PHOSPHORUS IN YOUR INFLUENT

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As a follow up to an earlier issue of Aquafacts on sequestration chemicals where we focused on municipal water corrosion control of the distribution system, this article will take us in another direction. One which presents the idea of controlling phosphorus at the source. For systems that do not practice or have a need for corrosion control, but are still plagued with higher than normal influent total phosphorus loadings, it is in your best interest to investigate and identify the various sources. It is estimated that approximately 60% of the phosphorus in the wastestream is from urine which leaves us with approximately 40% of the phosphorus that can be accounted for by cleaning chemicals and food garbage disposals. On average a typical wastewater treatment facility with effluent limits is trying to remove less than 10 mg/L total phosphorus.

If you are a Wastewater Operations Specialist and are concerned with the inevitable cost of phosphorus treatment and removal that is soon to be imposed, or may already be written into new effluent State Pollution Discharge Elimination System, S.P.D.E.S permit limits, you may find yourself in the precarious position of struggling to meet these much lower limits. Although a great deal of research has been undertaken to study existing and new treatment technologies to identify the best phosphorus removal techniques, as an operations specialist you will be in the position to carry out the day to day treatment objectives. Your community may already have an engineering firm working on upgrading your facility to meet these lower effluent limits. The cost of upgrading existing facilities with phosphorus removal capabilities is a significant capital investment. Granted, some of the older, secondary treatment facilities across the state are in dire need of upgrading.

Here in lies the opportunity for the Wastewater Operations Specialist to participate in the overall reduction of the phosphorus loadings that the wastewater treatment plant receives in the influent. This will require sampling the influent wastewater to generate data on just how much phosphorus enters the treatment plant will be the first step in knowing just how much phosphorus needs to be removed. Consider that according to Metcalf and Eddy, 1991 *Wastewater Engineering Treatment Disposal Reuse,* they published typical composition of untreated domestic wastewater values for total phosphorus as follows:

	Weak	Medium	Strong
Phosphorus as Total P	4 mg/L	8 mg/L	15 mg/L
Organic	1 mg/L	3 mg/L	5 mg/L
Inorganic	3 mg/L	5 mg/L	10 mg/L

Taken at face value you can categorize your influent total phosphorus as weak, medium, or strong by comparing your influent monitoring results to their findings. As any seasoned operations specialist knows, what may be normal for one plant, may not be normal for another, therefore, it is important to determine what range adequately depicts normal conditions for your wastewater influent. This can only be done with monitoring results that represent all conditions of the plant influent, which means generating data from day to day (including weekends), week to week, and month to month. In short, it is a lot of sampling to generate enough data to know what constitutes the normal range for your system. A sample value outside the established normal range may indicate a slug load of phosphorus from a commercial or industrial source. As an example, a wastewater influent that routinely measures between 9 mg/L and 12 mg/L is observed at 24 mg/L. This is well above the normal range, and is an indication of a slug discharge from a discharger in the system. In a case like this, look to non-routine process practice, like a large boiler taken out of service for repairs or maintenance. Schools have boilers, Hospitals have boilers, Nursing homes have boilers, Industrial facilities, etc. Boiler treatment chemicals can contain zinc and phosphates. It is advisable to talk with these institutions to obtain copies of the MSDS information on any and all chemicals that are purchased for their boiler maintenance as well as their cleaning products, like floor strippers.

If you have not already done so, and your community has phosphorus limits imposed upon it in the S.P.D.E.S. permit, update your Sewer Use Ordinance with provisions for phosphorus standards and limits to ensure that the phosphorus levels that you are expected to treat for are published and enforceable. It only makes sense that if it is going to cost extra money for your community to remove phosphorus from the wastewater, then the contributors of excessive amounts of phosphorus should be identified and held accountable to pay their fair share. It >>>

is not my intent to suggest that you update your sewer use law solely to generate sewer use fees and fines to help offset the cost of treating for phosphorus. However, for communities that have realized the cost savings of controlling BOD and TSS from industrial and commercial users, the limiting of phosphorus should be no different. Fees and/or penalty fines should be a last resort. Once identified, work with your major phosphorus contributors to help them understand the impact that their activities have on the overall wastewater treatment performance. Sometimes simple changes in cleaning product purchases can have a big impact on their discharge quality.

Getting involved and working on a phosphorus management plan in which you identify and implement phosphorus reduction strategies can make a worthwhile impact on reducing the overall influent loadings to your wastewater treatment plant. This won't happen overnight and will take the extra effort to encourage community outreach and educate your public. Billing notices are a great way to include educational tidbits. Embrace your commercial, institutional, and industrial users and encourage them to reduce their contribution of the total phosphorus mass loading. It is fundamental that everyone understands that by reducing the amount of phosphorus from the source, they will help to reduce the cost of chemicals needed to treat for phosphorus removal at the wastewater treatment plant.

The phosphorus management plan guide and development resources have been developed by the Minnesota Pollution Control Agency (MPCA) and the Minnesota Technical Assistance Program (MnTAP), - University of Minnesota (revised July 2006). MnTAP – 200 Oak Street SE, Suite 350 Minneapolis, MN 55455. 612.624.1300 mntap@umn.edu