GE Power & Water
Water & Process Technologies

Case Study

Pharmaceutical Wastewater Treatment

Introduction

Pharmaceutical wastewater streams can be difficult to treat with conventional physical/chemical and biological treatment systems. High chemical oxygen demand (COD), variable strength waste streams, and shock loads are just a few of the conditions that limit the effectiveness of these conventional systems.

Physical/chemical systems are a common method of treating pharmaceutical wastewater; however, system results are limited due to high sludge production and relatively low efficiency of dissolved COD removal.

Biological aerobic treatment systems are also used extensively, often with limited success due to the final clarification step. The clarifiers are susceptible to sludge bulking and variations in total dissolved solids, often associated with batch process production, which can cause destabilization of bacterial floc formation, with a consequential loss of biomass in the final effluent. These systems require constant operator attention to adjust chemical dosing for the daily, even hourly changes in influent flow.

Solution

GE's Water & Process Technologies has been developing and advancing membrane bioreactor (MBR) systems to meet changing market needs. The ZeeWeed* MBR system is helping manufacturers meet and exceed all direct discharge regulations, while simplifying the treatment process.

ZeeWeed MBR combines membrane filtration with biological treatment. The system replaces conventional treatment and combines clarification, aeration and filtration into a simple and cost-effective process that reduces capital and operating costs.

Typical Treatment Results	
COD Reduction	> 90%
TSS Reduction	> 99%
Phosphorus Reduction	> 90%[1]
COD Reduction	> 90%
TSS Reduction	> 99%

[1] *with chemical addition*

ZeeWeed Features & Benefits	
Feature	**Benefit**
Membrane barrier technology	• Reliable, high quality effluent at all times • Handles shock loads • Reduces treatment chemical costs
Ability to handle high MLSS concentration	• Reduces sludge production and disposal costs
Small system footprint	• Reduces capital costs, clarifiers are not required • System can be placed virtually anywhere
Modular system	• Retrofit existing treatment tanks/infrastructure • "Just-in-time" plant expansion reduces capital costs
Simple to operate	• Reduces labor costs • System can be operated remotely

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By using membrane technology, biomass retention is assured, resulting in consistently high quality effluent.

GlaxoSmithKline, Ireland

Capacity: 130,000 gpd (492 m^3/d)

Commissioned: 2001

GlaxoSmithKline (Cork) Ltd. installed a ZeeWeed MBR system as part of an ongoing plant expansion for treatment of side-stream wastewaters. The MBR is equipped with two ZeeWeed membrane filtration trains and has been integrated into the site's overall wastewater treatment system. The system is designed for treatment of sanitary waste and utility blow down streams.

The plant consists of an equalization tank, pretreatment screening, a combination bioreactor and filtration tank, equipped with fine bubble diffused aeration for aerobic biological treatment and ZeeWeed filtration.

ScinoPharm, Taiwan

Capacity: 65,000 gpd (250 m^3/d)

Commissioned: December 2002

ScinoPharm installed a ZeeWeed MBR system as part of a complete solution to provide several levels of ultrapure water through the facility, and to treat all facility wastewater to meet discharge standards. The wastewater treatment system treats all R&D and production wastewaters aerobically with a ZeeWeed MBR system, including denitrification. The wastewater is highly variable with high solvent concentrations. The influent COD of 50,000 mg/L is effectively degraded to a final effluent concentration of < 500 mg/L.

Pfizer, Ireland

Capacity: 400,000 gpd (1,514 m^3/d)

Commissioned: 2001

Pfizer installed a ZeeWeed MBR system as part of an ongoing plant expansion and upgrade. The decision to install a containerized ZeeWeed MBR system was approved after successful pilot tests with the ZeeWeed ultrafiltration membranes.

The new MBR plant is designed to work as an extension of the existing activated sludge plant. The membrane system consists of two treatment trains, each designed to operate in parallel. These trains are standard systems, with a wet section housing the membranes and a process section housing the ancillary equipment, including process pumps, valves, instruments and control systems.