



NANOBUBBLES REMOVE INHIBITORY COMPOUNDS TO IMPROVE WRRF TREATMENT EFFICIENCY

Surfactants or Tensides, QACs, Antimicrobials, and FOG

Client Case Study: Goleta Sanitary District, California, USA

<p>Install Date:</p> <p>May 2022</p>	<p>Treatment Plant Metrics:</p> <ul style="list-style-type: none"> • Design Flow: 9.5 MGD (1,500 m³/hr) • Average Flow: 4.2 MGD (660 m³/hr) 	<p>Results:</p> <ul style="list-style-type: none"> • 15% reduction in plantwide energy consumption • 43% reduction in aeration energy usage • 44% total decrease in Chlorine demand • 10% increase in TSS removal efficiency
--	--	---

The Problem for Goleta Sanitary District

Goleta Sanitary District (GSD) in Goleta, California, faced significant challenges with their plant's efficiency as they were nearing design biological oxygen demand (BOD) and total suspended solids (TSS). Due to drought and extreme water conservation in California, their influent surfactant and antimicrobial concentrations were very high. Even though they eliminated contributions from industrial users in 2016 when they became aware of the impacts of surfactants, the 2020 pandemic increased surfactant loading on the facility.

Surfactants or tensides, such as laundry and dishwasher detergents, personal care products, cleaning chemicals and disinfectants (quatery ammonium compounds also known as QACs or quats), are persistent in municipal and industrial waste streams. Surfactants pose a significant challenge for wastewater treatment plants because they:

- Inhibit the Activated Sludge process
- Reduce oxygen transfer efficiency
- Lower oxygen transfer in the biomass
- Reduce biomass kinetics
- Inhibit solids separation and dewaterability of the sludge
- Continue to the effluent polluting the receiving body
- Accumulate in the anaerobic environment

Additionally, the increased use of surfactants (attributed to more liquid products and the pandemic) and the reduction in water use per person due to drought, water conservation and high-efficiency appliances have led to greater challenges for wastewater treatment facilities.

In May 2022, GSD began a trial with Moleaer, installing a nanobubble generator at post-screening and grit removal before the primary clarification as pretreatment.



Temporary installation at GSD for the trial period.



Permanent installation at GSD.

“ Moleaer’s nanobubble system applied as a pretreatment helped our plant with a variety of metrics that ultimately enabled us to reduce O&M inputs and produce better-quality effluent. This helped reduce operating costs and could save several million dollars in future capital costs associated with plant expansion to meet impending nutrient regulations,” states a Goleta Sanitary District representative. ”

The information and data contained herein are deemed to be accurate and reliable and are offered in good faith, but without guarantee of performance. Moleaer assumes no liability for results obtained or damages incurred through the application of the information contained herein. Customer is responsible for determining whether the products and information presented herein are appropriate for the customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Specifications subject to change without notice.

Copyright © 2023 Moleaer. All trademarks stated herein are the property of their respective company. All rights reserved. This document is confidential and contains proprietary information of Moleaer Inc. Neither this document nor any of the information contained herein may be reproduced, redistributed or disclosed under any circumstances without the express written permission of Moleaer Inc. Rev. 02-15-24 R8



NANOBUBBLES REMOVE INHIBITORY COMPOUNDS TO IMPROVE WRRF TREATMENT EFFICIENCY

Surfactants or Tensides, QACs, Antimicrobials, and FOG

How Nanobubbles Helped Goleta Sanitary District

Reduced Aeration Energy:

- 43% reduction in aeration energy (kW)
- Improved Oxygen Transfer Rate (OTR) due to the removal of surfactants
- Improved Oxygen Uptake Rate (OUR) due to more efficient biology that was less inhibited

Reduction in Chlorine Demand:

- 44% total decrease in Chlorine demand
- Less demand for soluble organics in effluent

Primary Clarifier: Improved Liquids/Solids Separation:

- Clear supernatant down to the sludge blanket
- More compact sludge
- No evidence of denitrification or fermentation
- Allowed for multiple primary clarifiers to be online without the risk of septicity due to long hydraulic retention times
- Significant odor reduction

Primary Effluent Equalization Basin:

- Reduced odor
- Reduced visual evidence of surfactant foam

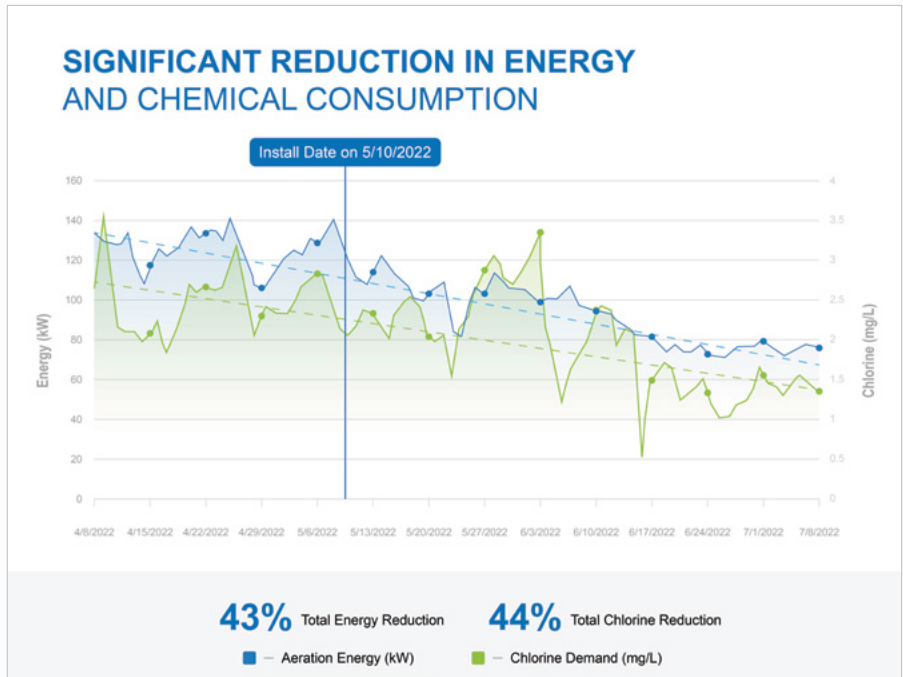
Improvement in Final Effluent Quality:

- BOD went from being greater than TSS to equal after nanobubbles suggesting all soluble BOD was converted in the biological process

Costs Savings for GSD:

- 15% of the plant's electricity budget
- 10.7% in plant chemical costs
- 4.7% of operations and maintenance budget
- Eliminated bio-augmentation

Based on the success of the pilot, GSD signed a Nanobubble-as-a-Service (NaaS) contract with Moleaer, which allows them to implement the most advanced nanobubble technology over the life of the contract.



To learn more about Moleaer's technology for improved wastewater treatment capacity while reducing costs, visit our website at www.moleaer.com/industries/wastewater

The information and data contained herein are deemed to be accurate and reliable and are offered in good faith, but without guarantee of performance. Moleaer assumes no liability for results obtained or damages incurred through the application of the information contained herein. Customer is responsible for determining whether the products and information presented herein are appropriate for the customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Specifications subject to change without notice.

Copyright © 2023 Moleaer. All trademarks stated herein are the property of their respective company. All rights reserved. This document is confidential and contains proprietary information of Moleaer Inc. Neither this document nor any of the information contained herein may be reproduced, redistributed or disclosed under any circumstances without the express written permission of Moleaer Inc. Rev. 02-15-24 R8