

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**