Concurrent Sessions
Track: Technical

Monday, October 14, 2019
1:30 pm to 2:00 pm
The Smarter Way to Treat
Charles Otis

Fixed-film MBBR systems can operate via a single blower - all aeration, mixing, and pumping processes powered by the single air source. Smart systems with integrated remote control and monitoring and innovations in technology with no moving parts below water, reduce energy usage, lower O&M costs for onsite treatment systems, while achieving a high level of treatment for both BOD and N. The presentation will highlight innovative ways to improve decentralized advanced treatment processes which reduce equipment components, vastly reduce maintenance, improve energy efficiency, and allow for intelligent decision making. A combination of fixed film media and mixing equipment using accumulated air to agitate without aerating, and the same air-accumulating equipment with modifications for use in pumping in a controlled fashion eliminate the need for flowmeters and underwater pumps and mixers. The smart system is remotely controlled via cloud computing which controls, monitors, and provides real-time feedback of process performance, additionally allowing changes to be made remotely from a smartphone. Recently a system using MegaBubble mixing and pumping technology was installed in late October 2018 at a small multi-unit commercial property off I-94 in western Wisconsin. The treatment load includes brewery and restaurant waste. The treatment system has three fixed film stages: BOD reduction, nitrification, and post-denitrification. No carbon is added, internal recirculation achieved with a MegaBubble pulsed-air pump, the anoxic stage is mixed with MegaBubble pulsed-air mixers. A January sampling showed excellent BOD reduction. The N/DN aspect, though not required by permit, showed signs of microbe establishment even in cold startup conditions. Further sampling results and process diagrams will be shared as well. Advancements in technology have allowed for full scale SCADA-like intelligent control (without the need for ladder logic programmers!) when decentralized flows are highly variable for a fraction of the cost, and the pulsed-air technology has allowed for extremely low maintenance and predictable performance without the need for power hungry equipment to run continuously when not needed.

Monday, October 14, 2019
2:00 pm to 2:30 pm
Algae Assisted Nutrient Removal from Domestic Wastewater in an Illuminated Septic Tank Design
Carlise Sorenson

Septic tanks are widely used as a simple solution to onsite wastewater treatment. However, studies have shown that septic discharge may be an underestimated source of nutrient loading into waterways. Many states are moving towards developing policies to control nutrient loading from small systems such as these. This research has worked to address these issues using an algae-assisted septic tank design. The experimental tank was inoculated with a poly culture of algae and bacteria with access to a light source and operated for 30 days at 15C and a hydraulic retention time of 2.5 days. A control tank of anaerobic sludge was maintained under the same operational parameters for comparison. The algae-assisted septic tank demonstrated significant improvement in removal of nitrogen and phosphorus.

Concurrent Sessions
Track: Technical

Monday, October 14, 2019
2:30 pm to 3:30 pm
Rocky soils and imported treatment sand; a Colorado perspective
Chuck Cousino

This presentation will provide information relative to how the onsite wastewater regulations in the State of Colorado address sites/soils with a high content of rock as well as the requirements for treatment of effluent applied to these sites. The presentation will address the following: Why soils with high rock content are such a big issue in Colorado; How the regulations to address the various sizes and quantity of rock within a soil profile were developed; What existing research was used to determine the different categories of rock soil; Requirements for the installation of an OWTS in high rock content soils; and Single-pass sand filters (or equivalent) Subsequent to the Colorado regulations requiring the installation of a single pass sand filter when rocky soils are encountered, an issue arose regarding the quality of sand and its availability across the state for this type of system. As such, a study of several sand gradations from sand/gravel pits across the state was conducted. As a result of this study, two categories of sand were written into the regulation; Preferred and Secondary sand. This presentation will address how these two sand classifications were developed, and the availability of each product. We will also touch on how the private industry has accepted these standards.

Monday, October 14, 2019
4:00 pm to 4:30 pm
Moving Bed Biofilm Reactor for Enhanced Denitrification
Keven Kelley

Over the past two decades, wastewater regulations throughout the United States and in many parts of the world have become more restrictive for nutrient discharge, particularly regarding effluent nitrogen. Discharges to bodies of water are seeing more Ammonia Nitrogen (NH3-N) limits, and many coastal water bodies and areas where wastewater discharges are entering drinking water aquifers are more frequently having Total Inorganic Nitrogen (TIN) or Total Nitrogen (TN) limits applied or discharge values lowered. In the decentralized industry, technologies for reducing ammonia have been in use for many years; however, denitrification for total nitrogen reduction has been primarily accomplished with filter beds using consumable materials, making ultimate replacement messy and expensive. A common method for denitrification in larger municipal systems is a Moving Bed Biofilm Reactor (MBBR). It is typically provided in an open vessel, which is temperature sensitive; uses mechanical mixers; and from an operational standpoint, is not conducive to most decentralized applications. For decentralized applications, it was important to develop an MBBR in a vessel that was resistant to temperature impacts, had mixing components without moving parts, and provided carbon feed for supplemental carbon after nitrification. The control panel is programmed to use operational flow data to determine mixing and supplemental carbon needs without constant operator interaction. The resulting product is a tertiary denitrification system with low operation and maintenance needs, designed to accomplish greater than 90% total nitrogen reduction for systems with highly nitrified secondary effluent.