South Santee Aquaculture, Inc.

Divisions: Commercial Pond Management
Swimming RockFish Farms
AlgaeControl.US

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Ultrasound & Biofilm Control ©

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Biofilm grows and attracts algae to attach into its matrix. Initial biofilm formers are anaerobic bacteria that are aerobic during their planktonic stage where they seek new areas to colonize. The ultrasonic signature gives these bacteria a sense of turbulence. In nature, they do not colonize turbulent areas. So with the proper amount of ultrasound, they don't grow on the walls of the equipment.

In normal operation without ultrasound, they colonize a surface and send out bio-chemical compounds that are recognized by other colony forming bacteria (a process known as quorum sensing). This signal attracts the bacteria that then form a lipid matrix over the original colony, thereby cutting it off from oxygen. When that happens, the initial colony has achieved its purpose (no oxygen) and facultatively changes to its anaerobic state.

The ultrasound interrupts the process and prevents biofilm formation. Without an easy to attach to biofilm matrix, algae will not get a foothold to grow into. The colony formers do not reproduce when they are in the planktonic state and any gel groups they may have formed will tend to declump and disperse.

This reduces the need to pre-chlorinate the sedimentation and clarifier sections to prevent the growth. At Union, SC, they reduced their sodium hypochlorite use by about 50% and also reduced their required cleaning effort. This helped them meet their tri-halomethane (THM) and halo-acetic acid (HAA) levels to within the EPA guidelines.

To make this work, the facility needs to install the devices in the sedimentation basin and clean the walls using a high pressure wash to remove any existing biofilm. If they wait a week or so after the install, it will be somewhat easier to do the cleaning as some of the bacteria will have begun to declump. However, the initial layer which is attached with polysaccharide glues will have to be removed with the vigorous high pressure wash. After this, the wall cleanings will be a simple water hose wash down.

With biofilm, the residence time typically needed to control algae is not an issue. The output sound intensity seems to be the most important factor for keeping the biofilm regrowth from occurring. Each different powered device will have a different range for this effect to occur, based on the initial power level that it emits.