

“By George”



How does the LG Sonic slow down and reduce the production of biofilm?

Ultrasonic units help to eliminate the biofilm growth that acts as a host and attachment point for algae. The ultrasound will prevent most of the planktonic bacteria from becoming strongly attached sessile bacteria that forms the base layer of the biofilm. Bio-film typically start forming as quickly as 20 minutes to 3 hours. Bacteria are not killed by the LG Sonic device although they are being affected. The ultrasonic sound waves vibrate the bacteria and their pili retract as if they are in turbulent water. They do not excrete the polysaccharide glue they use to attach to a surface. The influence of the ultrasound actually slows down biofilm growth on surfaces. Thus, if you start with a very clean surface, the formation of biofilm is nearly inhibited.

The LG Sonic has had very positive results on preventing bio-film in the following applications: WWTP clarifiers, potable water basins and v-notch weirs, swimming pools, viewing glass windows and aquarium tanks at a zoo.

Biofilm reduction is a large benefit to our clients for overall algae control.

MESSAGE FROM OUR PRESIDENT

Our municipality and industrial clients are experiencing significant operational benefits while lowering costs with the LG Sonic ultrasonic devices by controlling algae growth in ponds, lakes, and reservoirs; and biofilm growth in WWTP clarifiers, sedimentation basins, v-notch weirs, and viewing glass windows to name the largest applications. Ultrasound waves are a natural answer to eliminating most algae related issues at their source!

What are your most pressing 2008 water issues?

1. Reducing maintenance cycles for greater efficiency
2. Reducing maintenance cycles due to severe drought
3. Lowering THM levels in potable water plants
4. Lowering your TSS levels in WWTP
5. Potable Water Taste & Odor issues from algae

By controlling the algae in your ponds, lakes, and reservoirs, less algae are brought into your plant at the intake; or one can reduce TSS prior to the effluent by controlling the algae which flourish in polishing ponds. By controlling biofilm in your plant, one can reduce normal maintenance cycles, especially with the imperative to preserve water during times of drought. By controlling biofilm one would not need to chlorinate in that portion of the process, thus affording you the huge benefit of lowering THM levels. If one eliminates the environment where the algae attach, you could prevent the taste and odor issues once derived from algae.

This New Years newsletter is full of successful testimonials from clients who have embraced our ultrasound technology in 2006 and 2007 and have already experienced the benefit discussed above. I encourage you to contact your local AlgaeControl.US authorized dealer today for their expertise in how you can best put this “sound” environmentally friendly solution to work in your plant processes. Contact a dealer @ www.algaecontrol.us/dist.htm

All the best,

Kevin Hutchinson
CEO, Fishery Biologist



ALGAE OF THE MONTH - MICROCYSTIS



Microcystis: Shaken on left. 2 hours later on right. Recovered from pool filter backwash. Sample is three weeks old. LG Sonic treated.



Genus: **Microcystis**

Microcystis aeruginosa

Microcystis botrys

Microcystis firma

Microcystis flos-aquae

Microcystis ichthyoblabe

Microcystis marginata

Microcystis natans

Microcystis novacekii

Microcystis pulverea

Microcystis robusta

Microcystis viridis

Microcystis smithii

Microcystis stagnalis

Microcystis viridis

The Genus *Microcystis* consists of 14 algal types and derives from the Family *Microcystaceae*, a Phylum of *Cyanobacteria*. Most of these different types have the same make up however some are covered in a gelatinous protective coating and some are linked together in a colony. It is obvious by the photo taken on the right that ultrasound not only breaks the gas vacuoles' of algal cells but also renders them unable to feed, propagate or float. Once exposed to the proper residence frequency, the algae become vulnerable to bacteria intrusion and eventually gets consumed adding to increased bacteria counts in a pond environment. The *Microcystis* is usually killed by ultrasound within four to seven days on average depending on how dense the algae growth is in the pond.

There is one factor in this process that we have to consider, "sunlight". In a Swimming Pool setting, the water clears and settles the algae to the bottom just like the picture to your right, however; since sunlight is still in contact with the algae and no bacteria is present, it remains green on the bottom and should be removed by vacuuming or by installing an EARTHTEC Nanostick.

Water Gardens too have a very similar situation. Most systems usually do not have adequate filtration to remove the dead algae; therefore bacteria should be added to the system to remove it. Most Water Gardens are also overstocked with fish which give a lot of available nutrients for the algae to feed on and grow. If they have a lot of algae and the ultrasound begins to kill it, additional bacteria and micro-filtration may need to be added to the system.

In a Pond application always remember that oxygen depletion will occur and can cause fish kills due to decomposition. Even though ultrasound kills algal cells slowly, the decomposition of these dead algae will drop the oxygen levels very low. It is always recommended to apply surface or bottom aeration to increase oxygen demand when possible and always suggest bio-augmentation practices using bacteria to eliminate excess nutrients from the pond.

The methodology of "The Water Trifecta" is your environmentally friendly answer to water management given the proper amount of time and care. Remember, It's not nice to fool Mother Nature!

Oxygen, Bacteria and Ultrasound
"Sound water practices are the key to success!"

ULTRASOUND / LG SONIC

BIO-FILM POSITIONING & CASE STUDIES

Potable Water Plant & Biofilm Case Study

Due to the US Federal Regulation to reduce Trihalomethanes in potable water, the City of Union, South Carolina stopped chlorinating at the intake from the river. The elimination of chlorination caused bacteria to adhere to their sedimentation basins walls which formed a layer of bio-film. The bio-film in turn created an ideal environment for algae to grow. Instead of cleaning the basins once every six week, the plant operator had no choice but to begin an every other week schedule for cleaning the basin walls and v-notch weirs which was an arduous and difficult task.

Upon implementing a test with two LG Sonic units, one in a sedimentation basin and another aimed at their v-notch weirs, Arnold found the bio-film was not forming for weeks. When it did begin to form and he had to clean the basins, he discovered the cleaning process was quicker in the basins where the ultrasound was present, as the biofilm was attached so loosely compared to those basins without ultrasound.

The city budgeted for a full roll-out of the LG Sonics plant wide and to date, 6 months later, The City of Union has reduced their THM's and have reverted their cleaning cycles back to their original schedule - once every six weeks. This reduction in schedule took place during the height of summer heat when 2007 drought conditions necessitated a more reasonable and reduced cleaning cycle. Their Jan-08 THM level measured 34.4 ppb, well under the specified regulated threshold of 80 ppb. The HAAS level is 22 ppb compared to the 60 ppb maximum level.

No Ultrasound - December 2006



With LG Sonic - August 2007



Freshwater Aquatic Plant Display

Bio-film Case Study



In May of 2007 Dr. Richard Sneider, freshwater biologist, installed the LG Sonic SSS to control algae in a freshwater plant display. This display environment was under the scrutiny of an intense light source being a zoo / aquarium setting, which promoted excessive algae growth. Dr. Sneider has an ongoing travel schedule and he needed an automated method to control algae. The LG Sonic SSS enabled the glass surfaces to remain cleaner longer, and also kept the diatoms formally present in the tank from settling on the aquatic plant leaves.

Waste Water Clarifier & Bio-Film Case Study

In late July 2007 AlgaeControl Shenandoah approached AlgaeControl.US to discuss their ideas on how to implement the LG Sonic in a waste water clarifier. B.J. recognized the huge market of clarifiers available, and since his career has focused on the municipality market place he was willing to tread where no AlgaeControl dealer had yet ventured. Chris Dye, the operator at Lebanon, Virginia was the test site.

Since there wasn't any eco-system involved, we decided to "upsized" the LG Sonic unit due to the turbidity in the clarifier to produce as strong a signal as possible across the unit.

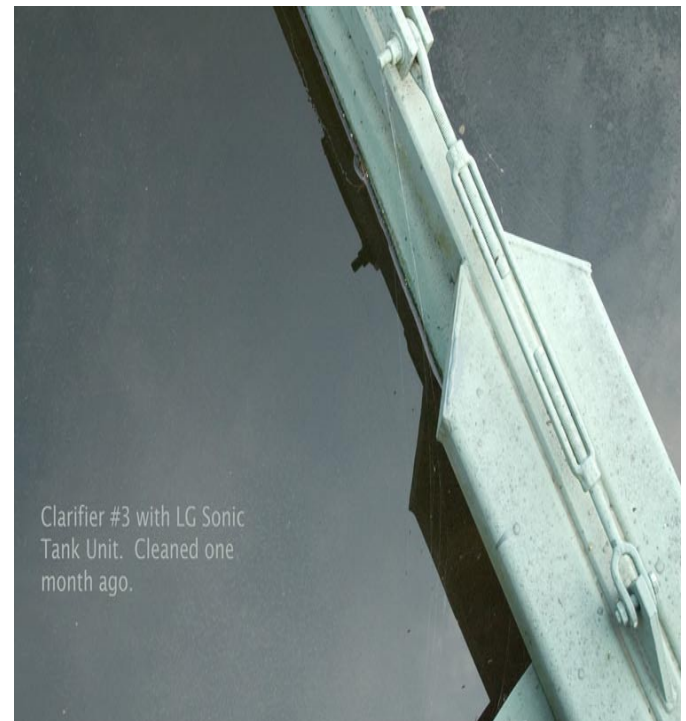
The installation involved placing a rigid conduit on the inside sidewall of the clarifier and the LG Sonic mounted to the rear of the skimmer trough underneath the path of the rotating arm. The rotating skimmer easily passes over the conduit due to a rubber scraper at the end of the skimmer arm.

Chris typically cleaned his 3 clarifiers each week which took 4-5 hours total. He now cleans all three clarifiers once a month. A visual notation was made that noted the improved clarity of the water inside the clarifier. The city also noticed a slight reduction in their chlorine demand before the discharge to the creek.

No Ultrasound - Cleaned Yesterday



With Ultrasound - Still Clean 30 days Later



Aquaculture & Bio-film Case Study



AlgaeControl.US recently received this aquaculture side by side pond comparison from LG Sound headquarters. The study was conducted by ChemSearch at a site located in Czechoslovakia. The test involved raising carp while keeping numbers on the water chemistry, watching the effects of ultrasound on the algae species, and finally the overall effects on the fish. (For the complete report please simply email us). This photo is one of the best visual and dramatic representations we have seen to date for the presence or lack of bio-film growth under the influence of the LG Sonic.

BIO-FILM REDUCTION SUMMARY OF BENEFITS

1. A municipality will reduce the man hours and maintenance cycles inside their plant.
2. Biofilm elimination can be your answer to how much chlorine is necessary.
3. Drought conditions raise the importance of a longer time between maintenance cleanings.
4. Total suspended solids are lowered by reducing or eliminating the algae present in the pond.
5. Ultrasound can provide the benefit once derived from chlorination in potable water plants.
6. Any large viewing glass for a tank, river fish ladders, swimming pool, or large aquarium is kept cleaner for a lot longer thus slowing the algae and biofilm removal maintenance schedule.

Basics of the Water Trifecta

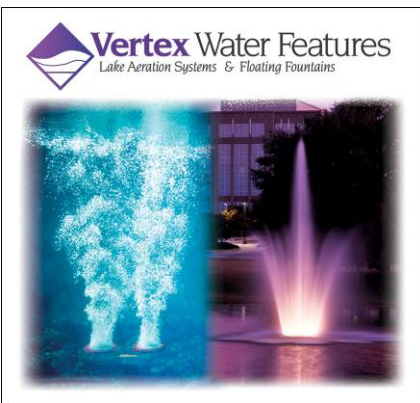
The Water Trifecta[®]



Kevin Hutchinson, Freshwater & Fisheries Biologist, created the Water Trifecta methodology for “environmentally friendly / Green” water management practices. We partner and cooperate with Mother Nature with these three sound principles which work in synchronicity. We encourage common sense water management practices by following this strategy. The “Water Trifecta” is a sound methodology.

Oxygen:

Install an aeration system to keep a consistent level of oxygen throughout your pond. Bottom aeration (>10' depth) or surface aeration or aerating fountain (<10' depth) will keep the necessary oxygen levels throughout your pond and for fish to have healthy respiratory systems. Bacteria need oxygen to function



and increased oxygen levels keep the bacteria active consuming the excess nutrients which cause algae blooms. An aeration system also de-stratifies your pond by turning over the entire water column and cooling the

water. A stratified stagnant body of water is hot on the surface and forms layers with the coolest temperature on the bottom. The hot surface promotes algae blooms.

Ultrasound:

Install an ultrasound algae control transducer to kill the majority of algae types that are prone to bloom in your pond. Help prevent new algae spores which are introduced through wind, rain, or from a stray ducks foot from catching hold. Ultrasound waves prevent new algae blooms from occurring and also help reduce the biofilm in the water where algae attach and grow. Ultrasound also is effective in stimulating the transfer of nutrients in and out of bacteria cells which will increase the rate in which decomposition of sludge happens.

Bacteria:

Add beneficial bacteria to your pond to consume the nutrients and consume suspended solids in the pond. Bear in mind that bacteria breathe oxygen and give off CO₂. Adding beneficial bacteria to a pond must be

coupled with aeration to provide proper oxygen levels for the bacteria to consume. Beneficial bacteria are the good “bugs” who consume what is decomposing in your pond.



South Santee Aquaculture, Inc.

AlgaeControl.US Division

401 South Santee Rd., McClellanville, SC 29458

www.algaecontrol.us