Swift Suburban Treatment

Skokie, Ill., facility provides efficient service to the northern Chicago metropolitan area

By Michael Meyer

Name: Terrence J. O'Brien Water Reclamation Plant
Location: Skokie, Ill.
Size: 450 mgd
Infrastructure: Coarse screens, aerated grit tanks, fine screens, primary settling tanks, aeration tanks, final settling tanks, fine bubble diffusers, UV disinfection (beginning in 2016)

The Terrence J. O'Brien Water Reclamation Plant in north suburban Skokie treats much of the wastewater produced on the north side of Chicago and the city's near northern suburbs.

The village of Skokie is a suburb of Chicago located just north of the city. It has a population of approximately 65,000 in an area of just more than 10 sq miles. It is a quiet, somewhat sleepy town—surprisingly so, given its proximity to one of the country's largest cities. But if you take the "Skokie Swift" Yellow Line train into Chicago, you will get a good look at an enormous wastewater treatment facility situated in the southeast corner of Skokie—the Terrence J. O'Brien Water Reclamation Plant (WRP).

Bigger & Better

The O'Brien WRP—formerly the North Side WRP—opened in 1928 and is owned and operated by the Metropolitan Water Reclamation District of Greater Chicago (MWRD), the wastewater treatment and storm water management agency for the city of Chicago and 125 communities in Cook County. The O'Brien WRP is one of the largest wastewater treatment facilities in the U.S.—it serves more the 1.3 million people in a 143-sq-mile area that covers much of the northeast portion of Cook County, including much of the north side of Chicago. It treats an average of 330 million gal per day (mgd), and its maximum capacity is 450 mgd.

The facility's treatment process begins with filtering wastewater through coarse screens to remove large debris. The water then is pumped up from the sewer level and flows by gravity into aerated grit tanks and settling tanks, which use physical and mechanical processes to remove fats and oils and separate solids from the water. The solids are either landfilled or pumped to temperature-controlled digesters, where microorganisms break them down, converting nutrients to forms that plants can use, killing pathogens and reducing odors. The sludge then passes through centrifuges for dewatering, after which it is air dried to refine moisture and further reduce odors.

"The O'Brien WRP is situated in a heavily residential area, and we are able to operate the plant in a largely odor-free manner," said Allison Fore, public and intergovernmental officer for MWRD.

After sludge is treated at the O'Brien facility, it starts a long journey to its final destination.

"The O'Brien WRP does not have a full solids-handling facility," Fore said. "Our primary sludge and waste-activated sludge is pumped 18 miles [southwest] to the Stickney WRP for further processing."

Meanwhile, the water undergoes secondary treatment that consists of a biological and physical process by which microorganisms remove organic material in secondary aeration tanks. Afterward, the water enters settling tanks, where the remaining suspended and soluble solids settle to the bottom. From there, the clean water is released into the North Shore Channel, a drainage canal that flows into the North Branch of the Chicago River. The entire treatment process takes 12 hours.

Not Leaving Well Enough Alone

Despite the plant's excellent performance—it has been recognized by the National Assn. of Clean Water Agencies for 100% compliance with National Pollutant Discharge Elimination System effluent standards for nine consecutive years—its operators are always looking for ways to improve it.

"The O'Brien WRP will begin tertiary treatment in 2016," Fore said. "The world's largest ultraviolet disinfection system will be online in spring of 2016 to further enhance the quality of the treated water."

The facility will utilize the TrojanUVSigna system, which will consist of 1,152 low-pressure, high-output TrojanUV Solo lamps. This arrangement will provide significant energy and maintenance savings when compared to utilizing a greater number of medium-pressure lamps.

In addition, the plant's operators are evaluating other treatment processes that will make the facility more energy efficient, as it aims to be energy neutral by 2023. For example, it currently is demonstrating a GE ZeeLung membrane aerated biofilm reactor cassette in order to determine if it will help the facility reduce its energy consumption over the its existing fine-bubble aeration system. The ZeeLung is a gas-transfer membrane that transfers oxygen by diffusion to a biofilm that grows on its outside surface. In the presence of oxygen, the microorganisms metabolize nutrients and organics in the wastewater, which should allow for significant energy savings when compared with fine-bubble aeration. W&WD

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