

CASE STUDY: Loveland, Colorado Water Reclamation Facility

Application:	RAS Fermentation, Anaerobic and Anoxic Selectors
Design Flow (ADF):	12 MGD
Mixing Efficiency:	≈ 0.14 HP/1000 FT ³
Compressors:	Two (2) 30 HP Rotary Screw
Nozzles:	148
Design Engineer:	Carollo Engineers, Inc.

BioMix™ System Provides Low ORP Mixing for RAS Fermentation and Anaerobic Selectors

In 2018, the City of Loveland upgraded and expanded the Loveland Water Reclamation Facility. The upgrade was designed to comply with Colorado Department of Public Health and Environment Regulation 85 which placed stringent limits on nitrogen and phosphorus released into the Big Thompson River. Moreover, the expansion allowed the facility to be rerated from 10 MGD to 12 MGD, meeting projected growth for the next 10-15 years.

The project utilized a delivery method which permitted the construction managers to be an integral part of the design and bidding process. The Construction Manager-at-Risk (CMAR) process allowed them to preselect equipment for the project including the BioMix Compressed Gas Mixing System from EnviroMix. This process allowed technology selection based on the highest quality equipment and lowest total cost of ownership, as opposed to simply being based on lowest initial cost.

BioMix was selected based on energy efficiency, process flexibility, and reduced O&M versus mechanical mixing technology. Eliminating the need for up to 18 submersible mechanical mixers, BioMix enabled the facility to achieve **annual energy savings of \$45,000** versus submersible mixers.



Nozzles seamlessly integrated with diffused aeration



ENERGY EFFICIENCY

Mixing efficiency
of 0.14 HP/1000 FT³

**\$45,000 annual
energy savings vs.
submersible mixers**



STRAIGHTFORWARD OPERATION

One duty and one
standby compressor
instead of up to 18
mechanical mixers



PROCESS OPTIMIZATION

Supports an ORP
environment of
less than -425 mV
in the RAS
fermentation process



UNPARALLELED FLEXIBILITY

Operates independent
from or concurrently
with aeration

Operator adjustable
parameters (frequency
and duration)



Custom control panels



Easy to install press technology piping feeds air to the in-basin nozzle headers

BioMix enabled the Loveland facility to realize annual energy savings of \$45,000 vs. submersible mechanical mixing.

To help improve the facility’s nitrogen and phosphorus removal processes, BioMix compressed gas mixing was installed in the return activated sludge (RAS) fermentation basin, anaerobic selector, and anoxic selector.

Specifically, the upgrade utilized side stream RAS fermentation to improve biological phosphorus removal efficiency and comply with permitted phosphorus discharge limits. Two factors that are critical for the RAS fermentation process are:

- An oxidation reduction potential (ORP) environment of less than -250 mV
- Low mixing energy to avoid air entrainment

BioMix provides very low mixing energy, minimizing air entrainment and consistently producing an ORP environment of -425 mV.

BioMix also offered the facility unparalleled flexibility — the system is able to operate independently or concurrently with aeration in the anoxic swing zones, and it allows the operator to adjust frequency and duration of mixing in order to produce optimal anaerobically mixed conditions in the RAS fermentation basins.

Thanks to the Loveland WRF plant upgrade including BioMix, levels of nitrogen and phosphorus being released to the Big Thompson River have been significantly reduced. The quality of the treated water being discharged back into the river is now higher than the quality of the water removed upstream for the city’s drinking water.



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