

City of Lawrence Increases Capacity

OxyStream™ and COP™ Spiral Blade Clarifiers

CASE STUDY

Location: Lawrence, Kansas
Owner: City of Lawrence
Engineer: Black and Veatch
Contractor: Garney Construction

Problem

The City of Lawrence had several reasons for wanting to build a new, state-of-the-art wastewater treatment plant (WWTP). For one, its existing plant lacked the capacity to deal with wet weather conditions, which sometimes created combined sewer overflow (CSO) in the sanitary sewers. For another, the current facility did not include the capacity for removing nitrogen and phosphorous, and the City needed the new facility's effluent to meet current and future environmental regulations. In addition, it sought to provide capacity for future population growth. And finally, it wanted to ensure that current and future customers would enjoy reliable service.

Analysis of Alternatives

After evaluating seven potential sites, the City purchased 538 acres for the new WWTP. It then issued a request for proposal (RFP) for the biological nutrient removal (BNR) and clarifier systems that would enable the new WWTP to meet the City's needs. After a competitive bidding process that included submissions from WesTech

and three competitors, the City awarded the BNR and clarifier contracts to WesTech.

While municipalities are inherently price sensitive because they use taxpayer money to fund projects, WesTech's extensive experience, proven reliability, and exemplary level of customer service are also factors in the company's ability to win bids.

Solution

Because the City specifically wanted state-of-the-art equipment with proven reliability, consulting engineers selected an OxyStream™ oxidation ditch with

BNR capabilities, followed by WesTech's COP™ Spiral Blade Clarifier. Together, OxyStream and COP provide components that ensure the plant's ability to meet requirements for discharge into the Wakarusa river.

The OxyStream oxidation ditches at the Wakarusa facility use an anaerobic area to increase phosphorous uptake in the system's aerobic (oxygenated) channels, which include organisms that assimilate the phosphorous. This OxyStream also includes a pre-anoxic zone that uses the system's nitrate-recycle stream to remove nitrogen as a gas and a post-anoxic zone that uses internal respiration to remove remaining nitrate.

To ensure redundancy for the secondary process, consulting engineers chose to install two COP clarifiers.

COP™ Spiral Blade Clarifier

Quantity	2
Dimensions	95 ft. diameter
EDI Configuration	Dual Gate

Each clarifier is 95 feet in diameter and relies on modern technologies that



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enable greater efficiency than older technologies do —namely, spiral blade and dual-gate energy dissipating inlet (EDI) technologies.

The industry has now embraced spiral rake blades, which remove sludge more than four times faster than segmented-scraper designs can.

Dual-gate EDIs use perpendicular gates to create impinged flow (by forcing two inlet streams into each other) and are destined to become another such industry-standard technology. EDI gates impede the horizontal velocity of the influent, which speeds its sedimentation rate.



Dual Gate EDI

Implementation

At the engineer's request, WesTech provided an automated bypass gate to control the amount of oxygenated mixed liquor that enters the anoxic zone.

More importantly, WesTech equipment included two 100 HP Landy-7 slow-speed surface aerators and two COP Spiral Blade clarifiers. The Landy-7 impeller delivers a



Two COP Clarifiers Ensure the Capacity for Future Growth

higher oxygen transfer efficiency (OTE) than any surface aerator on the market today. With its guaranteed minimum OTE of 3.8 pounds of oxygen per HP per hour, these aerators provide the best-possible conditions for ammonia oxidation and phosphorous removal.

Results

With this new facility, Lawrence enjoys a plant with a BNR capacity of 3.6 million gallons per day (MGD), measured over the course of a month. The OxyStream delivers efficient aeration and mixing while removing biological phosphorus to levels below 0.5 mg/L. Meanwhile, each of the COP clarifiers supports a maximum daily flow of 3.625 MGD and a peak hourly flow of 7.5 MGD, giving the plant the extra capacity it needs to avoid storm-driven CSO and service disruptions.

Because Lawrence's Wakarusa WWTP is entirely new and encompasses modern technologies that have proven reliability, and because the plant was built to a high standard of efficiency and effectiveness, students from the University of Kansas and operators from across the state of Kansas are able to visit the plant to see firsthand how the new technologies and high-quality equipment work in production.

"We're very happy with the equipment," affirmed Mark Hegeman, Superintendent of Treatment for the City's Utilities - Water and Wastewater Operations.



Under Construction: The Wakarusa WWTP OxyStream Oxidation Ditch