L)			Effluent Concentration (mg/L)			Average Concentration Percent Removal			Annual Load Percent Removal		
		Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max
Chemical phosphorus removal	12	5.18	1.23	10.88	0.68	0.08	1.75	85%	71%	99%	89%	73%	98%
Stabilization ponds	120	5.34	1.17	14.31	1.84	0.17	5.93	63%	-17%*	96%	68%	9%	98%

Avg = average. Min = minimum. Max = maximum. * Facility under construction and other variables.

Comparing your facility

- Compare your average annual influent phosphorus concentration (mg/L) to the average influent concentration for similar types of WWTFs.
- Compare your average annual effluent phosphorus concentration (mg/L) to the average effluent concentration for similar types of WWTFs.
- Compare your average annual phosphorus percent removal to that of similar types of WWTFs. In some cases, high percent removal rates simply reflect the influence of elevated influent phosphorus concentrations, and do not necessarily result in lower than average effluent phosphorus concentrations.
- Do these comparisons suggest that further reductions may be feasible?

Record the recommended action for your WWTF based on treatment at comparable facilities.

Fill in information below. Based on your facility's relative performance, select the recommended action below:

- If your data show that your WWTF is performing at or below average influent and effluent values and/or above average percent removal values: **Maintain or improve performance.**
- If your data show that your WWTF is performing at or above average influent or effluent values and/or below average percent removal values: **Evaluate phosphorus reduction strategies.**

Effluent Phosphorus Levels: Average Annual Concentration

Your WWTF mg/L	Comparable WWTF Systems (from Tables 2A or 2B) mg/L	Recommended action (from above)

Influent Phosphorus Levels: Average Annual Concentration

Your WWTF mg/L	Comparable WWTF Systems (from Tables 2A or 2B) mg/L	Recommended action (from above)

Step 4: Set Phosphorus Reduction Goals for Your WWTF

Numeric phosphorus reduction goals are meant to make it easier to plan reduction strategies for your WWTF and to discuss reduction strategies with your phosphorus contributors. Reduction strategies, such as prevention and optimized treatment methods, have the potential to reduce effluent or influent phosphorus levels to reach your goals.

NOTE: This WWTF goal is not linked to an MPCA permit limit and MPCA does not hold facilities accountable for meeting the PMP proposed goals.

You may want to set your reduction goal lower than the typical WWTF levels because:

- You may project increased phosphorus influent or effluent levels due to business or community growth.
- You and your business users may find cost savings by reducing phosphorus use.
- Many industrial, commercial and institutional users will voluntarily substitute low/no phosphorus products if they are informed of concerns and alternatives.
- Statewide phosphorus limits for WWTFs are under consideration and may be required in future permits.
- Any phosphorus reduction will benefit the overall health of the watershed.

Setting a WWTF Effluent Reduction Goal

You may decide to set a reduction goal based on your past knowledge of the WWTF. If you develop an effluent goal using a more systematic approach, your users may be more receptive to discussions about reduction strategies for their facilities.

- If no permit limit applies, then use Tables 2A and 2B as a guide to select a phosphorus reduction goal that is aggressive, but feasible, and consistent with typical WWTF levels. If a limit applies, select a goal that will allow for a comfortable margin that will ensure that you do not exceed the limit at any time.
- Consider your specific circumstances to determine if you want your numeric effluent reduction goal to be lower than your limit or the general guidelines in Tables 2A and 2B.

Record your WWTF effluent reduction goal.

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Concentration (mg/L) The wastewater treatment plant will meet: mg/L discharge by (year) from all sources.	and/ or	Mass load (kg/day) Given current flow data, the plant will meet: kg/day discharge by (year) from all sources.

Mass load using kg/day is not necessarily relevant for ponds.

Setting a WWTF Influent Reduction Goal

Once you select your effluent goal, set a goal for an influent phosphorus level based on the amount of total phosphorus that the WWTF can process and still meet its established effluent goal. This influent goal reflects the level of phosphorus that cannot be exceeded to achieve the effluent goal.

- One method to determine your influent goal is to use your facility's annual average phosphorus removal rate. Calculate your current removal rate by using data compiled in Tables 1A or 1B. If you have multiple years of data, use the most recent annual averages in the calculations. To calculate the decimal value for removal rate, subtract the average annual effluent from the average annual influent and divide the answer by the average annual influent.

Decimal value for phosphorus removal rate =

$$\frac{\text{(Average annual influent – Average annual effluent)}}{\text{Average annual influent}}$$

- Now calculate an influent goal for your WWTF. Divide your effluent goal by 1 minus the removal rate (determined above) for your WWTF.

Influent goal for phosphorus removal =

$$\frac{\text{Effluent goal}}{\text{1 - Removal rate (decimal)}}$$

- This influent goal reflects the amount of phosphorus your WWTF can process and still achieve the effluent goal you established. If you anticipate growth or changes in your business or domestic phosphorus levels, your effluent goal should be adjusted and a new influent goal should be calculated. Removal rate may vary in response to changing influent levels.

Record your WWTF influent reduction goal.

Concentration (mg/L)		Mass load (kg/day)
The wastewater treatment plant will meet:	and/	Given current flow data, the plant will meet:
mg/L by (year) from all sources.	or	kg/day by (year) from all sources.

Step 5: Evaluate How to Optimize Your WWTF

You may be able to fine tune the operation of your WWTF to maximize its phosphorus removal capabilities. Compare the phosphorus performance (influent, effluent and percent removal) with that of similar types of WWTFs listed in Appendix A: *Phosphorus Removal by Minnesota Wastewater Treatment Facilities.*

See the fact sheet *Wastewater Treatment Facility Optimization for Phosphorus Removal* for tips on monitoring and process control activities that can help improve phosphorus treatment. Consider additional treatment processes including chemical addition and enhanced biological phosphorus removal.

Setting a WWTF optimization goal

Once your influent and effluent reduction goals have been established, select an achievable goal for optimizing phosphorus removal capabilities of the WWTF. Base your goal on the range of performance demonstrated by similar WWTF types (see Appendix A: *Phosphorus Removal by Minnesota Wastewater Treatment Facilities*).

Record your WWTF percent removal goal.

WWTF will achieve annual average % removal by (year).

Step 6: Evaluate the Phosphorus Reduction Potential of Your Users

Sources likely to contribute phosphorus to your WWTF include:

Industrial
- Cooling towers/boiler conditioning
- Dairies
- Electronic component manufacturing
- Equipment manufacturing
- Ethanol producers
- Food processing plants
- Meat packing and locker plants
- Metal finishing facilities

Commercial
- Agricultural co-ops
- Car/truck washing facilities
- Restaurants

Institutional
- Hospitals
- Nursing homes
- Schools

Municipal phosphorus sources
- Cleaning in government buildings
- Wastewater treatment plant recycle streams
- Water treatment plant phosphate addition

Other
- Satellite communities
- Septage
- Storm water*

* Storm water should not be discharged to the WWTF, but contaminated storm water will contribute to the degradation of water quality. Any public education program developed for residential and commercial customers should also emphasize activities to help prevent storm water contamination.

Determine which sources have the greatest opportunity for reducing phosphorus.

Many sources of phosphorus enter your wastewater treatment plant. List your phosphorus sources in Table 3. You may need to consult with other municipal staff to identify all possible contributing industrial, commercial and institutional sources, especially small operations.

Evaluate which of these sources have the greatest opportunity for reducing phosphorus. Depending on the businesses you may want to conduct walk-throughs to inventory their specific sources, screen effluent for the presence of phosphorus, sample effluent to determine the concentration of phosphorus, or conduct ongoing monitoring. Use the fact sheet *Sampling for Phosphorus* to assess phosphorus levels. See *Appendix B. Phosphorus Reduction Tips at a Glance* for strategies that may help users of the wastewater treatment facility reduce their phosphorus loads. Rate the sources' phosphorus reduction potential as high, medium or low.

Complete as much of Table 3 as appropriate for your WWTF. Use utility bills or accounts as a reference.

Record results in Table 3.

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☐ Check here if you used the Excel spreadsheet for Table 3 to record your data. Attach copies of your spreadsheets at the end of your PMP. Do not repeat the information in this Word table.

Table 3: Summary of Phosphorus Sources

Year:	Walk-through inventory	Sampling results				Assessment
Businesses (industrial, commercial, institutional)	**Phosphorus sources**	**G or C* Manhole #**	**Flow (MGD)**	**Phosphorus (mg/L)**	**Total mass load (kg/day)**	**Reduction potential high, medium or low**
Municipal sources	**Phosphorus sources**	**G or C* Manhole #**	**Flow (MGD)**	**Phosphorus (mg/L)**	**Total mass load (kg/day)**	**Reduction potential high, medium or low**
Satellite communities	**Phosphorus sources**	**G or C* Manhole #**	**Flow (MGD)**	**Phosphorus (mg/L)**	**Total mass load (kg/day)**	**Reduction potential high, medium or low**
Domestic (population served #)	**Phosphorus sources**	**G or C* Manhole #**	**Flow (MGD)**	**Phosphorus (mg/L)**	**Total mass load (kg/day)**	**Reduction potential high, medium or low**
		Total all				

*Grab (G) or composite (C). Manhole # if one applies. Insert additional rows as needed.

Setting Industrial, Commercial and Institutional Effluent Goals

Industrial, commercial and institutional users can be significant contributors to your WWTF's phosphorus levels. Work with them to select numeric phosphorus reduction goals for their facilities to help meet your WWTF's effluent goal.

- **One industrial, commercial or institutional user.** If only one user discharges to your WWTF, you can estimate a business effluent goal by first estimating domestic total phosphorus. To calculate domestic total phosphorus multiply the municipal population by 0.8 kg per year per person, and divide the answer by 365 days.

$$\text{Domestic total phosphorus} = \frac{\text{Municipal population} \times (0.8 \text{ kg/year/person})}{365 \text{ days}}$$

To calculate your business effluent phosphorus goal, subtract domestic total phosphorus (from Table 3) and a small reserve to allow for future growth from your WWTF influent.

Business effluent goal = (WWTF influent goal) - (Domestic total phosphorus) - (Reserve capacity)

- **Multiple industrial, commercial and institutional users.** When serving these multiple users, you should allocate portions of your WWTF's influent reduction goal to them. Refer to the procedure provided in *Appendix C. Setting Effluent Phosphorus Goals for Multiple Industrial, Commercial and Institutional Users*.

Record effluent goals for either one or multiple industrial, commercial and institutional users in the appropriate space below.

1. Effluent goal for one industrial, commercial or institutional user		
Concentration (mg/L) By (year), this business will meet an individual allocation of mg/L total phosphorus discharge to the city sewer, a goal that is expected to help the WWTF meet its influent goal previously set.	and/or	Mass load (kg/day) By (year), this business will meet an individual allocation of kg/day to the city sewer, a goal that is expected to help the WWTF meet its influent goal previously set.
-OR-		
2. Effluent goal for multiple industrial, commercial and institutional users		
Concentration (mg/L) By (year), businesses will meet individual allocations ranging between mg/L and mg/L total phosphorus discharge to the sewer, a range that is expected to meet a total allowable phosphorus of mg/L.	and/or	Mass load (kg/day) By (year), businesses will meet individual allocations ranging between and kg/day to the city sewer, a range that is expected to meet a total allowable phosphorus of kg/day.

Step 7: Create an Implementation Plan to Meet Phosphorus Reduction and Removal Goals

Prevention First

Phosphorus can be reduced at the source by eliminating or minimizing it through product substitution or other means. You may not be able to reduce phosphorus to needed levels by preventive approaches alone. You may need to combine prevention with pretreatment at your businesses and improved efficiency or phosphorus treatment at the WWTF.

Summarize Past Phosphorus Reduction Activities

Have you implemented any source reduction or WWTF optimization activities in the past five years? Take credit for those efforts and list past PMP activities.

Select Phosphorus Reduction Strategies

To start preparing your implementation plan, use the *Phosphorus Sources and Reduction Opportunity Walk-through Checklist, Phosphorus Reduction Tips at a Glance* and other MnTAP fact sheets to evaluate reduction strategies specific to your phosphorus contributors. Prioritize efforts according to your assessment of your contributors phosphorus reduction potential recorded in Table 3.

Select and describe phosphorus reduction strategies for the following four areas:

1. **Business users—industrial, commercial and institutional operations.** Your business users may be able to change a process, substitute a product, institute a materials recovery plan or improve staff training to target phosphorus reductions. For example, reduction strategies for all industrial, commercial and institutional businesses may include switching to non-phosphate detergents. Industrial, commercial and institutional users may have greater opportunities to reduce phosphorus, including evaluating modifications to pretreatment procedures or new pretreatment technologies. See MnTAP fact sheets for reduction strategies.

2. **Municipal.** Consult with the municipal drinking water treatment plant regarding optimizing phosphorus levels added to the drinking water supply to prevent corrosion.

3. **Satellite communities.** Discuss reduction strategies with your satellite communities to see if business users or residents could reduce phosphorus.

4. **Domestic sources.** Residential users may benefit from information about environmentally preferable purchasing of low- or non-phosphorus products, and other practices.

Set Phosphorus Removal Strategies

Your WWTF. You may be able to improve the phosphorus removal capabilities of your existing WWTF using the biological or chemical treatment methods of enhanced biological phosphorus removal and chemical precipitation. Removal is achieved by transferring phosphorus from the dissolved to a solid form, followed by liquid-solid separation and removal of phosphorus in the waste sludge. See the fact sheet *Phosphorus Removal and Treatment Technologies* for more information.

Develop a Timeline

Create a timeline for implementing the strategies. Set milestones at which the reduction goals and strategies will be reassessed. If businesses will be closely involved in helping you achieve an influent goal, meet with them to confirm the implementation plan.

Throughout the implementation plan, explain your choice of reduction strategies, timelines or milestones. You may want to explain why you chose one option over another.

Organizing Your Phosphorus Reduction Strategies

When creating your implementation plan, you can organize the phosphorus reduction strategies into the following categories:

- Source reduction (prevention)
- Best practices
- Education
- Pretreatment (at businesses or institutions)
- Phosphorus removal at the WWTF (for example, WWTF optimization or biological and chemical treatment methods)
- Ongoing monitoring

Including Additional Information

In some cases, including additional information in your implementation plan may be helpful:

- Will the implementation plan include phosphorus monitoring to help track WWTF and business performance?
- Will all the strategies combined reduce total phosphorus to achieve your goal?
- If a phased implementation is planned, explain why.
- Will you need to collect additional information (i.e, alternatives to high phosphorus products, monitoring data) before finalizing the PMP?
- How will you reassess goals and strategies at the milestones?
- What is the potential for new phosphorus contributions from domestic or business sources? Or increases from existing sources?

My WWTF Phosphorus Reduction Implementation Plan

Describe your implementation plan. Include reduction strategies and a timeline.

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For each source of phosphorus, summarize any phosphorus reduction activities implemented during the last five years. Looking ahead five years, focus on preventive practices—those practices that reduce phosphorus at the source before it becomes a waste.

Phosphorus Reduction Strategies

1. Businesses—industrial, commercial and institutional users:

Past five years:

Next five years:

2. Municipal sources:

Past five years:

Next five years:

3. Satellite communities:

Past five years:

Next five years:

4. Domestic:
Past five years:
Next five years:

Phosphorus Removal Strategies

My WWTF.
Past five years:
Next five years:

Gather signatures.

Signature of preparer Date

_____ _____

Signature of principle executive officer or authorized agent Date

_____ _____