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AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Operation Update

A Newsletter for Aqua-Aerobic Plant Operators

The Effect of Septage on Your AquaSBR®

There are millions of septic tanks installed at homes and businesses around the country. Ultimately, as these septic tanks fill up, they must be drained with disposal of the waste. The following article will focus on this waste stream being treated in your AquaSBR®.

It is likely that many of you have been approached by septage haulers, or perhaps even city officials, about the possibility of treating septage in your SBR system. While it is possible to treat septage effectively in your SBR, there are a few things to consider.

Septage Strength

Note that as we discuss septage in this article, we are referring to the septage generated at homes and businesses, not necessarily septage from industrial sites or landfills. As you may suspect, septage strength varies from one truck load to the next, much the same as your SBR influent strength varies from day to day.

Typical Septic Truck

Table 1 on the right represents what may be considered "typical" septage waste strength. There are a few things to consider when reviewing the data in Table 1. First, the strength of the septage is approximately 30-40 times stronger than typical municipal waste. Second, it is important to note that the septage is not nutrient deficient. In other words, the addition of septage to a system treating municipal waste does not lead to an issue with nutrient deficiency. Third, the septage contains high levels of oil and grease. These high levels have a tendency to clog pumps or accumulate on the surface of the SBR itself, potentially leading to either aesthetic issues or filament growth. Last, you will notice that the amount of TSS in the septage is relatively high. This would lead to an increase in the amount of sludge that would be generated by an SBR if it were to accept septage.

Table 1: Typical Septage Waste Strength

Parameter	mg/L
BOD	6,480
COD	31,900
TSS	12,900
Total Nitrogen	600
Chloride	
Sulphate	
Oil & Grease	5,660
Alkalinity (as $CaCO_3$)	
Total Phosphorus	200
pH	

EPA Guide to Septage Treatment and Disposal, September 1994

Septage Addition to the SBR

There are essentially three different ways that septage could be added to the SBR system:

1. Upstream, such as at a manhole, or at the plant headworks. This approach should only be utilized on larger plants to avoid slug loading the SBR. An advantage is it can provide dilution of the septage before it enters the treatment plant. A disadvantage is it creates a potential for grit and grease accumulation in the sewer system.

2. In the digester. An advantage of this is it reduces the potential affect on the SBR effluent quality. A disadvantage is that it may affect the dewatering process.

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The Effect of Septage on Your AquaSBR®

continued from page 1

Prior to introduction, the septage should run degritted, deragged and then bled into the digester to avoid overloading the aeration system in the digester. Another concern is that the substantial amounts of oil and grease typically found in the septage could cause foaming and production of filamentous bacteria.

3. Adding it into the SBR itself. This approach would occur after the septage has been settled, deragged and degritted, and then bled into the system slowly. The intent with this approach is to separate the liquid fraction of the septage from the solid fraction, prior to its introduction into the SBR. Advantages are providing more concentrated sludge for sludge processing and reducing the organic load to the SBR. A disadvantage is the requirement for a septage receiving station to separate the liquid stream from teh solid stream, which is costly to construct. Another approach to this is to run the septage through a primary clarifier prior to its introduction to the SBR (if your system has a primary clarifier).

Determining How Much Septage Your SBR Could Treat

Each AquaSBR installed is based on an original design capacity. This design can be found in your O&M manual (if you do not have an O&M manual, let us know and we can get you a copy). The SBR design defines the amount of organic and nitrogen load that your SBR was designed to treat, as well as your plant's aeration capacity. To determine if your SBR has the ability to receive septage (and if so, how much), you must compare your plant's original design load and aeration capacity with its actual load, plus the septage load. In other words, Aqua-Aerobic would compare the pounds per day of BOD and TKN of the plant's design, then compare that to the actual influent, plus the amount of load that the septage represents. When making this comparison, it is important to keep in mind that the SBR was designed for treating its load over the course of a 24-hour day. As such, if septage is to be treated in the SBR, it is best accomplished by bleeding it into the system over the course of the day. This maximizes the ability of the SBR's aeration system to keep up with the load. If for some reason it is not possible to bleed the septage, then the determination of how the septage would affect the SBR should be made based on loading the SBR more heavily over the course of an hour or two. A typical ratio to keep in mind is that a 1,000 gallon tanker of septage from a typical household has the equivalent organic, solids, and nitrogen load of about 35,000 gallons of typical strength municipal waste. From an aeration system standpoint, the goal would be to maintain a D.O. of 2.0 mg/l or greater during the React phase, even with the septage load going into the system.

Fine-Bubble Diffuser Rack

Effects of Septage on the SBR

Accepting septage to your plant can affect your system in several ways:

1. Sludge production will increase. This is due to the fact that the septage typically comes in with a high amount of solids, as well as the fact that treating the organic fraction of the septage will generate additional biomass.

2. The best way to introduce septage to your system is to remove grit and rags from the septage and then bleed it into your system. This leads to either the need to construct a septage receiving station, or additional manpower to control the flow of septage to the SBR.

3. Since the septage is anaerobic, it will lead to increased odor production at the location it is introduced.

4. The oil and grease found in the septage can lead to foaming and filament issues in the SBR.

5. If the amount of septage received is too great, it can overload the aeration system and lead to effluent violation concerns.

6. Depending on where the septage is coming from, there is a potential for toxicity concerns.

Summary

The addition of septage to your SBR system should be evaluated on a case-by-case basis. As a general rule, smaller SBR systems (less than 0.3 MGD) should be concerned about treating septage, due to the dramatic increase in loading that septage would represent. If a plant is larger and underloaded relative to its design capacity, then treatment of septage can be considered. While septage does not typically cause a toxicity concern, its affect on the aeration capacity and sludge production should be considered. Regardless of the size of the SBR system, the septage should be introduced to the SBR over the longest period of time possible.

If your plant is considering treating septage, feel free to contact Aqua-Aerobic Systems to assist you in determining if you have adequate capacity available in your system.

DID YOU KNOW?

AquaNereda® Aerobic Granular Sludge Technology

The AquaNereda® Aerobic Granular Sludge Technology is an innovative biological wastewater treatment technology that provides advanced treatment using the unique features of aerobic granular biomass. The unique process features of the AquaNereda technology translates into a flexible and compact process that offers energy efficiency and significantly lower chemical consumption.

SVI5 Comparison of Aerobic Granular Sludge (left) and Conventional Activated Sludge (right)

System Features and Advantages:

- Optimal biological treatment is accomplished in one effective aeration step
- Settling properties at SVI values of 30-50 mL/g allow MLSS concentrations of 8,000 mg/l or greater
- Four times less space required compared to conventional activated sludge systems
- Energy savings up to 50% compared to activated sludge processes
- No secondary clarifiers, selectors, separate compartments, or return sludge pumping stations
- Proven enhanced nutrient removal (ENR)
- Robust structure of granule withstands fluctuations in chemical spikes, load, salt, pH and toxic shocks
- Significant reduction of chemicals for nutrient removal due to the layered structure and biopolymer backbone of the granule
- Ease of operation with fully automated controls
- Lowest life-cycle cost

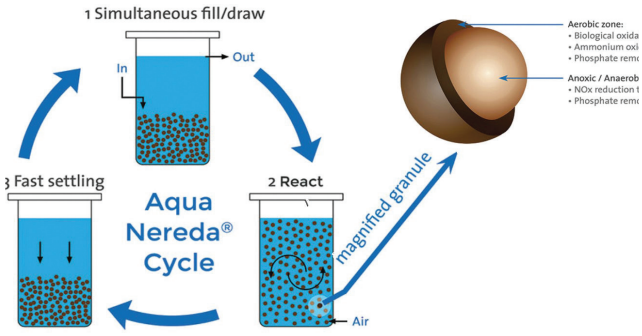
AquaNereda®

Typical Applications:

- It can double the capacity of your exisiting SBR, increasing treatment capacity
- Upgrade of existing treatment systems to meet BNR requirements
- New construction plants
- Municipal and industrial objectives.

How it Works: Batch Cycle Structure

Based on the unique characteristics of granular biomass, the AquaNereda Aerobic Granular Sludge Technology uses an optimized batch cycle structure. There are three main phases of the cycle to meet advanced wastewater treatment objectives (Fill/Draw, React, Settling). The duration of the phases will be based upon the specific waste characteristics, the flow and the effluent objectives.



Aqua-Aerobic Systems, Inc. is the exclusive U.S. and Canada provider of Nereda® technology developed by Royal HaskoningHDV

Maximizing the Capacity and Efficiency of Your Cloth Media Filter

Aqua-Aerobic Systems has thousands of cloth media filters installed around the world. While Aqua-Aerobic cloth media filters are considered to be a highly reliable, robust piece of equipment, we occasionally run in to situations where there is an issue with effluent quality or throughput from the filter. Since we now have over 25 years of experience in designing and operating cloth media filters, Aqua-Aerobic Systems has encountered practically any situation imagineable. With this, we are eager to address any and all concerns you may have (i.e., a concern with effluent quality).

Aqua-Aerobic cloth media filters typically produce high quality effluent; however, there are situations that arise that can lead to reduced effluent quality. Potential causes of reduced effluent quality are:

A. Particle size too small for the cloth media being utilized.
B. The cloth media itself may be compromised.
C. There may be a mechanical issue with the filter itself, for example the V-ring seal may be torn or missing.
D. An upstream chemical feed system may need to be adjusted relative to dosages or flocculation times.

In order to determine which of the potential causes may be leading to effluent quality concerns at your facility, there are a few steps that should be taken:

1. If there is a concern with particle size, it is recommended to send a sample to Aqua-Aerobic Systems for analysis. We can run a bench top filtration test and then a particle size analysis on the influent sample to compare the filter influent and effluent particle size distribution to the nominal pore size of the cloth. We offer this service free of charge to our customer base. If it turns out that the particle size distribution shows that the particles to be filtered are smaller than the cloth currently employed on the filter, then we can look at options for smaller pore size cloth. Our tightest nominal pore size that is currently available is 5 micron. If changing cloth style is not an option, it is possible that chemical addition could be employed upstream of the filter. This would be with the intent of creating a filterable floc that could be removed by the cloth media. Typical chemicals for this situation would be an aluminum salt, or a polymer. If this approach is taken, then bench top testing by a local chemical vendor to confirm the best chemical and dosage selected would be recommended.

2. To determine if the cloth media itself is compromised, the best approach is to drain the filter tank and visually inspect the cloth for wear. Here, you would be looking for unusual wear patterns due to a backwash shoe being misaligned, or just normal wear from years of use. If any holes are found in the cloth itself, the usual remedy would be to repair any mechanical misalignment if it exists, then replace the cloth.

3. To determine if a V-ring seal is compromised, the best approach would again be to drain the filter and visually inspect the V-ring seal. Here, you would be looking to confirm the V-ring seal is in place and not cut. If the V-ring seal is either damaged or missing, the remedy is to replace the seal. Before the seal is replaced, the operator should inspect the upper guide wheel to make sure that it is contacting the center tube. In addition, the pillow block bearing and collars should be inspected and replaced as needed. Note that V-ring seals and upper guide wheels are only found on the disk configuration of cloth media and are not applicable to an AquaDiamond® cloth media filter application.

4. If an upstream chemical feed system is overdosing flocculant such as aluminum or iron salt to the cloth media filter, this can lead to the production of excess chemical solids. Floc created by excess chemical dosing is typically fragile and may break up when it contacts the cloth, then passes through the filter and shows up as either TSS or turbidity. One solution in this case is to reduce the chemical dosage to the extent needed to achieve the required effluent quality, while not dosing so much chemical that it creates chemical solids that pass through the filter. Another potential solution would be adding a small amount of polymer along with the aluminum or iron salt to create a more robust chemical solid that won't break up upon hitting the cloth. Note that adequate contact time between the chemical being utilized and the influent stream is required. This is true whether the chemical is a flocculant, or a coagulant.


Chemical Feed Pump

Aqua-Aerobic Systems' filters are known for putting a large amount of flow through a small space. With that, occasionally issues with hydraulic capacity can arise. Filter throughput issues can usually be attributed to a couple of different issues:

A. Mechanical issues may be occurring with the filter.
B. The filter cloth may be fouled and need to be cleaned.

Maximizing the Capacity and Efficiency of your Cloth Media Filter

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Potential remedies for filter throughput issues are as follows:

1. If there is a mechanical issue that would most directly affect filter throughput, it would be to confirm if the backwash shoes are aligned properly with the face of the cloth media. A visual inspection of the filter after it has been drained can confirm if the face of the backwash shoe is flush with the face of the cloth media. If the backwash shoe is not flush with the cloth, then the cloth would not be cleaned efficiently, and this would lead to filter fouling. Typically, if a backwash shoe is misaligned, it would be due to an issue with a wall anchor, or related hardware that has come loose and needs to be tightened or realigned.

2. A second mechanical issue that could affect throughput would be the condition of the backwash pump and impeller. If the backwash pump is not achieving its targeted flow then the cloth cleaning will be inefficient, which can lead to fouled cloth. Typical pump flow rates for Aqua-Aerobic cloth media filter backwash pumps are 65 gpm for an Aqua MiniDisk® filter, 130 gpm for a Model 54 filter, and 400 gpm for an AquaDiamond® filter. A drawdown test can be performed on the cloth media filter to determine if the pump is achieving these targeted flows. If the pump is not achieving the targeted backwash flow rate, this can lead to inefficient cloth cleaning, and ultimately to fouling and loss of hydraulic capacity. Worn pump impellers would be a potential cause for the lack of flow from the pump, as would fouled filter cloth.

3. Cloth fouling may occur from a variety of causes. These causes vary from polymer overfeed, to organic fouling to oil and grease fouling. Each potential foulant has a different remedy, and the remedy applied needs to coincide with the type of cloth that is installed. In order to determine if the cloth media is fouled, there are a few indicators that we look for:

   a. Lack of hydraulic throughput
   b. Frequent backwash
   c. The filter not returning to low water level after backwash
   d. High vacuum readings on the backwash pump (> 20 in Hg)
   e. Pump cavitation

In order to intrepet what is causing a fouling issue, Aqua-Aerobic would typically question the operator on what is occurring upstream of the filter.

Potential remedies for cloth fouling are as follows:

Polymer Fouling - typically if a filter is fouled with polymer, the fouling can be alleviated by simply running influent through the filter.

Organic Fouling - organic fouling would typically be removed via cleaning with chlorine. If the plant utilizes PA2-13 cloth (all white) then the recipe for cleaning the cloth is a combination of ammonia and chlorine to create chloramines. If the plant utilizes PES-13 (white and blue) or PES-14 (all blue) then sodium hypochlorite is typically applied. Dosages for the chemical cleaning are dependent on the size of the filter. As we have recently updated our procedures, please contact Aqua-Aerobic Systems for specifics on the cloth media cleaning procedure applicable to your installation.

OptiFiber PA2-13®

OptiFiber PES-13®

OptiFiber PES-14®

Oil and Grease Fouling – if a filter is fouled with oil and grease, typically the filter capacity can be restored by cleaning the cloth with a non-sudsing detergent.

If your plant is dealing with a situation involving fouled cloth and you are unsure how to proceed, please note that Aqua-Aerobic Systems offers a service where we will inspect one of your cloth media socks in our lab to determine what the source of fouling is, and also the best solution to clean the cloth and restore the filter's capacity. We offer this service free of charge to all of our installations. You would just need to send us a wet sock for us to examine in our lab. If this is an option you'd like to pursue, please contact our Customer Service Department at 800/940-5008.


Cloth Inspection in R&D Lab

Note, there are updated procedures available that discuss many items covered in this article. Specifically, we have updated procedures for performing drawdown tests, changing cloth socks, installing V-ring seals, and chemically cleaning the cloth. If you would like updated procedures sent to you, please let us know.

Congratulations
2016 Plant Performance Award Recipients

CUSTOMER NAME	PRODUCT	CITY	STATE
Oneonta WWTP	AquaSBR System	Oneonta	AL
West Montrose Sanitation District	AquaSBR System	Montrose	CO
Big Coppitt WWTP	AquaSBR System	Big Coppitt	FL
City of Deland Wiley M. Nash WRF	AquaDiamond Filter	DeLand	FL
Eustis WWTF	AquaDisk Filter	Eustis	FL
Leesburg (City of) - Canal Street WWTP	AquaDisk Filter	Leesburg	FL
Lynn Haven WWTP	AquaSBR System & AquaDisk Filter	Lynn Haven	FL
Harlem WPCP	AquaSBR System	Harlem	GA
Portage Utilities Service Facility	AquaDisk Filter	Portage	IN
Spencer (Town of) WWTP	AquaSBR System	Spencer	IN
Itasca WWTP	AquaSBR System	Itasca	IL
Clear Lake Sanitary District	AquaSBR System	Clear Lake	IA
Grundy Center WWTF	AquaSBR System	Grundy Center	IA
Marshalltown Water Pollution Control Plant	AquaSBR System	Marshalltown	IA
Boonsboro WWTP	AquaSBR System & AquaDisk Filter	Boonsboro	MD
Taneytown WWTP (City Of)	AquaSBR System	Taneytown	MD
Lee WWTP	AquaSBR System & AquaDisk Filter	Lee	MA
Norfolk WWTP	AquaSBR System	Norfolk	NE
Sidney WWTP	AquaSBR System	Sidney	NE
Sparta WWTP	AquaSBR System	Sparta	NC
Abbottstown Paradise Joint Sewer Authority	AquaSBR System	Abbottstown	PA
Atglen Borough STP	AquaSBR System	Atglen	PA
Biglerville Borough WWTP	AquaSBR System	Biglerville	PA
Bloomfield Borough WWTP	AquaSBR System	New Bloomfield	PA
Bonneauville (Borough of) STP	AquaSBR System	Bonneauville	PA
Branch Cass Regional Sewer Authority	AquaSBR System	Llewellyn	PA
Centre Hall Potter Sewer Authority	AquaSBR System	Centre Hall	PA
Colver STP / Cambria Township Sewer Authority	AquaSBR System	Colver	PA
Conewago Township Sewer Authority WWTP	AquaSBR System	York	PA
Earl Township Sewer Authority	AquaSBR System	New Holland	PA
East Hanover Township - Dairy Lane WWTP	AquaSBR System	Grantville	PA
Eastern York County Sewer Authority WWTP	AquaSBR System & AquaDisk Filter	Hellam	PA
Fredericksburg Water & Sewer Authority	AquaSBR System & AquaDisk Filter	Lebanon	PA
Herndon WWTP	AquaSBR System	Herndon	PA
Jackson Township Authority	AquaSBR System	Myerstown	PA
Jefferson Codorus Joint Sewer Authority	AquaSBR System	Codorus	PA
Jenks Township	AquaSBR System	Marienville	PA
Leacock Township Sewer Authority	AquaSBR System	Intercourse	PA

2016 Plant Perfomance Award recipients

(continued)

CUSTOMER NAME	PRODUCT	CITY	STATE
Jonestown WWTP	AquaSBR System	Jonestown	PA
Lower Mahanoy Township Municipal Authority	AquaSBR System	Dalmatia	PA
Lykens Borough Authority	AquaSBR System	Lykens	PA
Millersville Borough WWTP	AquaSBR System	Millersville	PA
Monroe Valley STP	AquaSBR System	Jonestown	PA
North Codorus Township WWTP	AquaSBR System	York	PA
Northwestern Lancaster County Auth. STP	AquaSBR System	Manheim	PA
Oley Township Municipal Authority	AquaSBR System	Oley	PA
Penn Township WWTP	AquaDiamond Filter	Hanover	PA
Quarryville Borough Authority WWTP	AquaSBR System	Quarryville	PA
Revloc STP/Cambria Township Sewer Authority	AquaSBR System	Revloc	PA
Silver Spring Township Authority	AquaSBR System & AquaDisk Filter	Mechanicsburg	PA
South Coatesville STP	AquaSBR System	Coatesville	PA
Stewartstown Borough Authority	AquaSBR System	Stewartstown	PA
Twin Boroughs STP	AquaSBR System	Mifflin	PA
West Earl Sewer Authority - Brownstown	AquaSBR System & AquaDisk Filter	Brownstown	PA
West Hanover Township WWTP	AquaSBR System	West Hanover	PA
Wind Gap Municipal Authority WWTP	AquaSBR System	Wind Gap	PA
Ferrum WWTP	AquaSBR System	Ferrum	VA
Parham Landing WWTP	AquaSBR System & AquaDisk Filter	West Point	VA
Quechee WWTF	AquaSBR System & AquaDisk Filter	Quechee	VT
Northern Mineral - Franklin PSD	AquaSBR System	Ridgeley	WV

"Send us your data and win"
Contest Winners Announced

Since 2014, our Customer Service team has conducted an annual Treatment Plant Award Drawing as a "thank you" to those plants that send in their operating data.

Congratulations to this year's contest winners!
1st prize - Quarryville, PA
2nd prize - Boonsboro, MD

The 1ST Prize Winner Receives:
Two free days of on-site assistance from an Aqua-Aerobic Field Service Technician. The days on site can be used within a calendar year of the drawing and can be utilized for process or mechanical training, or equipment inspection.

The 2ND Prize Winner Receives:
$250 credit towards replacement /spare parts available through our Aftermarket Sales Department.

Aqua-Aerobic is grateful to all of our plants that have sent in their operating data over the past serveral years. The data is very useful to our process engineers in the event your facility contacts us with process concerns. The data allows us to access how your system is loaded relative to the original design and assists us in formulating our process recommendations.

If you have not yet sent us your data, please send it to ProcessData@Aqua-Aerobic.com. To qualify for the next drawing, we request a minimum of 6 months of data in the calendar year, with a minimum of the information below:

- Influent average and maximum flows (Required)
- Effluent Data (required)
- Influent data (if available)
- Daily operating information such as MLSS, Settleability, pH, etc. (if available)

Thanks to all for sending in your plant data, and please continue to do so as the drawing is an annual event.

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YOUR CUSTOMER RESPONSE CENTER:
TOLL-FREE 800.940.5008

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Filtration

Oxidation & Disinfection

Membranes

Controls & Monitoring Systems

Aftermarket Products and Services