

CASE STUDY: Stonegate Village, CO Wastewater Treatment Facility



Application:	Anaerobic, Anoxic, Deox Selectors; Anoxic Digester
Design Flow (ADF):	1.1 MGD
Mixing Efficiency:	≈ 0.25 HP/1000 FT ³
Compressors:	(2) 15 HP compressors (duty & standby)
Nozzles:	43
Design Engineer:	Burns & McDonnell

BioMix Selected for Upgrade, Offering Lowest CAPEX and OPEX

Stonegate Village Metropolitan District (SVMD) serves a population of approximately 11,000 near Parker, CO, and is responsible for providing a variety of vital services, including wastewater treatment.

In 2014, SVMD hired Burns & McDonnell to evaluate options for upgrading the wastewater treatment facility. The existing equipment had reached the end of its design life, and the facility could not meet future water quality discharge standards. A comprehensive upgrade and expansion were needed to improve performance, including an advanced process for biological nutrient removal and hollow fiber membrane separation designed to meet a permitted effluent total phosphorus concentration of less than 0.05 mg/l.

EnviroMix's BioMix Compressed Gas Mixing technology was well-suited for SVMD's upgrade. The existing treatment tanks were converted to selectors and digesters and configured as eleven small zones — which would have required more than 24 mechanical mixers. By contrast, BioMix leverages a low-maintenance centralized compressor system, providing optimal mixed process conditions for the anaerobic, anoxic, and deox selectors, as well as the anoxic digesters. **Compared to mechanical mixing technology, BioMix reduced annual maintenance by an estimated \$20,000 and decreased O&M costs by 90%.**



Efficient rotary screw compressors were utilized instead of dozens of submersible mixers.



ENERGY EFFICIENCY

50-60% or greater energy savings compared to mechanical mixing



STRAIGHTFORWARD OPERATION

Reduced annual maintenance cost by as much as \$20,000

No mechanical or electrical components in the wastewater



PROCESS OPTIMIZATION

Proven optimized mixed conditions

Maximized VFA fermentation and utilization by PAOs



UNPARALLELED FLEXIBILITY

Adjustable mixed conditions based on process requirements

Suitable for a wide variety of applications



BioMix-DC nozzles provide gentle pulses of mixing energy to transport VFA from the fermentation layer to the PAOs throughout the anaerobic selector.



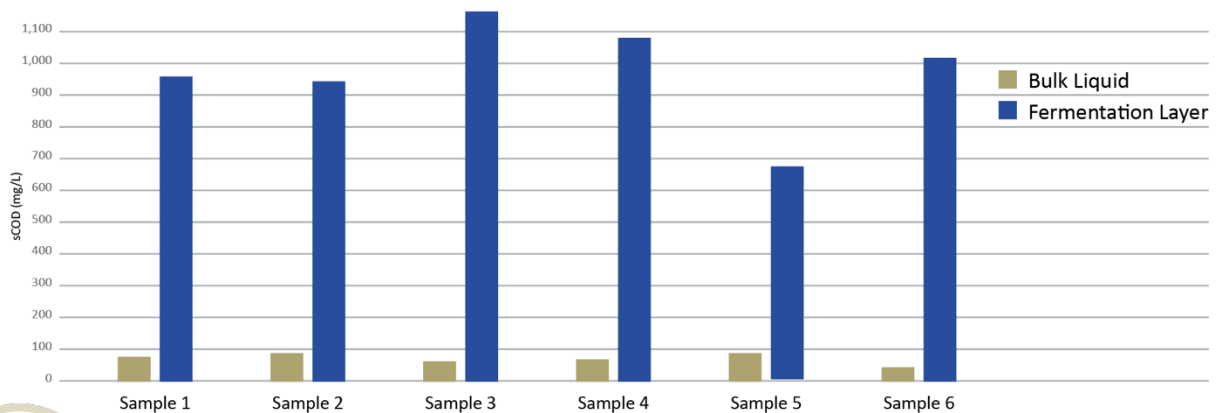
BioMix is used to continuously mix the anoxic selectors that follow the anaerobic selectors.

Taking Biological Phosphorus Removal to the Next Level with BioMix-DC

After seven years of operation with BioMix, SGVM was excited to upgrade their facility to BioMix-DC Enhanced Anaerobic Mixing in the anaerobic selectors. Released in 2021, BioMix-DC was the 2022 winner of the Water Environment Federation (WEF) Innovative Technology Award. Due to very stringent effluent phosphorus requirements during the winter months, SGVM initiated BioMix-DC operation in August 2022 as an early adopter of the new technology.

BioMix-DC optimizes bio-P by transforming a traditional anaerobic selector into an intensified fermentation tank by **alternating a short mixing cycle with a long deep cycle**. The deep cycle stratifies the reactor to increase anaerobic solids retention time (SRT) and **create a fermentation blanket to generate volatile fatty acids (VFA)**. The presence of additional VFA leads to the proliferation of PAOs, the microorganisms responsible for bio-P. Testing in SGVM’s anaerobic selectors demonstrates that the concentration of sCOD in the fermentation layer is more than 10X higher than in the bulk liquid (the volume of the reactor above the fermentation layer), indicating an abundance of VFA. By upgrading to BioMix-DC operation, SGVM is expecting to reduce chemical consumption due to increased stability of the biological phosphorus removal process.

Soluble COD in Bulk Liquid vs. Fermentation Layer



Contact sales@enviro-mix.com today to discuss the ways EnviroMix can optimize your mixing solutions.