

Impact of Nutrient Loading on Industrial Wastewater Pretreatment and Municipal Wastewater Treatment Systems

December 6, 2011

- Clean Water Act
- Federal Grants Program
- Sewer Use Ordinances
- Pretreatment Standards

Reasons for Pretreatment

- Protection of Investment
- Protection of Treatment Performance
- Cost Effective Sludge Disposal

- Driven by US EPA action
 - US and Illinois EPA have been sued by various environmental groups
 - P and N lead to algae and bacteria overgrowth, “dead zones,” fish kills, beach closures, loss of recreational and property value, human health risks / drinking water contamination
 - Failure of States to establish numeric standards
 - Mounting pressure
 - Deadlines have expired without resolution
 - States point out that a “one size fits all” standard is almost unachievable and that the Clean Water Act does not assure reductions from non-point sources

- Qualitative Nutrient Standard
 - Based on unnatural growth of algae.
 - Anyone can argue if the standard is met.
 - Most cases have resulted in dischargers and the IEPA giving up and implementing nutrient controls.
- Interim P limit 1.0 mg/l for expansions and new POTWs

- Illinois EPA Standing
 - More concerned about P than N
 - May not push N limits, unless required by US EPA
 - The Agency is proposing a definition of “Cultural Eutrophication” that will trigger treatment limits

"The goal is to affect a state plan to get nutrient reductions from all sources that includes accountability by all."

www.epa.state.il.us/water/nutrient

- P Removal

- Biological Treatment Option

- Is long term cost effective but requires capital improvements
- Only works in activated sludge plants
- Can meet some limits some of the time
- Is best at removing a percentage of influent P
- Causes a slight increase in sludge production
- Chemical Feed System backups are required by IEPA

- Chemical Treatment Option

- Low capital but high operating costs
- Is best at removing a percentage of P
- Causes a much greater increase in sludge production
- Additional capital costs for higher degree of solids removal may be required

- **N Removal**

- Biological removal is the only option
- Nitrates are generated through the biological digestion of ammonia
- Complements the Biological Phosphorus Removal process
- Capital improvements required
 - Magnitude depends on existing facilities and the effluent standard
- Removing more than 2/3 of the N requires a different process that is more expensive to construct and operate
- Operating costs range from break even to a significant increase

Potential Impact *on Industrial Pretreatment Requirements*

- Municipalities MAY decide to limit P and N
- The US EPA is pushing for these standards, and if they provide funds they may require pretreatment limits
- Right now, Illinois is only looking to implement P limits

Possible Ways of Setting Industrial Pretreatment Requirements

- Some limits are set for maintaining metals limits in sludge
 - P shouldn't impact sludge disposal
 - N is already a limiting factor but would decrease in sludge so should not be a problem
- Some limits are set at a "typical residential strength" such as BOD₅ of 200 mg/l
 - P limits could *possibly* be set in the 3.0 to 5.0 mg/l range
 - Total N limits could *possibly* be set in the 20 to 30 mg/l range

Possible Pretreatment Standard Details

- Pollutants can have firm limits that cannot be exceeded
 - Typical for metals
- Pollutants can have soft limits that establish fees for higher levels
 - Typical for BOD₅ and TSS
 - Provides flexibility for planning of pretreatment operations

Extra Strength Charges

- In 2007, 11 agencies had industrial extra strength charges up to \$10/lb for Total P*
- By 2010, an additional 6 began charging up to \$12.90/lb for industrial strength Total P**

Possible Ways of Pretreating to Meet New Requirements

- Phosphorus
 - Probable use of chemical treatment
 - Biological treatment could be considered if already using an activated sludge process
- Nitrogen
 - Biological treatment will most likely be required
 - Modifications may be needed if you already treat biologically

What You Can Do NOW

- Find out how much Total P and Total N is in your pretreatment effluent
- Keep informed on US EPA and IL EPA developments
 - www.epa.state.il.us/water/nutrient
 - water.epa.gov/scitech/swguidance/standards/criteria/nutrients
- Talk to the community you discharge to and find out what they intend to do
 - Some communities already do some nutrient removal so the new State Standards may not have any impact on pretreatment
 - If the community is considering developing additional pretreatment standards, then get involved with the process
 - Try to get the community to consider standards that allow for exceeding a target at a fee, especially for N