

CASE STUDY: Emporia, Kansas WWTP Sludge Process Upgrade



Application:	Anaerobic, Anoxic, and Deoxygenation Selector Mixing
Design Flow (ADF):	Expanded from 4 MGD to 5.4 MGD
Mixing Efficiency:	0.12 hp / 1000 ft ³ of tank volume
Compressors:	Two (2) 20 HP Rotary Screw
Nozzles:	100
Design Engineer:	Burns & McDonnell
Contractor:	CAS Constructors

BioMix Installation Helps City Reduce Costs and Comply with Effluent Standards

In order to meet strict effluent treatment requirements set to take effect in 2022, the City of Emporia upgraded its wastewater treatment plant in 2019. Using a progressive design build process, the city was able to reduce costs while complying with the impending regulations ahead of schedule.

The design-build team of Burns & McDonnell and CAS Constructors worked collaboratively to provide improvements to meet the upcoming discharge standards. Their primary goal was to upgrade and expand the plant’s conventional activated sludge process to an integrated fixed film activated sludge (IFAS) process.

As part of the project, process equipment procurement packages were issued to evaluate and select the most cost-effective technologies. The design team evaluated the performance, experience, and quality of numerous compressed gas mixing system manufacturers before selecting EnviroMix’s technology for the project.

The BioMix Compressed Gas Mixing System provided the lowest total cost of ownership mixing technology, enabling the city to realize \$50,000 in annual O&M savings versus submersible mechanical mixers.



Linear nozzle headers are well suited for rectangular tank geometry



ENERGY EFFICIENCY

60% energy savings vs. submersible mechanical mixing



STRAIGHTFORWARD OPERATION

Maintenance free components in the wastewater



PROCESS OPTIMIZATION

Optimal anaerobic and anoxic mixed conditions for biological nutrient removal (BNR)



UNPARALLELED FLEXIBILITY

Variable mixing intensity based on process parameters



BioMix is controlled and monitored from an easily accessible control panel



Compressors and receiver are located indoors for ease of maintenance

Upgrade of the plant allowed the city to comply with effluent standards and reduce the nutrients discharged to the Cottonwood River.

The IFAS process was selected to allow reuse of the existing aeration basins, reconfiguring them with separate anaerobic, anoxic, and deoxygenation selectors for biological nutrient removal. It also enabled the city to meet the discharge regulations, including those for 10 mg/l effluent nitrogen and 1.0 mg/l phosphorus. **The design team's selection of BioMix Compressed Gas Mixing was based on energy efficiency, process optimization, and cost minimization.**

- The configuration of the selectors would have required walkway and platform access along the length and across the width of the selectors to install and maintain mechanical mixing alternatives. However, given the design flexibility offered by the BioMix system, access walkways and platforms along the basins were not required, thereby significantly reducing the construction cost of the system.
- The large aspect ratio of the basins would have required more than a dozen mechanical mixers to uniformly mix the basin contents. With BioMix, only a duty and standby compressor were required to provide the mixing energy for the entire system, significantly reducing system maintenance and construction cost.

“The efficiencies we achieved at the Emporia plant really can be attributed to our design-build project delivery method that gave us the flexibility to evaluate and select the right technology,” says Ron Coker, senior vice president and general manager of the Water Group at Burns & McDonnell.



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