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# Simple, Early Steps Toward Meeting Lower Phosphorus Effluent Limits

WWOA Annual Meeting  
October 10, 2012

Troy A. Larson  
Jane M. Carlson, P.E.

# Outline of Presentation

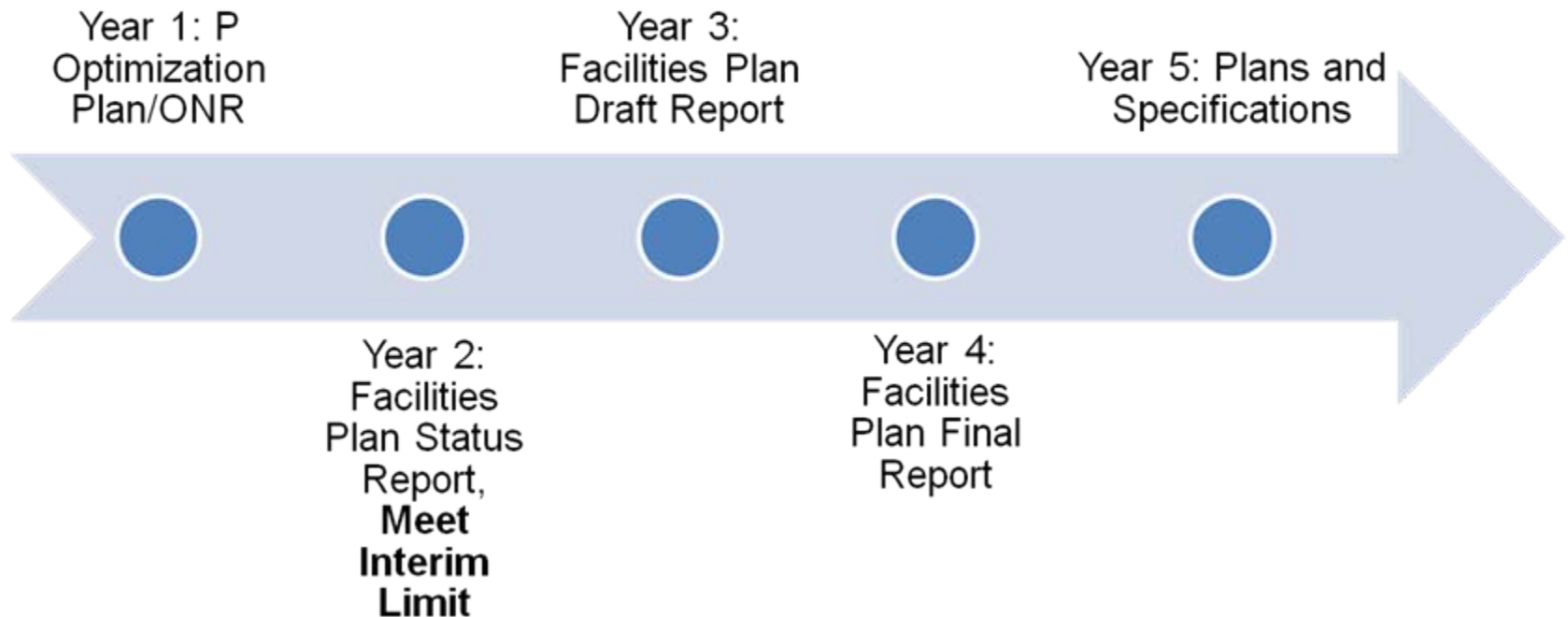
- Summary of Permit Requirements and Timelines
- Phosphorus Optimization Planning
- Operation and Needs Reviews (ONR)
- Facilities Planning
- Closing Thoughts



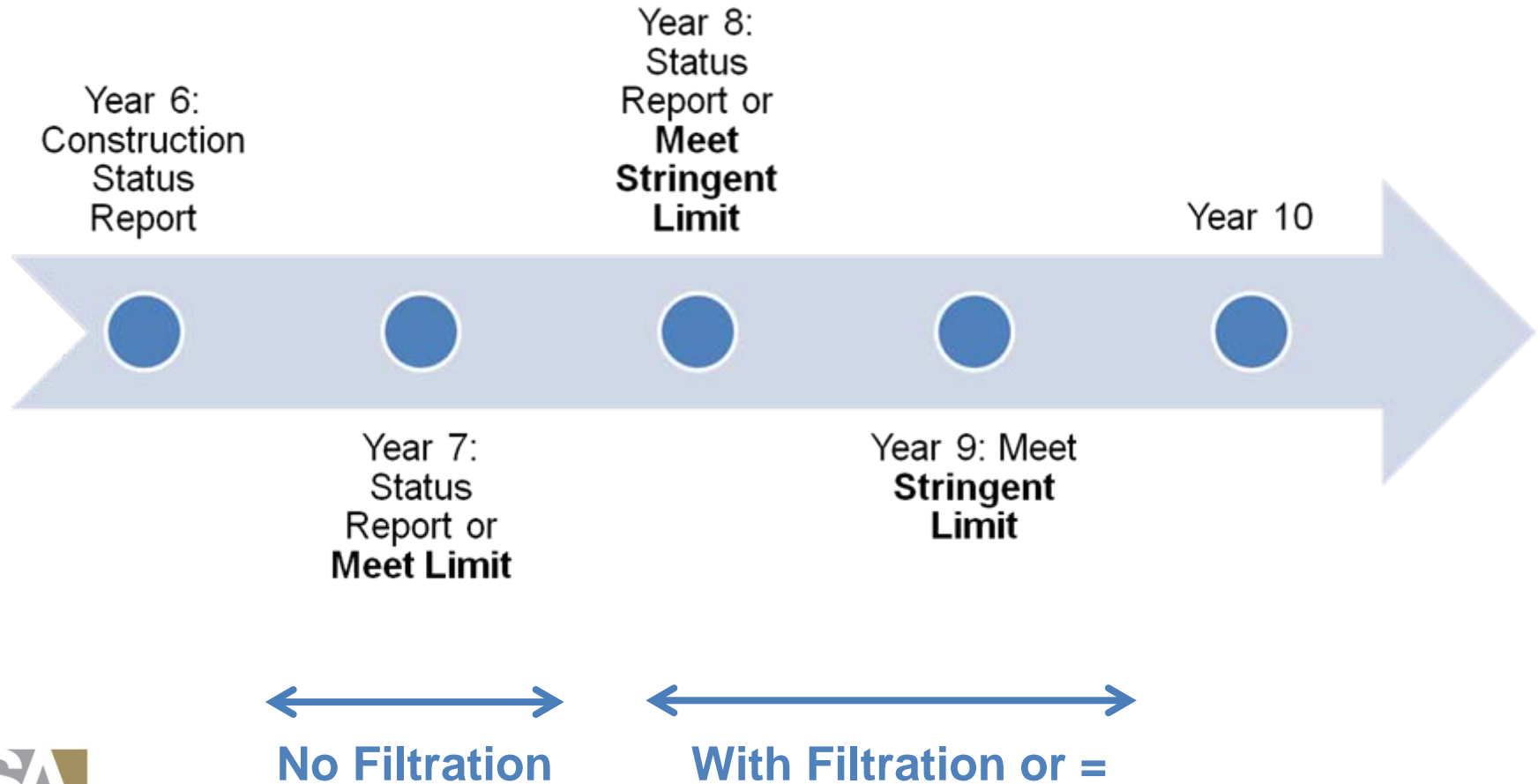


# Permit Requirements and Timelines

# Recently Reissued Wisconsin Permits – General Timeline for Stringent Limits



# Recently Reissued Wisconsin Permits – General Timeline for Stringent Limits





# Permit Discharge Optimization Planning

# Proper Phosphorus Discharge Optimization Planning Can Reduce Costs

- Wisconsin DNR goals:

Reduce as much of the phosphorus discharged as possible through *slight* operational changes to the facility

- Additional potential goals: reduce operating costs if possible
  - Reduce influent phosphorus
  - Optimize biological phosphorus removal (BPR)
  - Optimize chemical P removal

# Optimization Step 1: Know Your Influent Sources

- Drinking water additives
- Industrial customers
- Commercial and institutional customers
- Perform monitoring



2. Who should we contact for additional information?  
Name: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

3. Product(s) manufactured or service(s) performed:  
\_\_\_\_\_  
\_\_\_\_\_

4. What is your average volume discharge to the sanitary sewer system in gallons per day? \_\_\_\_\_

5. Does your discharge to the sanitary sewer system include process wastewater other than normal sanitary wastewater from restrooms and employee facilities?  
Yes ( ) No ( )  
If yes, please provide the average and peak daily volumes of process wastewater discharged to the wastewater treatment facility. Include any discharge other than restroom and employee facility wastewater.  
\_\_\_\_\_  
\_\_\_\_\_

6. Does your product contain phosphorus (food industry, beverage industry, etc.)?  
Yes ( ) No ( )

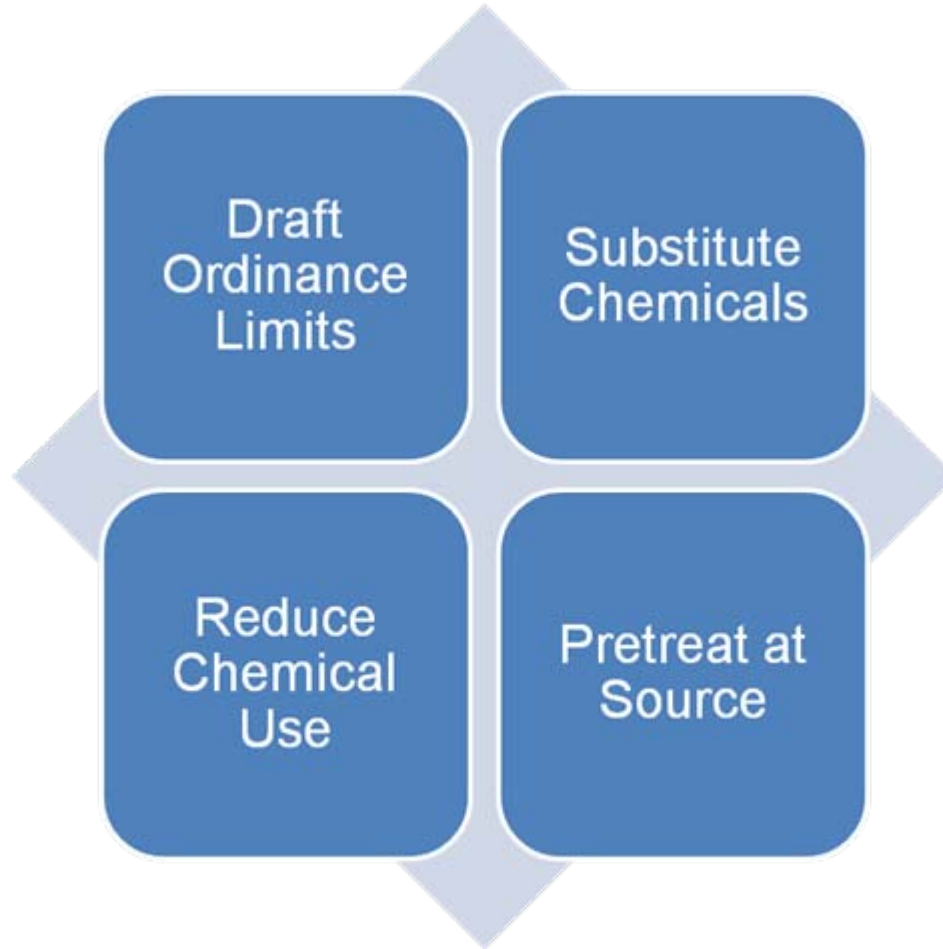
7. Do you use any substances containing phosphorus in either your production, cleanup, or cooling activities? These substances may be detergents, cleaning agents that contain phosphoric acid, cooling water additives containing phosphorus, etc.  
Yes ( ) No ( )

8. If yes to 6 or 7 above, please provide a list of all substances containing phosphorus and the amount used per month. Also, please provide a copy of the Material Safety Data Sheet (MSDS) for each of the substances you use which contain phosphorus.

**Survey Says...**  
Page 2 of 4

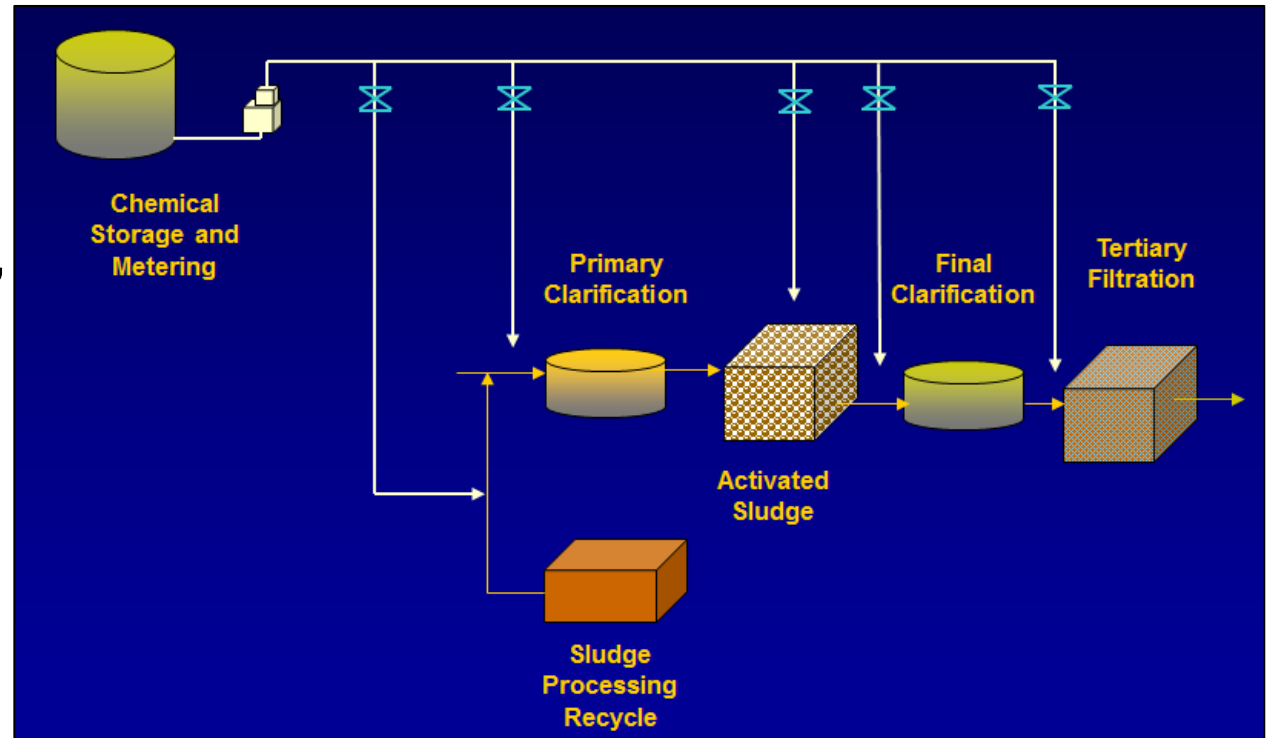


# Optimization Step 2: Pollutant Minimization



# Optimization Step 3: Treatment Optimization

- Additional chemical feed
- Multipoint chemical feed if available
- Optimize BPR through better monitoring, other simple methods



# WDNR Provided Forms Provide Structure to P Optimization Plans

- Part 1 - Background Information
  - Description
  - Baseline Data
  - Identified P Contributors
- Part 2 – Optimization Action Plans
  - Self Identified Actions
- Part 3 – Approval

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						

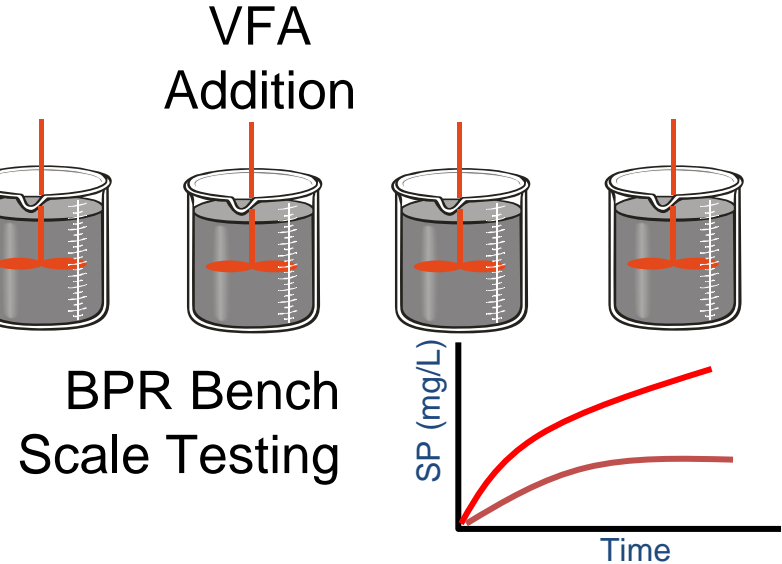
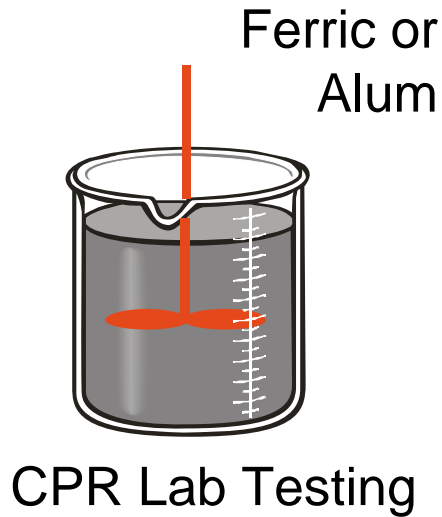


# Operation and Needs Reviews

# Operation and Needs Review Can Be a Useful Tool for Capital Improvements Planning

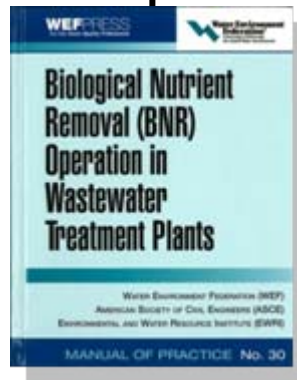
- Phosphorus data and facilities review:
  - Meet interim permit limit with minor operational changes?
  - Meet future (advisory) stringent limit with minor facility changes?
  - Other facility improvements needed?
- Communication tool
  - Budgeting
  - Support for rate increases
- Is future advisory phosphorus limit correct?
  - Stream monitoring

# ONR Process May Benefit from Collection of Additional Information

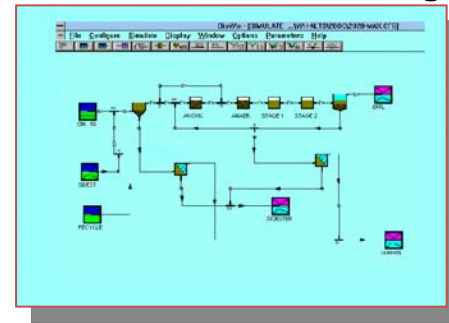


Additional WW  
Characterization

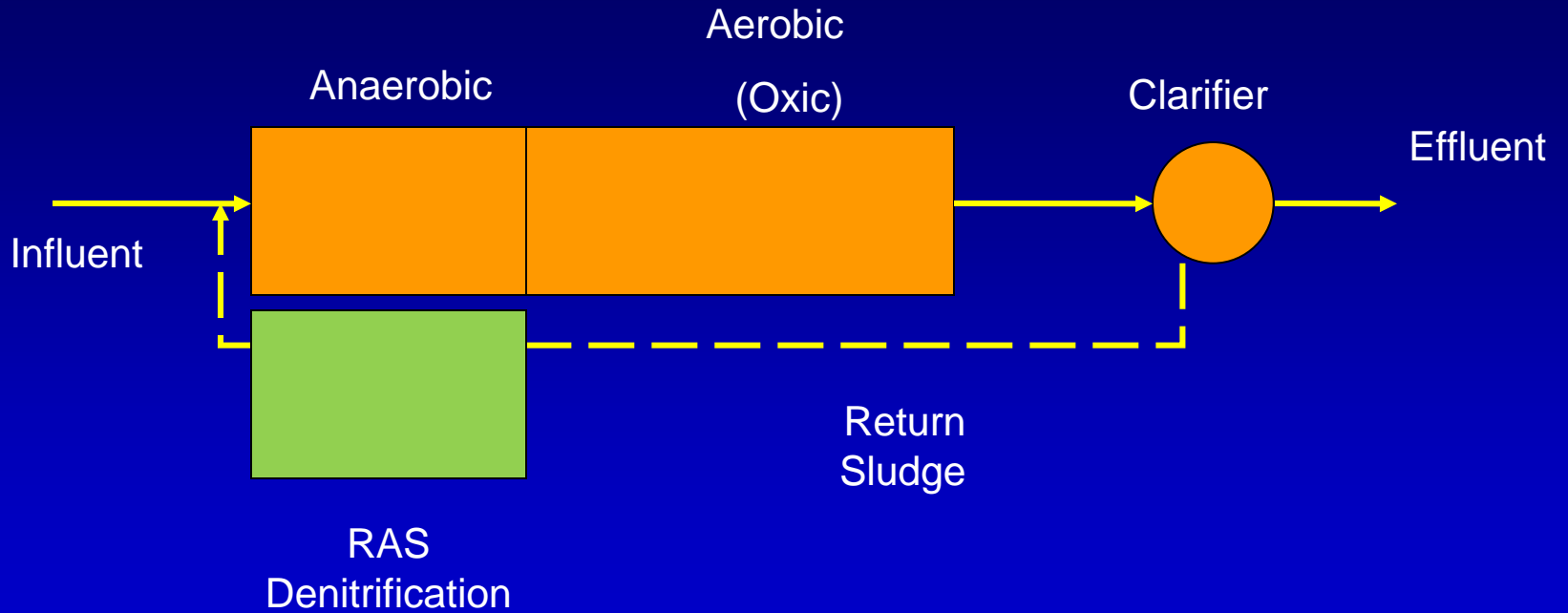
Rd CBOD  
VFA  
NO<sub>3</sub>-N



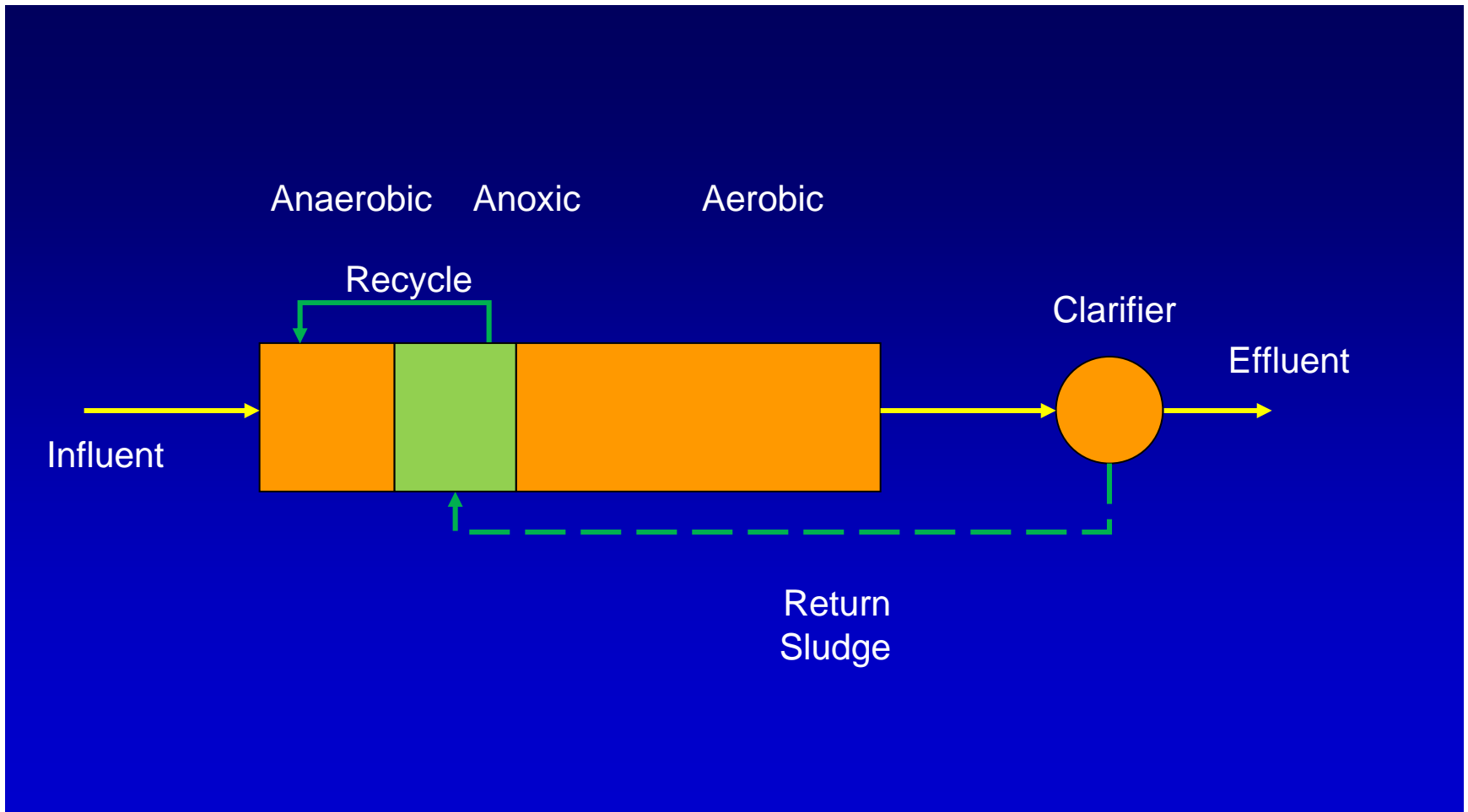
Process Modeling



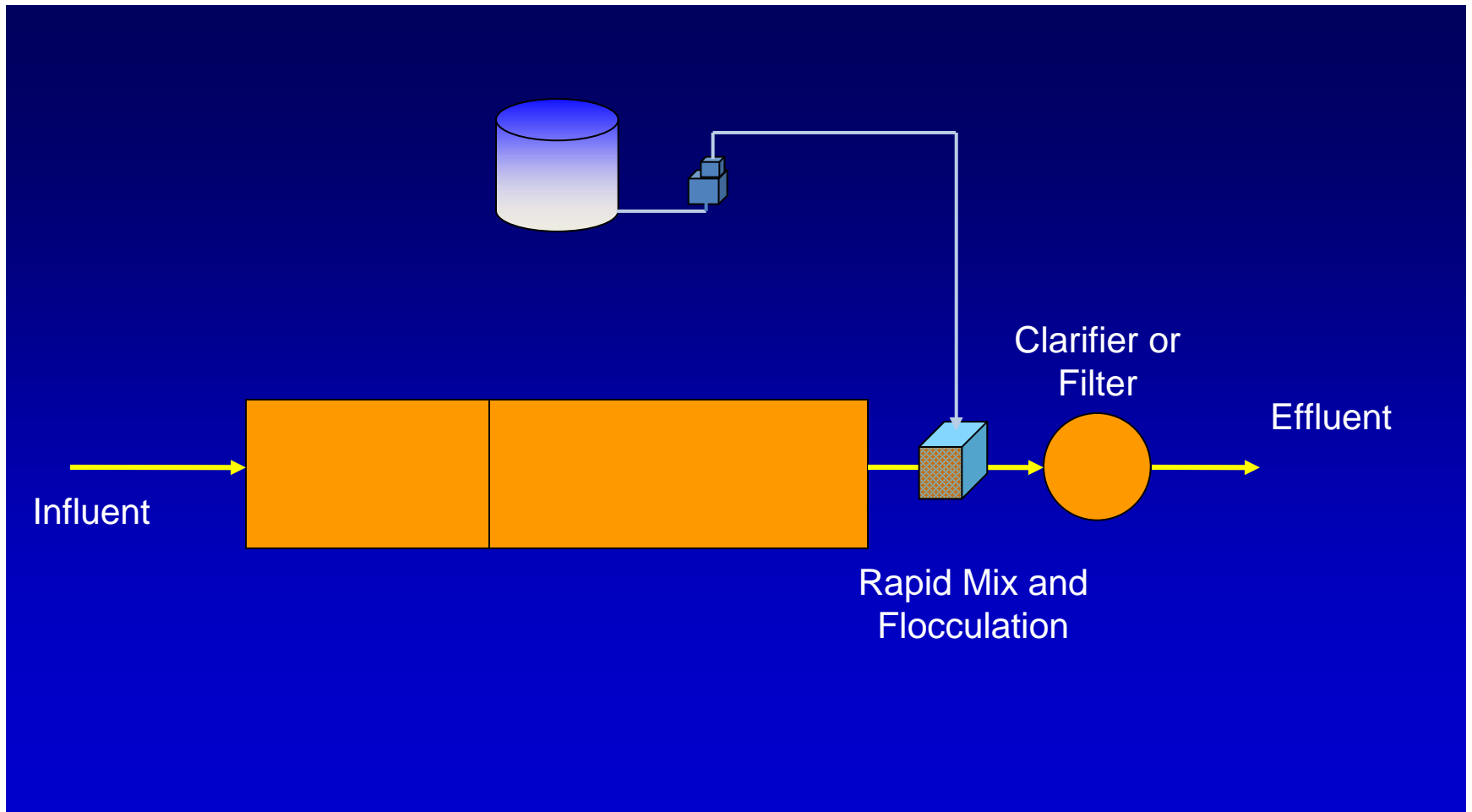
# Potential Low-Cost BPR Modifications



# Potential Low-Cost BPR Modifications



# Potential Low-Cost Flocculation Modifications



# A Complete ONR Provides Several Functions

- Optimizes P removal (through optimization plan)
- Sets the stage for facilities planning
- Optimizes WWTP for other changes (flows, loadings, etc.) if necessary
- Proactively address aging equipment or constrained site
- Basis for potential wastewater rate adjustments
- Better position for subsequent grant/loan funding, if available

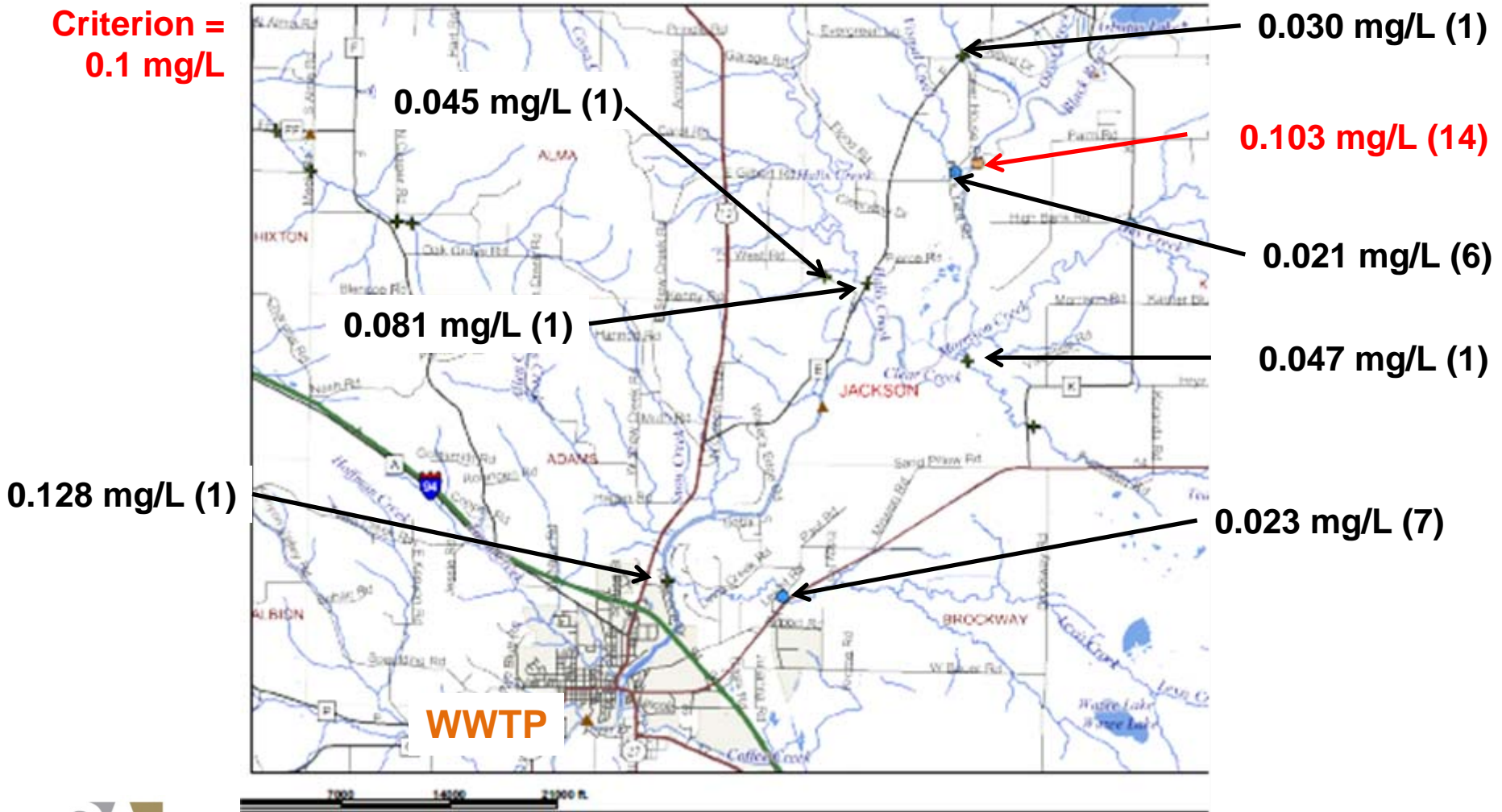
# When Should Stream Monitoring Be Conducted?

- During ONR phase (as soon as practical)
- When upstream conditions include..
  - Higher stream flows
  - Lower phosphorus concentrations expected
  - Little or no existing data
- When downstream conditions include...
  - Limited aquatic life (LAL)/ephemeral stream/wetlands
    - Where WQC Changes
  - Little or no existing data
- Other considerations
  - Variance or site-specific standard
  - Watershed Adaptive Management option



# Example of Recommended Stream Monitoring Situation

**Criterion =  
0.1 mg/L**



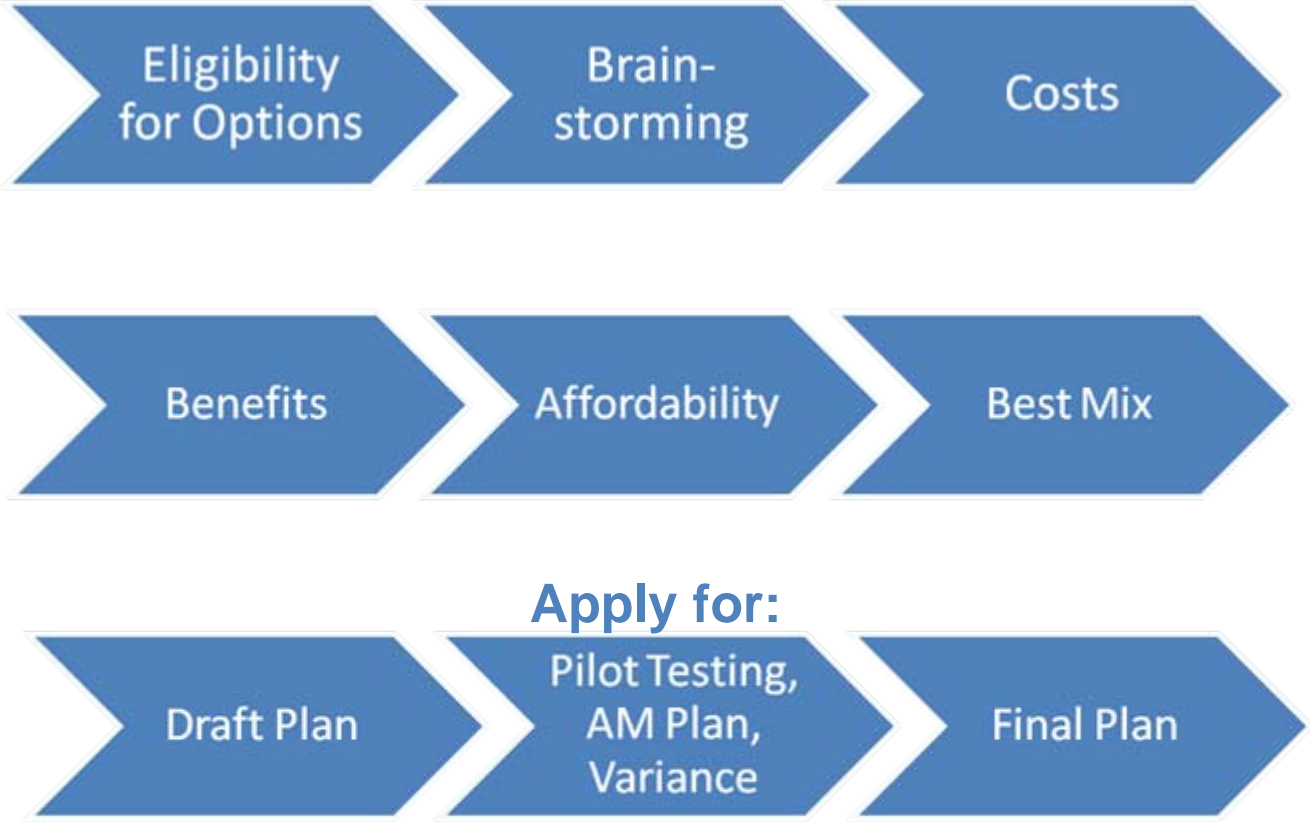
**Effluent limit has potential to change from 0.1 to 1.0 mg/L**

# Facilities Planning

# Facilities Planning Provides Opportunity to Evaluate All Options and Combinations



# Facilities Plan Should be Executed in Phases

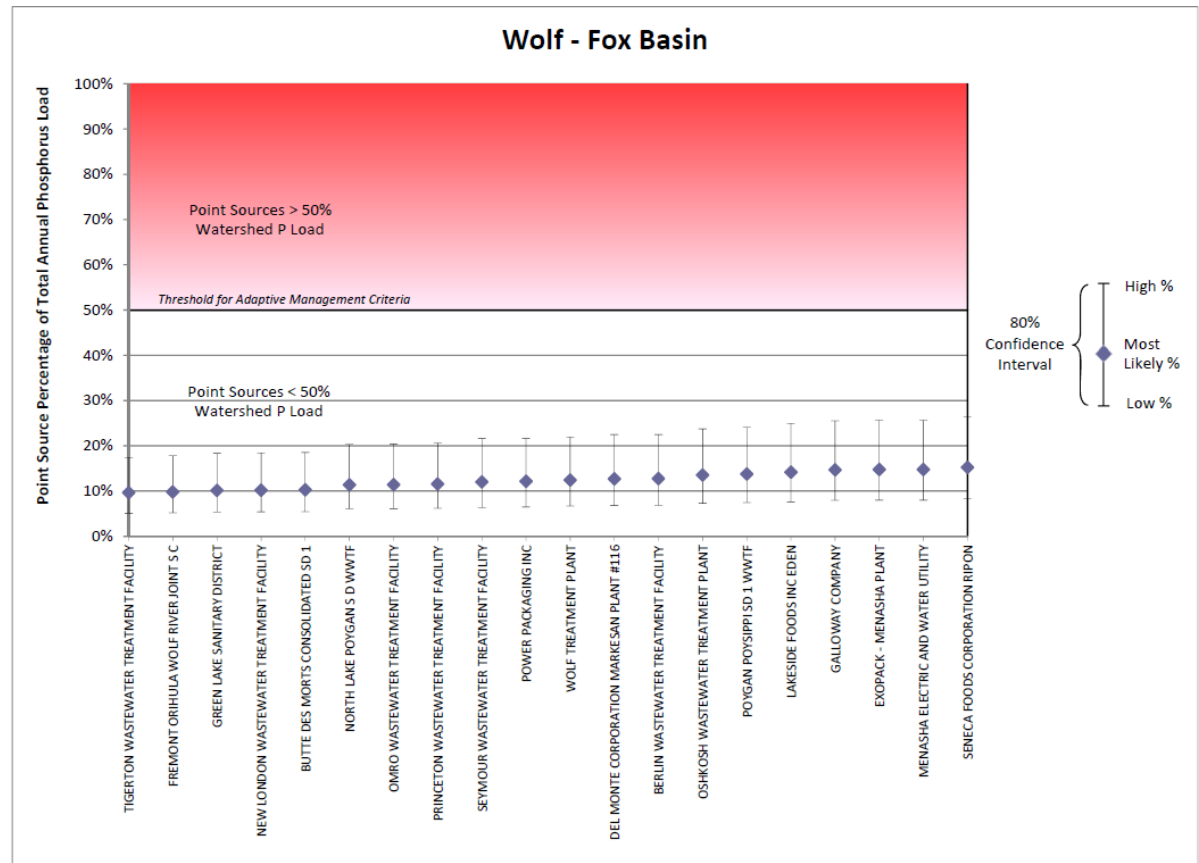


# Determine Eligibility for Various Options

- Variance or Site Specific Standard?
- Watershed Adaptive Management?
- Water Quality

Trading?

\*WDNR's PRESTO  
or similar tools



# However, Other Tests Could Be Used for Watershed AM

“...the permittee demonstrates that the applicable phosphorus criterion cannot be met in the watershed without the control of phosphorus from nonpoint sources.”



# Adaptive Management Has Several Advantages

- **Buys time: until TMDL can be implemented; until new total nitrogen and ammonia criteria are adopted**
- **Can potentially work with other point sources in Watershed (WWTPs and MS4s)**
- **Improves surface water quality more quickly/ thoroughly than WWTP treatment alone**
- **Lowest total present worth cost alternative for many**

# Adaptive Management Has Some Drawbacks

- **Need to spend public funds outside of municipal boundaries**
- **May not see improvements in upstream water quality in 5 -15 years**
  - **Need to comply with recalculated WQBEL at end (~20 yrs); so may be a delay tactic not a final solution**

# Water Quality Trading is an Option for Compliance with any WQBEL

- Partner with Other Sources of P in Watershed to implement BMPs, restore wetlands, etc.
- Point or nonpoint sources
- USEPA Toolkit and Handbook are available
- WDNR Framework (July 2011) is available; also statutes. Related rules are pending.
- More formal/permanent than AM

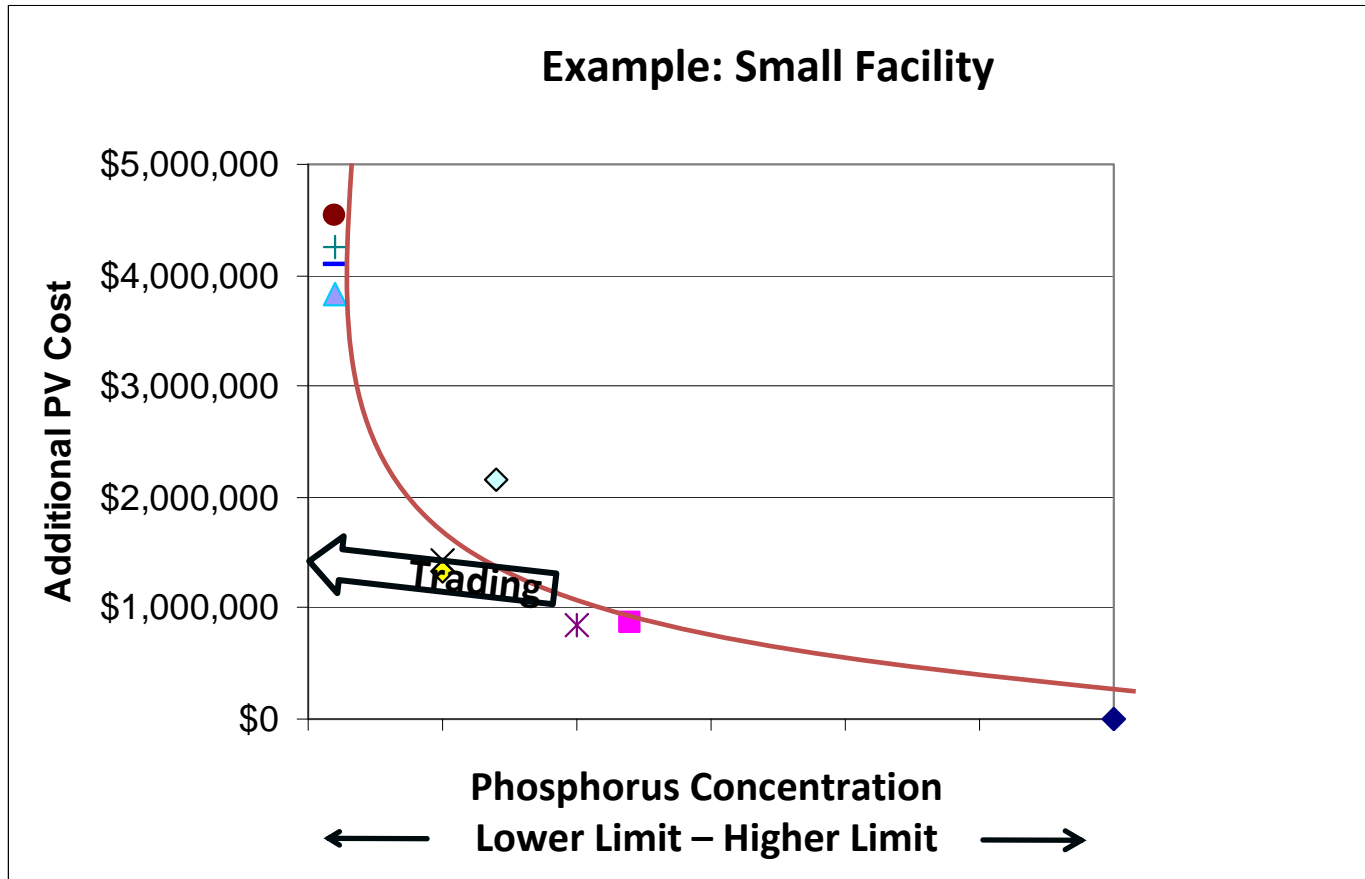


# Brainstorming Other Options

- Regionalization
- Effluent reuse
- Groundwater discharge
- New technologies
- Phosphorus recovery



# Cost-Benefit Analysis: Look for a “Knee” in the Treatment Cost Curve



# Potential Options to Consider in “Best Mix”

Watershed AM	Water Quality Trading
Goal is to meet WQ criteria	Goal is to comply with limit
1:1 “Trade Ratio”	2:1 Trade Ratio (Typical)
Monitoring Required	No Monitoring Required
Extra 10 Years in Schedule	Doesn’t Extend Schedule
Written Plan Required	No Plan Required
Unique to Wisconsin (for now)	Nationwide (Clean Water Act)

# Why Review a Draft WPDES Permit?

- **DNR makes mistakes/errors:**
  - Calculations
  - Application of rules/interpretation
  - Varying methods across DNR regions
- **You can affect your permit requirements!  
Negotiate changes.**
- **Commenting now can help the Utilities' position  
for future permits.**
  - **Begin planning/organization efforts.**

# Request Variances As Necessary

- Lagoon Variances – NR 217.19
  - Request during application period
  - Amend application if in backlog



Chapter NR 200		
APPLICATION FOR DISCHARGE PERMITS AND WATER QUALITY STANDARDS VARIANCES		
<b>Subchapter I — Purpose, Definitions and General Provisions</b>		
NR 200.01 Purpose.	NR 200.07 Application forms.	
NR 200.02 Definitions.	NR 200.09 Incomplete application.	
NR 200.024 Use of information.	NR 200.10 Time periods for action on permit applications and modification requests.	
NR 200.027 Analytical methods and laboratory requirements.		
<b>Subchapter II — Application for Discharge Permits</b>		
NR 200.03 Applicability and exclusions.		
NR 200.04 Reporting of existing discharges.		
NR 200.05 Reporting of new discharges.		
NR 200.06 Application for reinstatement.		
NR 200.065 Application monitoring requirements for discharges to surface waters.		
	<b>Subchapter III — Application for Water Quality Standards Variances</b>	
	NR 200.20 General.	
	NR 200.21 Time deadline for filing variance requests.	
	NR 200.22 Information to be included in an application for a variance.	
	NR 200.23 Signature of authorized representative.	
	NR 200.24 Application completeness.	
	NR 200.25 Time periods for department action on applications.	

- (a) Naturally occurring pollutant concentrations prevent the attainment of the standard.
- (b) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the standard, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating water conservation requirements.
- (c) Human caused conditions or sources of pollution prevent the attainment of the standard and cannot be remedied or would cause more environmental damage to correct than to leave in place.
- (d) Dams, diversions or other types of hydrological modifications preclude the attainment of the standard, and it is not feasible to restore the water body to its original condition or to operate the modification in a way that would result in the attainment of the standard.
- (e) Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses.
- (f) 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.

**History:** Cr. Register, November, 1999, No. 527, eff. 12-1-99.

# Affordability Analysis is Somewhat Prescribed

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

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)			

**WDNR Guidance**


Chapter 3 Page 77  
Section 3.03



United States Environmental Protection Agency  
Office of Water (4303)  
EPA-823-B-95-002  
March 1995


## Interim Economic Guidance for Water Quality Standards

### Workbook



"... to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."  
Section 101(a) of the Clean Water Act

Appendix M to the  
Water Quality Standards Handbook - Second Edition


 Recycled/Recyclable  
Printed on paper that contains  
at least 50% recycled fiber

# Closing Thoughts

# Closing Thoughts - Potential Concerns with Wisconsin's Permitting

- Plans and specifications deadline in first permit term is too soon
  - Not enough time following facilities planning
  - Phosphorus limit could change in second permit term
  - Requires design of WWTP improvements prior to knowing if limit will change
- WDNR may revoke and reissue or modify a permit to incorporate new limits sooner than permit expiration date
  - Rock River Basin example

# Additional Closing Thoughts

- Use early required documents such as ONR as a tools for:
  - Cost optimization
  - Creative review of options
  - Thorough planning
  - Effective communication
- Consider other upcoming regulations





# Questions



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