

Saving Energy and Improving Quality STM-Aerotor™ and ClearLogic® Membrane Bioreactor



CASE STUDY

Location: Melville, New York
Owner: Newsday Inc.
Engineer: Phase 1: Cameron Engineering
 Phase 2: H2M (Holzmacher, McLendon & Murrell)
Contractor: Newsday Inc. & Benson Construction and Development

Stringent Effluent Requirements

Located in Melville, NY, Newsday Inc. provides a daily newspaper for the metropolitan area of Long Island. More than 30 years ago Newsday constructed its own wastewater treatment plant to treat the combined sanitary and industrial waste.

Over the years, effluent requirements have become more stringent and the aging plant has had a difficult time meeting these requirements. Because the plant discharges to an underground cistern that ultimately discharges into the groundwater supply, total nitrogen was required to remain below 10 mg/L.

As the existing plant was requiring a lot of maintenance and was struggling to consistently meet the required effluent without extra care and costly chemicals, Newsday needed to upgrade the plant with a cost-effective and reliable solution to meet these discharge regulations. In addition to improving the treatment process, Newsday wanted to implement energy efficient technologies.

Effluent Requirements

Total Nitrogen	10 mg/L
Phenols	8 ppb

Pilot Study

To test WesTech's innovative STM-Aerotor™, a pilot study was completed between February and August of 2004 that investigated the feasibility of replacing the existing coarse bubble aeration system, piping, and blowers with the STM-Aerotor. Through the pilot study, the Aerotor proved it would reduce nutrient levels below the effluent requirements under various loading rates in addition to reducing the required energy consumption.

The Aerotor combines fixed film and activated sludge treatment processes into a single compact system. Aeration is achieved without the use of blowers, aeration piping, or diffusers due to the innovative design of the Aerotor. The Aerotor captures atmospheric air with each rotation, draws it down into the mixed liquor and slowly releases the compressed air as coarse bubble aeration.

In addition to effective aeration, the Aerotor also provides a large surface area for fixed film growth, allowing for a more diverse population of biology and improving the sludge settling characteristics of the solids.

The vertical profile allows for aerobic nitrification and anoxic denitrification to occur within the same process tank. Following a successful pilot study and with the help of the New York State Energy Research and Development Authority's (NYSERDA) green grant funding, Cameron Engineering selected WesTech to supply two STM-Aerotors for biological treatment as part of Phase I of Newsday's WWTP upgrade. The following year, Phase II — engineered by H2M — added two additional Aerotor units along with a

STM-Aerotor™

Quantity	2 Aerotor units per basin
Schematic	2 basins in parallel
Dimensions	3.2 m diameter x 3 m wide
Motor HP	5 HP

separate anoxic zone. The dilapidated clarifiers were also replaced with membranes, making the facility an STM/MBR process.

The WesTech ClearLogic® Membrane Bioreactor (MBR) provides a low-maintenance membrane and lengthened membrane life due to reduced fouling and fewer chemical cleans. The WesTech ClearLogic MBR is designed to be fully-stackable, creating a compact and robust system.

WESTECH®

Newsday Water Quality		
	Influent	Effluent
Total Nitrogen	Range: 24-108 mg/L Avg: 48 mg/L	Avg: 4 mg/L
Phenols (Total Recoverable)	Range: 3-78 ppb Avg: 21 ppb	Always < 0.8 ppb
BOD5	Range: 31-1000 mg/L Avg: 365 mg/L	Avg: < 5 mg/L

Successful Installation

With the printing processes that occur at Newsday, there is a high potential for large shock loads of either contaminant concentration or flow following the printing process and shift changes. The fixed film and suspended growth design of the Aerotor is a key factor for handling these shock loads, making this technology an ideal fit for Newsday.

At Newsday, the Aerotor removes over 90% of the total nitrogen. Through the pilot study and subsequently since the beginning of operation, the Aerotor has been an effective solution for meeting discharge requirements and saving energy.

As part of a complete treatment process, WesTech's STM-Aerotor biological nutrient removal system provides a simple and intuitive solution. The Aerotor treats Newsday's waste without complicated controls while significantly reducing energy consumption. Operators of the treatment plant are pleased with the new equipment and automated controls.

In addition to saving time, WesTech's Aerotor saves money and power for operation while reducing chemical dose. Compared to the existing coarse bubble aeration system, the Aerotor reduces required power and chemicals by over 70%. The following table shows the cost comparison between the existing technology and WesTech's STM-Aerotor.



STM-Aerotor™ Trains



ClearLogic® MBR Installation

Existing Technology vs. STM-Aerotor Replacement Costs		
	Coarse Bubble Aeration with Blowers	STM-Aerotor
Capital Replacement	\$1,100,000	\$1,200,000
Annual O&M	\$180,000	\$120,000
Power	720 KW-hrs/day	200 KW-hrs/day
Methanol	450 gal/month	0 gal/month
Soda Ash	3000 lbs/month	775 lbs/month