Point-Source Efforts on Nutrient Loss Reduction

Illinois Nutrient Loss Reduction Strategy

Policy Workgroup Meeting

August 4, 2015

Summary of point-source Total P and Total N historical loads and reduction targets

	1997-2011	1980-1996	25% Reduction*	45% Reduction*
Total P (million lbs/yr)				
Statewide	37.5	34.0	25.5	18.71
Point-Source	18.1 (48%)		5.75	9.03
Total N (million lbs/yr)				
Statewide	536	527	395.3	289.7
Point-Source	87.3 (16.3%)		21.5	38.6

*Percent of 1980-1996 loads.

Point Source Voluntary Efforts

- **Voluntary acceptance of limits to contribute to statewide goal of 45% reduction for gulf hypoxia remediation**
- **A 1.0 mg/L total P effluent limit is reasonable and feasible for newer facilities**
- **“One Size Fits All” not reasonable or necessary – Some facilities cannot meet 1.0 mg/L total P without significant costs (chemicals, infrastructure improvements, etc.)**
- **Point Source will also address local water quality impairments where nutrients are identified as a significant limiting stressor and/or numeric water quality criteria are developed**

Special Conditions for New Permits

- **P Discharge Optimization Plan (18 months)**
  - **Evaluate measures for P reduction (influent and effluent)**
  - **Schedule for implementation**
  - **Annual progress reports**
- **P Discharge Feasibility Study (18 months)**
  - **Method, timeframe and costs (construction/M&O) to achieve potential future effluent limits on monthly, seasonal and annual average basis**

Watershed Groups

DuPage River-Salt Creek Workgroup

- **16 POTWs with total P permits - effective after 8 yrs and three yrs to develop EBPR or two yrs for chemical P removal**

Fox River Study Group

- **Fox River Implementation Plan - Will define the P reduction and projects to improve water quality**
- **17 new permits with interim of 1 mg/L annual ave. P limit**

Hickory Creek Watershed Planning Group

- **Four POTW permits with 1 mg/L TP effluent limit**

Des Plaines

- **Goal to determine nutrient reductions to restore the Des Plaines River and achieve Gulf hypoxia goals.**

MWRDGC Activities

- Established long term strategic plan for resource recovery and sustainability – Informed IEPA in 2011 letter
- Interdepartmental Phosphorus Task Force to lead study and implementation of EBPR, 2012
- Voluntary acceptance of 1 mg/L total P permit limit to be met in 4 to 10 years at “Big Three” starting January 1, 2014
- Converted the Stickney WRP to the EBPR configuration in fall 2013 and established goal to meet 1 mg/L by July 2014
- Began a full-scale EBPR study at Calumet WRP, 2013 with carbon supplementation study in 2014
- Began construction of a P recovery facility at Stickney, 2015
- Began studies on algae technologies for P removal at O’Brien WRP
- Began Phosphorus Source Control Task Force, 2013

EBPR at Stickney WRP

Background Total P loading from MWRDGC's "Big Three" WRPs and 2014 from Stickney WRP after EBPR implementation

	Baseline (1997-2011)			With EBPR (2014)	
	Min	Max	Mean	Mean	Reduction*
----------Total P loading (million lbs/yr) ----------					------ % -------
Stickney	1.98	2.50	2.27	1.79	21.2
O'Brien	0.77	1.18	0.97		
Calumet	1.62	4.06	2.50		
All Three	4.64	7.35	5.74	5.26	8.4

*Percent of baseline loads.

EBPR Challenges and Lessons

Major Limiting Factors

- **Insufficient carbon for EBPR and oxygen demand and denitrification needs of RAS**
- **Spikes in influent P**
- **Back-mixing of DO from aerobic zone into anaerobic zone**
- **Managing high flow conditions**

EBPR Challenges and Lessons

Strategies to Address Limiting Factors

- Infrastructure reconfiguration
- Modify airlifts to return thicker sludge at lower flow rate
- Reduce RAS:PE from 1 to 0.7 to reduce carbon needs for denitrification
- Install baffles in the aeration tanks to separate anaerobic and aerobic zone
  - Prevent scum build-up, back mixing, and filament problems
  - Induce potential inline fermentation
- Source control – Lower P load and equalize carbon needs
- Use high strength wastes as carbon source

Nitrogen Reduction Through EBPR Implementation

Year	%Total N Removal	%Total N Reduction due to EBPR	
		Based on load in effluent	Based on whole plant removal
Stickney full-scale implementation			
2010	65		
2014	74	18.3	25.7
Calumet full scale study*			
Fall 2014 - Bat B	61		
Fall 2014 - Bat A	76	40.4	38.5

*with carbon supplementation.

Partnership with Non-Point Source Sector

The aim is to establish partnerships in addressing statewide goals and to initiate the ground work to demonstrate the feasibility of a statewide Watershed Protection Utility

Watershed Protection Utility

- **Convened a Stakeholder Steering Committee – Includes ADM; AWI; Bloomington-Normal, Urbana-Champaign, Peoria, Decatur Sanitary Districts; IL Corn Growers Assoc. IFCA; Nature Conservancy etc.**
- **Quarterly meetings and monthly teleconference**
- **In the process of securing a professional facilitator to develop a white paper**
- **Seeking funds for Needs Assessment Report - identify and evaluate funding and organizational structure**

Partnership with Non-Point Source Sector

Fulton County Nutrient Loss Reduction Research and Demonstration

- **Establish field and watershed scale research and demonstration at District's 13,000 acre site**
- **Test innovative BMPs (2015 – 2017) and establish watershed scale BMPs (2017 and beyond)**
- **Current partnerships**
  - **Univ. IL – Denitrification bioreactors**
  - **Ecosystem Services Exchange - Drainage water management**
  - **IL State Univ. – Cover crops**
  - **Pursuing additional partnerships**

Summary

- **Point sources are moving ahead on voluntary basis even prior to completion of strategy or issuance of permits**
- **Significant progress underway through watershed planning groups and collaborations between point and non-point source sectors**
- **EBPR shows promise to achieve P and N reduction goals, but requires optimization based on plant configuration**
- **Create cooperative supportive environment focused on attaining goals and foster innovation of sustainable solutions rather than adversarial environment focused on imposing one size fits all solution**