PULSED BURST SYSTEMS
Low Maintenance, Low Energy, Mixing and Pumping

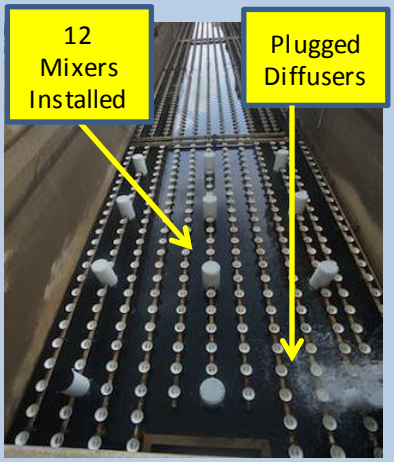
Mega Bubble
LOW MAINTENANCE LOW ENERGY MIXERS

MegaBubble™ – Anaerobic Mixing - Nutrient Removal
South Shore WRF, 300 MGD, Milwaukee MSD (WI)

Highlights

- **Low Maintenance:** No moving parts, no electricity below water
- **Simplicity:** Mega Bubble mixers accumulate low pressure air and intermittently release 3' diameter mega bubbles that rise at 20 ft/s for mixing
- **Truly Anaerobic:** Mega Bubbles transfer insignificant oxygen into wastewater
- **Optimal BioP:** Very efficient P release and uptake was observed indicating truly anaerobic conditions
- **Energy Efficient:** Low energy: <1 Kw per basin
- A/O process anaerobic zone mixing

About Pulsed Burst Systems (PBS)
Headquartered in Milwaukee, WI, PBS is a winner of the 2017 BREW competition and operates out of the Global Water Center. PBS designs and manufactures treatment systems to reduce energy and maintenance costs while helping facilities achieve nutrient removal limits. For additional information please visit www.pulsedburst.com.



South Shore WRF Installation

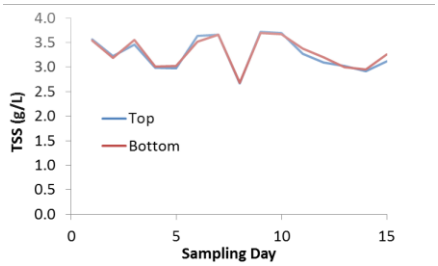
The Milwaukee Metropolitan Sewerage district owns the South Shore Water Reclamation Facility which can treat flows up to 300 MGD. This facility has historically used chemicals to removal phosphorus in order to achieve the 1 mg/L effluent permit limit for total phosphorus. MMSD has been investigating low cost options to implement biological phosphorus removal. A simple option is to turn the air off in the first aeration grid of each basin and add mixing, creating an anaerobic zone.

In 2015, MMSD initiated a mixing study to compare various technologies for mixing the 30'x45'x16' (0.16 MG) anaerobic zones. Air was turned off in the first aeration grid of basins 25 and 26. Basin 25 was retrofitted with twelve (12) Mega Bubble mixers and basin 26 was retrofitted with a mechanical mixer. The Mega bubble mixers utilized low pressure air already available at the bottom of the basin while a new electrical service was run for the mechanical mixer in basin 26.

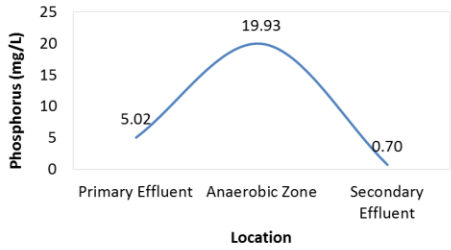
Demonstrated Results
The Mega Bubble mixers at South Shore provide energy-efficient anaerobic reactor mixing while minimizing maintenance and safety issues as Mega Bubble has no submerged mechanical or electrical components, unlike the mechanical mixers.

During the testing period, the Mega Bubble system consumed less than 1 Kw (1.4 hp) while maintaining uniform TSS in the anaerobic zone.

Basin 25 demonstrated very low ORP (-120mV average) and no dissolved oxygen, indicating truly anaerobic conditions which promoted substantial anaerobic P release and subsequent aerobic uptake.



Basin 25 TSS @ Top vs Bottom of Basin



Basin 25 Average P Release and Uptake (7/18/17 – 11/20/17)

This data validates the use of Mega Bubble mixing in anaerobic/anoxic biological treatment zones as an energy efficient, low maintenance solution for biological nutrient removal.