

Optimizing the Biological Process with Claros Process Management

Problem

Extreme climate and unpredictable, rapid load changes were posing a significant threat to this small desert municipality's wastewater treatment budget.

Solution

The operations team needed a treatment method that would enable them to make real-time adjustments to nitrification, denitrification and sludge retention time based on actual load fluctuations.

Benefits

Claros™ Process Management made it possible to establish consistent effluent and SRT, and to minimize energy consumption, saving more than \$15,000 in energy costs annually.

Background

The Wastewater Treatment Plant of Barstow, California (USA), sits in a challenging geographic and demographic position on a straight line between Los Angeles and Las Vegas. Operating a biological nutrient removal system, the plant treats 2.1 million gallons of water per day and discharges into percolation ponds. Kody Tompkins is the Chief Plant Operator of the facility.

Problem

Located in the Mojave Desert, the facility is subject to 40-degree temperature swings over a 24-hour period, which affects the nitrification process. Plus, their influent varies wildly due to spikes created by the travelers between L.A. and Las Vegas. As a result, the Barstow WWTP struggled with an inconsistent sludge, unpredictable effluent, and was continually at risk of being over budget due to the high-energy consumption of their aerators.

The operations staff is composed of an intelligent team, but they didn't have the resources to gain better insight into their loading patterns and react to it with an appropriate real-time strategy. They had an ammonia analyzer, but it monitored the effluent of the aeration basin, thus creating a reactive treatment approach versus measuring the influent for a real time strategy. Armed only with "after-the-fact" data, they struggled to know what their DO set point needed to be in real-time.

As a result, the blowers often increased energy consumption when it wasn't required, so the cost outweighed any benefit it could provide. Their load teemed with unpredictability, yet their reaction was predictable and always chasing optimal treatment. They wanted to minimize energy consumption of the aerators while maintaining compliance with total inorganic nitrogen, but



Headquarters of the Barstow (CA) Wastewater Treatment Plant

they didn't have a treatment method that could make real-time adjustments according to a knowledge of the load's fluctuating character. In addition, down the line in their process, they were either under- or over-wasting their sludge, either "ahead or behind the curve," Kody said. This inconsistent wasting also played a significant role in the efficiency of the blowers. If they were to stay within budget and produce a good effluent, Barstow needed to optimize their nitrification, denitrification, and sludge-retention time.

Case Study: Variable Load and Inconsistent Sludge in Barstow, California

Solutions & Improvements

To overcome these challenges and efficiently optimize their biological process, Barstow WWTP investigated, selected and ultimately installed three Claros Process Management (CPM) modules, part of Hach's Water Intelligence System. The three implemented modules were:

- Claros Process Management for Nitrification (CPM-N)
- Claros Process Management for Denitrification (CPM-DN)
- Claros Process Management for Sludge-Retention Time (CPM-SRT)

The CPM-N system measures the ammonia load entering the facility and calculates an optimized mixed-liquor dissolved-oxygen set point moment-by-moment. If input signals such as inflow, ammonium, or suspended solids are not available, the system automatically switches to fallback strategies.

Meeting total-nitrogen limits requires the best usage of the available denitrification capacity. The CPM-DN system measures nitrates at the downstream end of the anoxic zone and calculates an optimized internal mixed-liquor return rate.

The CPM-SRT automated system optimizes secondary sludge wasting by measuring the mixed-liquor suspended solids and waste-activated-sludge suspended solids in real time, calculating exactly how many pounds of solids are required to be removed from the system to maintain the user-entered SRT set point. The Barstow WWTP can choose over the course of what period to waste sludge, from 1 to 24 hours, and at what time to begin wasting.



Located in the challenging environment of the California high desert, the Barstow Wastewater Treatment Plant has embraced Claros Process Management to optimize their process.

Conclusion

With these three modules actively in place, the team at Barstow is no longer burdened by the inefficiency and strain of managing their process according to guesswork and chance. They now have a much more consistent effluent and SRT, and they've achieved over \$15,000 in annual energy savings. In fact, they even secured \$20,700 in incentives to update their process from their energy provider, Southern California Edison, and received highly valuable support from their energy-efficiency E&C partner, Lincus Energy Inc. Plus, their regulatory numbers have seen dramatic improvement as well, significantly reducing their compliance risk. After watching Total Nitrogen levels drop from 7.8 mg/L to 3.4 mg/L in only 3 months, Kody says, "I've been cautious to celebrate because I didn't want to jinx it, but three months of great results is good enough to say this is the new way of things."

"It's been an absolute success," Kody said. His staff embraced the new technology from day one. They receive weekly system reports provided by the remote system monitoring and optimization from Hach's dedicated CPM Technical Support personnel. Hach helped the Barstow team set up real-time system alerts of operating outside of set points, flow issues, data-missing, etc. Kody said this support eased the learning curve of acquiring a new technology. It took less than a month for the plant to entrust their manual control to CPM's automation, but, Kody said, as a safeguard, they can regain manual control "with the push of a button." Because of the convenience of automation, Kody and his team have been relieved to turn their attention and efforts to other things around the facility. The process is no longer in control of the staff; the staff is in control of the process.

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