Eastex Environmental Laboratory

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And a Happy New Year!

From all of us at

Eastex Laboratory

Operator Control of the Activated Sludge Process Who said operators have an easy job? Operators are the unsung heroes of modern society. Each day you deal with the complexities such as the "quality" and quantity of the organic compound in the wastewater entering the "bio-reactor", temperature, pH, nutrients, flow rate, the list goes on and on. You make it simple for someone like me to understand the process. You have broken it down to two words – **Process Control.** This is simply the effectiveness of the activated sludge treatment process in reducing the organic load. A successful Process Control depends on the amount of activated sludge solids in the system and the health of the microorganisms.

Process Control evaluations are the indicators of how the facility is performing prior to the effluent. If you only gauge every thing off the appearance of the effluent, you will be trying to change things when its is too late. Be proactive and tell the plant what to do. Every facility has its own quirks but will have typical process control ranges that the plant should operate in. The first step is to know what type of facility you have. Some examples are contact stabilization, step feed, complete mix, extended aeration, oxidation ditch, SBR, racetrack, etc.

Next, identify the control points you can sample to see what the plant is doing. These may include the influent, aeration, RAS, WAS. A variety of analysis can be performed at these sample points to provide you information to help determine the state of the plant. Below we have listed some of these analysis, and what information they can give you.

GSA — Average number of days solid particles remain in aeration. Used to help maintain the proper amount of sludge in aeration tank. Considers solids only entering the plant.

MCRT (Solids Retention Time) - The number of days the sludge is retained by the facility. Similar to GSA but MCRT considers solids leaving the plant. Adjust RAS/WAS rates to optimize MCRT or GSA.

SVI — Quickest and easiest calculation. Tells how many milliliters are occupied by one gram of sludge. Typically 50—100 but a good effluent can be produced outside of this range. Track SVI with plant performance to develop trends and detect sharp increase/decreases.

FM Ratio—The ratio of food to microorganisms present. Too high of a FM will give poor floc development and poor settling. If the influent is consistent, increase mlss to raise the FM Ratio to a good range. A COD/MLSS modified FM Ratio can be used for faster data.

MLSS—Measure of organic (microorganism) and inorganic solids present at the sample site. Used in a variety of calculations and can be used to help determine when and how much to waste to digestor. Refer to chart on back page for typical ranges. MLVSS/MLSS ratio range should be 0.7-0.85.

Microscopic—The microscopic evaluation gives a summary of the microorganisms present and relative abundance along with a review of the floc. Helpful in monitoring microscopic activity and troubleshooting in biological activity is present.

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Process Name	Type of Reactor	GSA MCRT SRT, days	FM Ratio F:M kg BOD/kg MLVSS-d	MLSS, mg/L	SVI
High-rate aeration	Plug flow	0.5-2	1.5-2.0	200-1000	50-150
Contact stabilization	Plug flow	5-10	0.2-0.6	1000-3000[b] 6000-10000[c]	50-150
High-purity oxygen	Plug flow	1-4	0.5-1.0	2000-5000	50-150
Conventional plug flow	Plug flow	3-15	0.2-0.4	1000-3000	50-150
Step feed	Plug flow	3-15	0.2-0.4	1500-4000	50-150
Complete mix	CMAS	3-15	0.2-0.6	2000-5000	50-150
Extended aeration	Plug flow	20-40	0.04-0.10	3000-5000	50-150
Oxidation ditch	Plug flow	15-30	0.04-0.10	2000-5000[d]	50-150
Batch decant	Batch	12-25	0.04-0.10	2000-5000[d]	50-150
Sequencing batch reactor	Batch	10-30	0.04-0.10	2000-5000[d]	50-150
Countercurrent aeration systems (CCAS)	Plug flow	10-30	0.04-0.10	2000-4000	50-150

The TCEQ lists additional process checks and frequencies, depending on the flow of the facility, in "Process Control Tests for Domestic Wastewater Treatment Facilities" RG-002.

Visist our website to review the document and see what is suggested for your facility.

References:

Sludge process. Retrieved from http://waterfacts.net/Treatment/Activated_Sludge/Process_Control/process_control.html

TEEX: Basic Wastewater Operation (1995)

Please let us know your bacteria monitoring cycle. It is listed on your DMR form. Email or call us.

Do you have a NAP?

Public Water Systems (PWS) using surface water are required to develop a Nitrification Action Plan (NAP) . PWS are required to monitor the monochloromine, total chlorine, free ammonia and nitrate/nitrite levels periodically at different locations. This ensures that an adequate disinfectant residual is being maintained and that nitrification is not occurring in the distribution system. Ammonia, nitrate and nitrite must be sampled at least once in your source water. Routine residual sites may be used for NAP sites.

Call Eastex Lab to get your samples analyzed. Eastex lab does Total Chlorine, Ammonia, Monochloramine, Free Chlorine, Nitrite, Nitrate and pH test.

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Field Supervisor

Chris Wirzberg 936-653-3249

Field Techs Contact

Brian Sewell 936-827-3377

Wendy Willson 936-828-7209

Rico Valley 936-828-7205

Christopher Guinn 936-827-3378

Shawn Arnold 936-828-7208

Mark Bourgeois 936-828-7206

Lulia Galusha 936-828-7203

Cassie Tarron 936 –788-4193